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Research Publication and Awards

METRIC NO.-3.3.2

Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years

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3.3.2: ***Number of books and chapters in edited volumes/books published and papers published in national/ international conference proceedings per teacher during last five years***

3.3.2. **Number of books and chapters in edited volumes/books published and papers Published in national/ international conference list year wise during thelast five years**

2022-23	2021-22	2020-21	2019-20	2018-19
30	1	1	0	0

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A.Y. 2022-23 , 15th July 2023

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Design Steps of Online Leave Management Application System for Academic Institution

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Abstract
An Online web-based employee's leave management application system integrates various processes and systems to automate and simplify the management of employee data, leave requests, and tracking, as well as the approval of leave. In many organizations, employees are entitled to different types of leave, which are allocated based on institutional policies. However, the manual management and approval of leave requests can be time-critical, time-bound, time-consuming, error-prone, paper-based, and challenging to handle.
To address these issues, an automated leave management system is being developed using technologies such as HTML, PHP, and MySQL. The implemented system will successfully fulfil its intended purpose, demonstrating satisfactory functionality and error-free operation. The system enables employees to request leave in a timely manner, ensuring efficiency and accuracy. This automated solution is suitable for both academic staff and the administrative department of an institution, facilitating effective and efficient management of employee leave. It reduces paperwork, streamlines processes, and provides a reliable platform for leave management.
Keywords: Leave Request, Leave Tracking, Approval, HTML, PHP, and MySQL.

Introduction

The employee's leave management system is a user-friendly web-based application accessible to both staff and administration within an institution. This system simplifies the process of requesting and tracking leave for employees. Additionally, the administrative department can efficiently allocate, grant, and manage all leave requests using this system. The application also ensures that relevant staff members are notified about approved leaves, enabling the administrative department to effectively coordinate leave schedules and manage employee absences. When an employee's leave approves, the system automatically deducts the approved leave from their total entitlement. Furthermore, the system provides comprehensive information to all involved parties, including the total leave taken, the remaining leave balance, and the day and date of the leave, load adjustment in compliance with the institution's policies. This automated approach enhances transparency and streamlines the

overall leave management process, benefiting both employees and the administrative department.

Problem Statement

Manual management of employee records presents numerous challenges. For example, in processes like leave management, employees often encounter delays as their leave forms can take considerable time to be approved. Additionally, many organizations store employee records in physical in the files/ rooms located within administrative blocks, creating difficulties in accessing information remotely or retrieving accurate leave records.

To overcome these challenges, the implementation of a web-based employee's leave management application system is recommended. This system securely stores and manages employee records in a database that is accessible only to authorized administrators. The primary objective of the "web-based employee leave management application system" is to develop a computerized solution for efficient leave management. By replacing the existing manual paper-based process, this system aims to reduce storage requirements and ensure that all records are digitally stored for convenient future reference. This aims to paperless work (to save papers) and green initiative by the institution.

Design Methodology

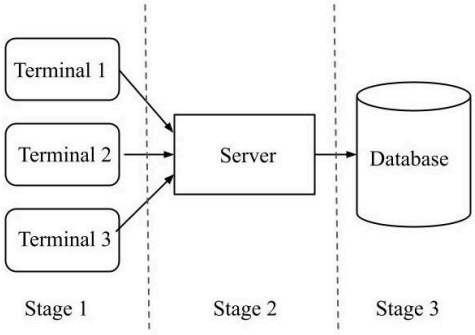

Fig.1 Three Stage Diagram

The employee's leave management system follows a three-stage system model which is developed using different programming languages. This architecture operates on a client/server model, with the web server serving as a vital component. The first stage, known as the presentation stage, involves the client-side of the system. It showcases the Graphical User Interface (GUI) developed using HTML, CSS, and JavaScript. All HTML forms and content displayed on the client's browser are part of this stage. CSS is applied through the web browser, which communicates with the business stage and data through API calls. The second stage, also referred to as the business logic stage, acts as the middle layer. It comprises the application server built using a web server and is responsible for executing the actual data processing. This stage incorporates PHP coding and handles the communication between the presentation and data stages. The third stage, known as the data stage, is developed using MySQL and encompasses methods and classes that handle data storage and retrieval within the database (storage layer). Queries are utilized to access data and perform other database operations. Data received from the presentation stage is stored in the database, and this stage manages all read and write interactions with the database.

Proposed Architecture

The faculty user applies for leave using the application on their terminal PC or mobile device. They can then check the status of their leave in the status tab. Additionally, a notification is sent to the load adjusting faculty. The load adjusting faculties can choose to accept or reject the workload adjustment.

Once all the faculties have accepted the load adjustment, the leave application is forwarded to the Head of Department (HOD) with a notification sent to their phone number.

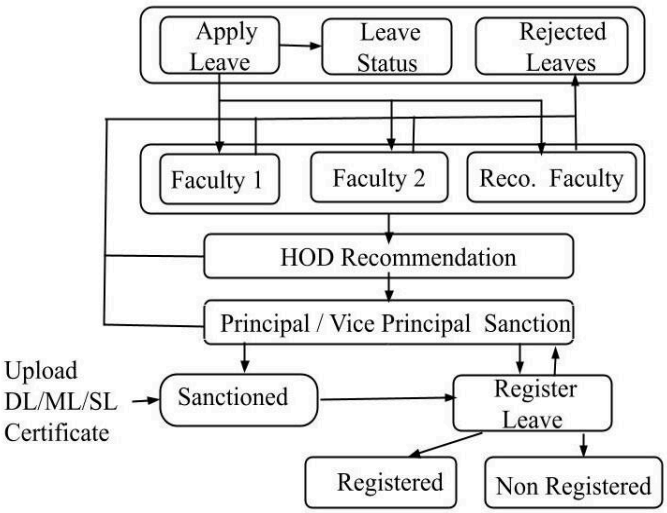

Fig.2 Architecture of Leave Management System

Subsequently, after the HOD's recommendation, the leave application is forwarded to the principal's login, where the leave is officially sanctioned, and a notification is sent to the user.

Flow Chart of system

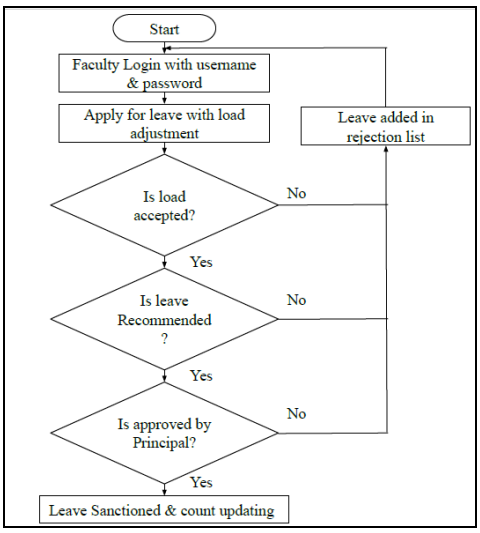

Fig.3 Flow Chart

Algorithm

Step 1: Faculty will login into the system with login credentials
Step 2: Faculty will apply the leave with load adjustment

Step 3: Once leave received to adjutant faculty he/she will accept or reject the load.
Step 4: After load acceptance, it will be forwarded to the HOD for recommendation.
Step 5: Finally leave will reaches into principal login for final decision.
Step 6: Leave approved status & count will be reflected in faculty login for further notification

Advantages:

After implementation of Leave management system following are the advantage

1. User friendly
2. Paperless system
3. Maintain Leave record automatically
4. Faculty easily knows the status of the leave
5. Simple, saves time
6. Leave can be applied by 24x7

Conclusion

The Leave Management System is an invaluable tool for institutions, enabling them to effectively maintain and track employee leave records. This comprehensive system not only handles the management of staff leave records but also facilitates the submission and processing of leave applications. By incorporating an approval process, it allows higher authorities to accept or reject staff leave requests, thus streamlining the institution's leave management workload.

Furthermore, this system actively works towards reducing unnecessary formalities and delays that often occur during the leave approval process. It empowers faculty members to swiftly and efficiently seek approval for their leaves, eliminating unnecessary paperwork and delays.

In summary, the Leave Management System serves as a crucial asset to institutions, easing the burden of leave record maintenance and simplifying the leave application and approval process for staff members.

References

[1] Prajakta R. Palase, Mina D. Waghela, Pooja M. Dandage, Anuradha H. Dhope, Dr. S. B. Thigale, "Review on Case Study of Employee Leave Management System using PHP", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 1, June 2022, Pg. 361-362

[2] Rajan Deshmukh, Saurav Avhad, Adarsh Maid, Abid Dhankwala, "Leave Management System", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162, April 2022, Volume 9, Issue 4, Pg. 561-567

[3] Mishal Raj1, Prity Satbhaya2, Prachir Chauhan3, Arhant Chatterjee4," Employee Leave Management System", IJARIIE-ISSN(O)-2395-4396, Vol-3 Issue-5 2017, Pg. 1273-1277

[4] Ms. Linda Malomo, "Leave Management System", The International Journal of Multi-Disciplinary Research, ISSN: 3471-7102, ISBN: 978-9982-70-318-5, Pg. 1-47

[5] Nameera Choudhary1, Aynas Khalfe2, Yaman Khan3, Mukhtar Ansari4, "Leave Management System for AIKTC.", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056, p-ISSN: 2395-0072, Volume: 07 Issue: 03 | Mar 2020, Pg. 1715-1717

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Applications of Artificial Intelligence in Manufacturing Processes: A Review

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Abstract
The rapid advancement of artificial intelligence (AI) has significantly impacted various industries, including manufacturing. AI techniques such as machine learning, deep learning, and computer vision have the potential to revolutionize manufacturing processes by improving efficiency, quality, and productivity. This review paper provides an overview of the recent developments and applications of AI in manufacturing processes.

Keywords— Artificial intelligence, manufacturing processes, machine learning, deep learning, process optimization, predictive maintenance, quality control, human-robot collaboration, edge computing, workforce readiness, efficiency, productivity, customization.

Introduction
Artificial Intelligence (AI) has emerged as a powerful tool in various industries, including manufacturing. AI techniques, such as machine learning, deep learning, and computer vision, have the potential to revolutionize manufacturing processes, improve efficiency, quality, and productivity. This review paper aims to provide an overview of the recent advancements and applications of AI in manufacturing processes.

Literature Review
Several research studies have demonstrated the wide range of applications of AI in manufacturing processes. Researchers have explored the use of AI techniques in areas such as process optimization, predictive maintenance, quality control, supply chain management, and human-robot collaboration.
Process Optimization: AI algorithms can analyze vast amounts of data collected from sensors, machines, and production lines to optimize manufacturing processes. Machine learning algorithms can identify patterns, detect anomalies, and suggest process parameter adjustments for enhanced efficiency and reduced waste. Optimization algorithms, such as genetic algorithms and reinforcement learning, can determine the optimal combination of parameters to achieve desired production outcomes.[1]
Predictive Maintenance: AI-based predictive maintenance systems utilize sensor data and historical records to predict equipment failures, enabling timely maintenance and reducing unplanned downtime. Machine learning algorithms can analyze sensor data patterns and detect early signs of equipment degradation or failure. This proactive approach to maintenance minimizes disruptions, optimizes maintenance schedules, and extends equipment lifespan.[2]

Quality Control: AI techniques, such as computer vision and machine learning, have been applied to automate quality control processes. Visual inspection systems based on deep learning algorithms can analyze images or videos to identify defects, classify products, and ensure compliance with quality standards. This reduces reliance on manual inspection, improves accuracy, and increases throughout.[3]

Supply Chain Management: AI-based supply chain management systems leverage predictive analytics and optimization algorithms to optimize inventory management, demand forecasting, and logistics planning. Machine learning algorithms can analyze historical data, customer behavior, and market trends to forecast demand more accurately. This enables efficient inventory management, reduced lead times, and improved customer satisfaction.[4]

Human-Robot Collaboration: AI enables human-robot collaboration by enabling robots to understand and respond to human actions and intentions. Advanced AI algorithms enable safe and efficient interaction between humans and robots, facilitating tasks that require precision, strength, or repetitive actions. This collaborative approach enhances productivity, flexibility, and worker safety.[5]

Objectives

Provide an overview: Present a comprehensive overview of the applications of artificial intelligence (AI) in manufacturing processes, highlighting the potential impact and benefits of AI in improving efficiency, quality, and productivity.

Review recent advancements: Review and analyze recent research studies and publications on the applications of AI in manufacturing processes. Identify the emerging trends, challenges, and opportunities in the field.

Provide insights and recommendations: Offer insights and recommendations for manufacturers, researchers, and policymakers to leverage the potential of AI in manufacturing processes effectively. Discuss strategies for successful implementation, adoption, and integration of AI technologies in manufacturing environments.

By addressing these objectives, the review paper can provide a comprehensive analysis of the current state of AI applications in manufacturing processes and offer valuable insights for researchers, practitioners, and decision-makers in the field.

Overview

Artificial Intelligence (AI) has emerged as a transformative technology in various industries, including manufacturing. By leveraging AI capabilities, manufacturers can optimize their processes, enhance decision-making, and achieve significant improvements in efficiency, quality, and productivity. Here is a comprehensive overview of the applications of AI in manufacturing:

Predictive Maintenance: AI enables manufacturers to implement predictive maintenance strategies by analyzing real-time sensor data to identify patterns and anomalies. This helps in predicting equipment failures, reducing downtime, and optimizing maintenance schedules.

Quality Control: AI-powered image recognition systems can identify defects and anomalies in manufacturing processes, enabling real-time quality control. This reduces errors, enhances product quality, and minimizes waste.

Process Optimization: AI algorithms can analyze large volumes of data from various sources to identify bottlenecks, optimize production schedules, and streamline manufacturing processes. This leads to improved efficiency, reduced costs, and faster time-to-market.

Supply Chain Management: AI can optimize supply chain operations by forecasting demand, automating inventory management, and enhancing logistics planning. This enables manufacturers to reduce inventory costs, minimize stockouts, and optimize delivery routes.

Robotics and Automation: AI-powered robots and automated systems can perform complex tasks with precision and speed. This improves efficiency, reduces human error, and allows human workers to focus on more strategic and creative activities.

Demand Forecasting: AI algorithms can analyze historical data, market trends, and external factors to accurately forecast demand. This helps manufacturers optimize production levels, minimize excess inventory, and meet customer demands more effectively.

Product Design and Development: AI can assist in product design and development processes by generating design alternatives, simulating performance, and optimizing parameters. This reduces time-to-market, enhances product quality, and enables faster innovation.

Energy Management: AI can optimize energy consumption in manufacturing facilities by analyzing data from sensors, identifying energy-saving opportunities, and adjusting equipment settings. This reduces energy costs and supports sustainability efforts.

Worker Safety: AI can enhance worker safety by monitoring work environments, identifying potential hazards, and providing real-time alerts. This reduces workplace accidents and improves overall safety standards.

Customer Service and Personalization: AI-powered chatbots and virtual assistants can handle customer queries, provide personalized recommendations, and offer post-sales support. This improves customer satisfaction and loyalty.

The potential impact and benefits of AI in manufacturing are significant. It can lead to increased productivity, reduced costs, improved product quality, faster innovation cycles, and enhanced competitiveness in the global market. However, it's important to note that the successful implementation of AI in manufacturing requires a combination of advanced technologies, skilled workforce, and effective integration strategies.

Emerging Trends

Edge Computing: The adoption of edge computing in manufacturing processes allows for real-time data analysis and decision-making at the edge of the network, reducing latency and improving responsiveness.
Explainable AI: With the increasing complexity of AI algorithms, there is a growing emphasis on developing explainable AI models that provide transparency and interpretability, enabling users to understand the reasoning behind AI-driven decisions.

Collaborative Robotics: The integration of AI with collaborative robots (cobots) enables safe and efficient human-robot collaboration, expanding the scope of automation in manufacturing processes.

Digital Twins: Digital twin technology, coupled with AI, enables the creation of virtual replicas of physical manufacturing systems, allowing for simulation, optimization, and predictive maintenance.

Challenges

1. Data Quality and Integration: Manufacturing processes generate large volumes of data from various sources. The challenge lies in ensuring data quality, integrating data from disparate sources, and preparing the data for AI analysis.
2. Cyber security: As manufacturing systems become increasingly connected, the risk of cyber threats and attacks also increases. Protecting sensitive data, intellectual property, and ensuring the security of AI systems is crucial.
3. Workforce Readiness and Transition: The integration of AI in manufacturing processes requires a skilled workforce capable of working alongside AI systems. Training and up skilling employees to adapt to new technologies are essential.
4. Ethical Considerations: AI systems must be developed and deployed in an ethical and responsible manner. Concerns around privacy, bias, and algorithmic transparency need to be addressed.

Opportunities

1. Enhanced Efficiency and Productivity: AI can optimize manufacturing processes, reduce waste, and improve operational efficiency, leading to increased productivity and cost savings.
2. Predictive Maintenance and Reduced Downtime: AI-powered predictive maintenance systems can help identify equipment failures before they occur, minimizing unplanned downtime and optimizing maintenance schedules.
3. Quality Control and Defect Detection: AI-based vision systems and machine learning algorithms can automate quality control processes, ensuring product quality and reducing defects.
4. Supply Chain Optimization: AI enables demand forecasting, inventory management, and logistics optimization, leading to efficient supply chain operations and improved customer satisfaction.
5. Customization and Personalization: AI technologies can enable mass customization and personalized manufacturing, allowing manufacturers to meet individual customer needs more effectively.

These emerging trends, along with the associated challenges and opportunities, provide a glimpse into the evolving landscape of AI in manufacturing processes. Addressing the challenges and capitalizing on the opportunities can help manufacturers unlock the full potential of AI to drive innovation and competitiveness.

Insight & Recommendation

Insights and Recommendations for Leveraging AI in Manufacturing Processes:
Invest in Data Infrastructure: Establishing a strong data infrastructure is crucial for successful AI implementation in manufacturing. Manufacturers should focus on collecting and organizing high-quality data from various sources, ensuring compatibility and integration across different systems. This lays the foundation for effective AI-driven analysis and decision-making.

Foster Collaboration and Partnerships: Collaboration between manufacturers, researchers, and technology providers is essential for unlocking the full potential of AI in manufacturing. Manufacturers should actively seek partnerships with AI experts, universities, and research institutions to leverage their expertise and access the latest advancements in AI technologies.

Prioritize Data Security and Privacy: Manufacturers must prioritize data security and privacy when implementing AI. Robust cybersecurity measures should be in place to protect sensitive manufacturing data from unauthorized access or breaches. Compliance with relevant data protection regulations should be ensured.

Embrace Incremental Adoption: Manufacturers can start with smaller-scale AI implementations to gain experience and insights before scaling up. By focusing on specific areas or processes, manufacturers can evaluate the impact, address challenges, and refine their AI strategies before expanding to broader applications.

Invest in Workforce Training and Upskilling: Manufacturers should invest in training programs to equip their workforce with the necessary skills to work alongside AI technologies. Upskilling employees to understand and leverage AI systems will foster a culture of innovation, enable effective collaboration, and maximize the benefits of AI adoption.

Address Ethical and Bias Concerns: Manufacturers and policymakers should be mindful of ethical considerations associated with AI, such as algorithmic bias and fairness. It is crucial to establish guidelines and frameworks that ensure transparency, accountability, and responsible use of AI in manufacturing processes.

Create a Learning Culture: Establish a culture of continuous learning and experimentation within manufacturing organizations. Encourage employees to explore AI applications, share insights, and learn from failures. This fosters innovation, promotes knowledge exchange, and accelerates the integration of AI technologies.

Encourage Regulatory Support: Policymakers should create an enabling environment for AI adoption in manufacturing by providing regulatory support and incentives. This includes fostering data sharing, promoting research and development initiatives, and addressing legal and liability concerns associated with AI technologies.

Implement Change Management Strategies: AI implementation may require changes in processes, job roles, and organizational structures. Manufacturers should implement effective change management strategies to ensure smooth integration, address employee concerns, and foster a positive attitude towards AI technologies.

Continuously Monitor and Evaluate: Regularly monitor and evaluate the performance and impact of AI implementations in manufacturing processes. Measure key performance indicators, collect feedback from employees, and continuously refine AI systems to optimize their effectiveness.

By following these insights and recommendations, manufacturers, researchers, and policymakers can harness the potential of AI in manufacturing effectively. Strategic implementation, strong data foundations, workforce readiness, and ethical considerations are key factors for successful integration and adoption of AI technologies in manufacturing environments.

Conclusion

Artificial Intelligence (AI) is revolutionizing the manufacturing industry, offering significant potential to improve efficiency, quality, and productivity. This comprehensive overview has highlighted the diverse applications of AI in manufacturing processes, including predictive maintenance, quality control, process optimization, supply chain management, and more. The benefits of AI adoption in manufacturing are evident, with improved operational efficiency, reduced costs, enhanced product quality, and accelerated innovation.

Reviewing recent advancements in AI for manufacturing has revealed emerging trends and opportunities. Research studies have explored areas such as explainable AI, edge computing, human-robot collaboration, sustainable manufacturing, and AI-driven customer insights. These advancements hold the promise of further enhancing manufacturing processes and outcomes.

To effectively leverage the potential of AI in manufacturing, manufacturers, researchers, and policymakers should consider the insights and recommendations provided. Building a strong data infrastructure, fostering collaboration, prioritizing data security and privacy, investing in workforce training, addressing ethical concerns, and implementing change management strategies are crucial for successful AI integration. Additionally, policymakers play a vital role in providing regulatory support and creating an enabling environment for AI adoption.

In conclusion, AI has the power to transform manufacturing processes, driving operational excellence, cost reduction, and improved product quality. By embracing AI technologies and addressing the associated challenges, manufacturers can unlock new possibilities and drive the future of manufacturing in the era of Industry 4.0.

REFERENCES

[1] Nguyen, S., & Castells, X. (2021). AI and Optimization for Manufacturing: Challenges and Opportunities. Procedia Computer Science, 181, 402-409. doi:10.1016/j.procs.2021.02.059.

[2] Sharma, R., Kumar, A., & Pal, A. (2020). Predictive Maintenance for Industry 4.0: Challenges and Opportunities. Journal of Intelligent Manufacturing, 31(6), 1481-1509. doi:10.1007/s10845-019-01502-0

[3] Tsai, M. L., & Shih, Y. Y. (2021). Machine Vision Inspection Systems: A Review. IEEE Transactions on Industrial Informatics, 17(8), 5806-5816. doi:10.1109/TII.2021.3056084

[4] Durach, C. F., Kurpjuweit, S., & Wagner, S. M. (2017). Artificial Intelligence in Logistics and Supply Chain Management: A Comprehensive Review. International Journal of Logistics Management, 28(3), 875-905. doi:10.1108/IJLM-04-2016-0062

[5] Yu, H., Sun, W., & Liu, H. (2020). Human-Robot Collaboration in Industrial Automation: A Comprehensive Review. IEEE Transactions on Industrial Informatics, 16(6), 4184-4200. doi:10.1109/TII.2020.2969415

[6] Li, M., & Cheng, G. (2017). Industry 4.0: A Survey on Technologies, Applications, and Open Research Issues. Journal of Industrial Information Integration, 6, 1-10. doi:10.1016/j.jii.2017.04.005

[7] Chen, C., Wu, N., & Chen, S. (2019). Machine Learning for Production Scheduling in Industry 4.0: A Review. Journal of Intelligent Manufacturing, 30(6), 2445-2461. doi:10.1007/s10845-017-1410-0

[8] Subasi, A. (2020). A Review of Machine Learning Approaches for Fault Detection and Diagnosis in Manufacturing Processes. Journal of Manufacturing Systems, 56, 499-512. doi:10.1016/j.jmsy.2020.04.005

[9] Sabattini, L., Secchi, C., & Fantuzzi, C. (2020). Vision Systems for Robotic Applications in Industry 4.0: Challenges and Opportunities. Annual Reviews in Control, 50, 13-25. doi:10.1016/j.arcontrol.2020.07.009

[10] Kocabasoglu-Hillmer, C., & Gavirneni, S. (2020). Artificial Intelligence in Supply Chain Management: Applications, Challenges, and Research Perspectives. Production and Operations Management, 29(4), 925-947. doi:10.1111/poms.13125

[11] Li, X., Tao, F., Zhang, M., Cheng, Y., & Luo, Y. (2020). Intelligent Quality Control in Cyber-Physical Systems: Current State and Opportunities. Journal of Manufacturing Systems, 54, 202-213. doi:10.1016/j.jmsy.2019.10.004

[12] Dietz, T., Singh, J., & Lim, C. P. (2021). Human-Centric AI in Manufacturing: A Review. Journal of Intelligent Manufacturing, 32(4), 939-958. doi:10.1007/s10845-019-01531-9

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Health Monitoring with Alcohol Detection and Control System Based On IoT

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Abstract:
Accidents caused due to drunken drive are increasing tremendously in this modern world. To prevent these kinds of accidents, we propose an IoT based health monitoring system with alcohol detection and control. The proposed project is designed to reduce accidents caused due to drunken driving. Globally the cases of accidents are increasing due to this aspect. In order to prevent these accident cases, in this project an IoT based method has been designed. In that Arduino, Alcohol Sensor, Heart beat rate sensor, Global System for Mobile communication, Wi-Fi modem, are utilized. Once the alcohol rate and heart beat rate are exceeding the specified limit, the command will be given to the ignition system of the vehicle to stop the operation of the vehicle.

Keywords: Arduino, Alcohol sensor, Heart beat rate sensor.

I. Introduction

IoT (Internet of things) based health monitoring with alcohol detection and control is an innovative system that combines the power of IoT, alcohol detection, and engine control to improve safety and health in various industries, including transportation, healthcare. The system is designed to monitor the health status of individuals, particularly those who work in hazardous environments, such as drivers. It uses senor, such as heart beat rate sensor to collect the data on the user's health status in real-time. The alcohol detection feature of the system uses alcohol sensor (MQ-135) to detect the alcohol levels in the users breathe. This feature is used to control the drunken drive accidents. The engine control feature of the system is designed to prevent accidents caused by impaired drivers. The system can detect if the user has consumed alcohol above a certain threshold, and in such cases, it can automatically disable the engine of the vehicle, preventing the user from operating. Overall, IoT based health monitoring with alcohol detection and control is an innovative system that can significantly improve safety and health in various industries. It can help prevent accidents caused by impaired drivers, reduce the risk of health-related incidents in hazardous conditions.

Mugila et al [1] proposed that wearing smart helmet to prevent any mishap is suggested by writer which have certain deficiencies. Firstly, restrictions on the use of helmets to only 2 wheelers. Secondly, microcontrollers are software based mega system in comparison to the economical siren that are open-source hardware. Pavan Shukla et al [2] proposed that the design and implementation of an Alcohol Detection with Engine Locking for cars using the Ultrasonic Sensor and Arduino UNO as the MCU (Master Control Unit). The system will continuously monitor level of alcohol concentration in alcohol detection sensor and thus turn off the engine of vehicle if the alcohol concentration is above threshold level. The model will also send the

message of whereabouts of the vehicle through SIM900A. The project provides an efficient solution to control accidents due to drunk driving. Pramod Gadekar et al [3] proposed that by integrating alcohol sensor with Arduino board. Arduino processor ATmega328 is able to handle more functions than conventional microcontrollers. The alcohol sensor used in this project is MQ3 which to detect the alcohol content in human breath. Since sensor has fine sensitivity range around 2 meters, it can suit to any vehicle and can easily be hidden from the suspects. This project is fitted inside the vehicle. The project is designed for the safety of people sitting inside the vehicle. Viswanatha et al [4] proposed that the system has demonstrated three ways of detecting alcohol level in the body of the car driver and prevent car driver from driving the vehicle by turning off the ignition system. It also sends messages to concerned people. In order to detect breath alcohol level MQ-3 sensor is included in this module along with a heartbeat sensor which can detect the heart beat rate of driver, facial recognition using webcam & MATLAB and a Wi-Fi module to send a message through the TCP/IP App, a Raspberry pi module to turn off the ignition and an alarm as prevention module. Diwakaran et al [5] proposed the alcohol detection system is mainly integrated and developed for road transportation Safety for the people who are living in the smart cities can enjoy the availability of Alcohol detection system. This mainly works with the help of IoT. When it traces the breathing levels of host and trigger the necessary actions like deny the driving availability and reduces majority of the drunk and driving accidents. Gupta et al [6] proposed Alcohol Detection with Vehicle Controlling. A liquor finder and a GPS is used for this. And where as GSM is associated with Arduino. The liquor inside the body of a person crosses the limit the Arduino will stop the vehicle and GPS sends the location of the drunker person to their family/police. Goswami et al [7] proposed that Android based rush and drunk driver alerting system. DUI is the system we used for detecting the alcohol present in the vehicle where the DUI works when there is presence of alcohol the vehicle stops and sends the alert message to the police /family. Jiangpeng Dai et al [8] proposed that Drunk driving, or officially Driving Under the Influence (DUI) of alcohol, is a major cause of traffic accidents throughout the world. In this paper, we propose a highly efficient system aimed at early detection and alert of dangerous vehicle manners typically related to drunk driving. The entire solution requires only a mobile phone placed in vehicle and with accelerometer and orientation sensor. Piyush Vinay Phalak et al [9] proposed that highly efficient smart mobile phone sensor based drunk driving detection system via this paper. The hardware as well as the smart phone, which will be placed in the vehicle, will collect and analyze the data from specialized sensors to detect if any violations such as driving under alcohol influence are detected. We expect the system to present solution that observes very low false positive and negative rates, accurate evaluations. In the future might integrate more additional features to make it more efficient. Dwipjoy Sarkar et al [10] proposed that a distinct system is designed which combines the application of computer vision with embedded systems and are targeted for reducing road accidents due to driver drowsiness and alcoholic intoxication. Development of software algorithm is completed which is partially tested and found successfully working. The research is still in continuation to develop it into a full-blown system. There is much yet to improve and work on in this field. Dhivya et al [11] proposed an effective prevention mechanism is to provide awareness and safety mechanism to the driver.

Major cause of vehicular accidents is alcohol consumption. This paper introduces methods such as alcohol detection, a heart rate monitoring system, and a personal identification system and discusses how they can be implemented to avoid accidents. Parameswaran et al [12] proposed that vehicle accident detection and alert system with SMS to the user defined mobile numbers. The GPS tracking and GSM alert-based algorithm is designed and implemented with ATMEGA 8A MCU in embedded system domain. The proposed Vehicle accident detection system can track geographical information automatically and sends an alert SMS regarding accident. Experimental work has been carried out carefully. The result shows that higher sensitivity and accuracy is indeed achieved using this project. EEPROM is interfaced to store the mobile numbers permanently. This made the project more user friendly and reliable. The proposed method is verified to be highly beneficial for the automotive industry. Baskett et al [13] proposed that preliminary work towards a smartphone-based wireless body area sensing system that will be used to improve current methods and provide realtime interventions if necessary. This system consists of several wearable sensors for measuring physiological data, a smartphone, and a web server. The smartphone is the centre piece, responsible for collecting sensor data, interacting with the user, performing real-time computation, and communicating with the web server. The system collects physiological data, self-reported emotional and behavioural state, and other user context data such as GPS location or ambient audio recording.

II. Proposed methodology

In this proposed module, An MQ-135(alcohol) sensor is placed to detect the alcohol consumption level of driver and heart beat sensor is placed motorbike to monitor the heart beat rate. The results obtained from sensors are constantly updated to cloud using IoT. When the values obtained from alcohol sensors attains the threshold limit (0.04 mg/ml to 50 mg/ml) then the system prevents the chances of accident by stopping the vehicle ignition system and stores the alcohol consumption values of the vehicle user. The heart beat rate of the driver is also continuously monitored with the help of appropriate heart beat rate detection sensor and the data are updated in the cloud. In case of any abnormal detection in heart beat rate of the driver, then the current status of the person is informed to their contacts through Global system for mobile communication. Whenever the accident happen the accident switch is used to send the message to the respective mobile numbers with the help of GSM, when we hold accident switch for 3 seconds. The ARDUINO plays an important role in this system, It is connected with alcohol detection and heart beat rate sensors which helps to update the values to the user of the vehicle. It has a built-in Wi-Fi module which is responsible for cloud updates when it is connected to the internet. The sensed values from sensors are continuously updated in the vehicle owner's cloud storage. The proposed module includes different aspects such as Development, Testing, Deployment, Maintenance and support.

Design: In the design stage, the requirements of the system are defined based on the needs of the target users. This includes defining the sensors to be used, the data to be collected, and the algorithms to be developed for detecting alcohol levels and controlling the engine. The system design should also take into account the security and privacy concerns of the users.

Development: The development stage involves building the hardware and software components of the system. This includes the sensors, the data

collection and processing should be designed to enable remote monitoring and control of the system through a web-based interface or a mobile app.

Testing: The system should be tested in a controlled environments to ensure that it meets the performance and accuracy requirements. This involves testing the sensors and algorithms under different conditions and scenarios to ensure that they can detect alcohol levels accurately and control the engine effectively.

Deployment: Once the system has been tested and validated, it can be deployed in the target environment. This involves installing the sensors, connecting the system to the internet, and configuring the control mechanisms. The system should be tested again after deployment to ensure that it is functioning correctly.

Maintenance and support: The system requires regular maintenance and support to ensure that it continues to function correctly. This includes updating the software and firmware, replacing faulty sensors, and providing technical support to users.

III. BLOCK DIAGRAM

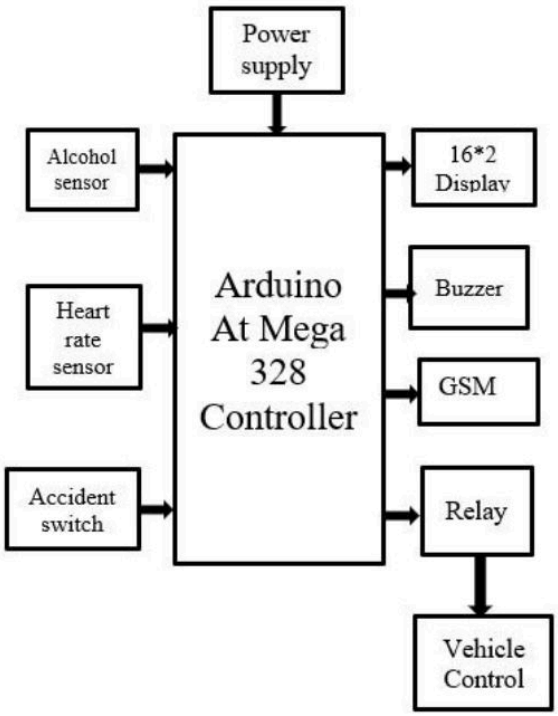


Fig. 1 Block Diagram

In the above fig1., MQ135(alcohol) sensor is placed to detect the alcohol consumption level of driver and heart beat sensor is placed at the handle-bar of the motorbike to monitor the heart beat rate. The results obtained from sensors are constantly updated to cloud using IOT. When the values obtained from alcohol sensors attains the

threshold limit (0.04 mg/ml to 40 mg/ml) then the system prevents the chances of accident by stopping the vehicle ignition system and stores the alcohol consumption values of the vehicle user. The heart beat rate of the driver is also continuously monitored with the help of appropriate heart beat rate detection sensor and the data are updated in the cloud. In case of any abnormal detection in heart beat rate of the driver, then the current status of the person is informed to their contacts through Global system for mobile communication. The ARDUINO plays an important role in this system. It is connected with alcohol detection and heart beat rate sensors which helps to update the values to the user.

It has a Wi-Fi module which is responsible for cloud updates when it is connected to the internet. The sensed values from sensors are continuously updated in the vehicle owner's cloud storage.

Alcohol sensor

The fig. 2 explains the MQ-135 sensor which detects the presence of alcohol consumed by the driver. It can sense the alcohol content ranging from 0.04mg/L to 4mg/L. It can operate at temperatures between -10'C to 50'C.It requires a minimum power supply. The alcohol sensor is technically referred to as a MQ135 sensor which detects ethanol in the air. When a drunk person breathes near the alcohol sensor it detects the ethanol in his breathe and provides an output based on alcohol concentration.

Fig.2 MQ-135AlcoholSensor

It consists of total 6 pins, but we use only 4 pins. The two pins A, H are used for heating purposes and the other two pins are used for ground and power. The air exhaled by the driver is monitored continuously with MQ-135 sensor and updated in the cloud. When the values detected from the sensor attains the threshold limit, then the vehicle ignition system will stop resulting in accident prevention.

Heart Beat Monitor Sensor

The heart beat rate of fig. 3 of the driver is detected using a heartbeat monitoring sensor. The sensor board consists of IR(Infra-red) transmitter and IR (Infra-red) receiver, which are placed in straight line to each other. It also has 3pins(ground, power supply, output). In order to measure the pulse rate, the finger is placed in between the IR sensors. This sensor module is attached to the handle-bar of the motorbike. The variation in the IR sensor readings provides the appropriate heartbeat rate of the driver. When an abnormal heart beat rate is detected, then the current health status of the driver comprising of his/her heart beat rate is send to the irrelative through IoT.

Fig.3Heart Rate Sensor

Gsm Modem

In the below fig. 4 GSM is a digital cellular communication standard that is universally accepted. The European Telecommunication Standards Institute created the GSM standard to define the procedures for second-generation digital mobile networks that are used by devices such as mobile phones.

Fig. 4GSM Module

Relay

In this project relay of fig. 5 plays the key role as it controls the vehicle operation. The relay will be connected from Arduino to the Ignition switch of the vehicle which is connected to the battery. It will turn on the vehicle through producing high voltage spark in the engine through which the vehicle will start. The relay will act as a switch between the battery and the ignition switch. Whenever the alcohol rate exceeds the threshold level then the Arduino will send the command to the relay to stop the connection between the ignition switch and battery. As a result, high voltage spark in the engine will not be produced. Thus, the vehicle operation will be stopped.

Fig. 5 PCB Power Relay

Internet Of Things

In the below fig. 6 The network of physical devices, home appliances embedded with electronics, sensors, software, actuator and network with proper internet, connect together to store, share, process data is called as Internet of Things (IoT). The applications for internet connected devices are extensive. IoT helps object to sense data and control it remotely. The system consisting of network connected embedded devices with minimum CPU, power resources and memory is

responsible of collecting appropriate information from natural ecosystem to perform the proposed function.

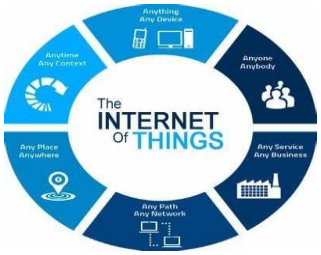


Fig.6InternetofThings

Push Button Switch

A Push Button switch of fig. 7 is a type of switch which consists of a simple electric mechanism or air switch mechanism to turn something on or off. Depending on model they could operate with momentary or latching action function. The button itself is usually constructed of a strong durable material such as metal or plastic. It is a mechanical device used to control an electrical circuit in which the operator manually presses a button to actuate an internal switching mechanism.

Fig. 7 Push Button switch

We also included this switch which operates as an accident remainder. Whenever the person is

subjected to an accident then by pressing this switch button for 3 seconds a message will be sent through the GSM module.

IV. RESULTS AND DISCUSSION

In this system, An MQ-135(alcohol) sensor is placed to detect the alcohol consumption level of driver and heart beat sensor is placed at the handle-bar of the motorbike to monitor the heart beat rate. The results obtained from sensors are constantly updated to cloud using IoT. When the values obtained from alcohol sensors attains the threshold limit (0.04 mg/ml to 50 mg/ml) then the system prevents the chances of accident by stopping the vehicle ignition system and stores the alcohol consumption values of the vehicle user. The heart beat rate of the driver is also continuously monitored with the help of appropriate heart beat rate detection sensor and the data are updated in the cloud. In case of any abnormal detection in heart beat rate of the driver, then the current status of the person is informed to their contacts through Global system for mobile communication. Whenever the accident happen the accident switch is used to send the message to the respective mobile numbers with the help of gsm, when we hold accident switch for 3 seconds. The ARDUINO plays an important role in this system, it is connected with alcohol detection and heart beat rate sensors which helps to update the values to the user of the vehicle. It has a built-in Wi-Fi module which is responsible for cloud updates when it is connected to the internet. The sensed values from sensors are continuously updated in the vehicle owner's cloud storage.

Table 1: Time taken by Module to send message

Activity	Action	Time in sec.
Alcohol level exceeds the limit	Off the ignition of vehicle	3.54
Message sent to mobile through gsm	Send message	8.28
Graphs and updating of values in things view app	Shows the values of Alcohol, Heartbeat and accident switch	9.43
Alcohol sensor sensing the alcohol level	Light will on after sensing	4.23

The above table 1 has explained about what is the time taken by module and gsm to off the ignition and send the message to the respective mobile numbers. And graphs and values of alcohol rate, heart beat rate, accident switch button are shown in things view app and alcohol sensor sensing the alcohol level.

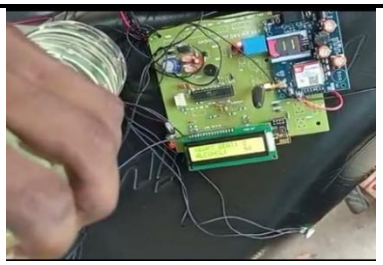
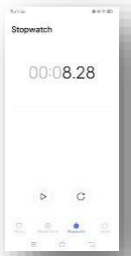


Fig. 8(i)Alcohol rating exceeds

Fig. 8(ii)SMS through GSM

In the fig. 8(i)& fig. 8(ii) proof for alcohol rate exceeding and message sent to mobile through gsm.
The message sends to the mobile numbers which



are connected to the GSM.

Fig.8(iii)Time taken to send the message by GSM to mobile

Fig.8(iv)Time taken bythe module to stop the ignition and Time taken to update value in app

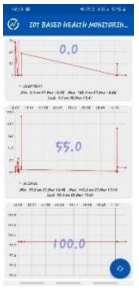


Fig. 8(v) Graphs on Thinks View App

Vehicle name	Honda Activa 4g
Vehicle braking	130 mm drum brakes
Vehicle CC	109cc
Vehicle battery	AmaronABR-PRAPBTZ4L(3Ah)

In the above fig.8(iii), fig.8(iv) & fig.8(v) shows the time taken by the module to stop the ignition of the vehicle is **3.54seconds**. The time taken by the GSM module to send the message is **8.28seconds**. The graphs and values are updated in Thinks view app within **9.43 seconds.**

In the above table 2, the vehicle specifications are mentioned with respect to type of vehicle, CC, braking and battery.

Advantages:

1. The proposed module can reduce the accidents due to drunken drive.
2. The module is useful to observe the user's position whether they drunken or not.
3. In the module the accident switch button is added additionally to send the message with help of GSM to the respective mobile numbers and will upload in the thinks view app.
4. In this, the module is connected to the ignition switch of the vehicle and it stops the operation as off when the value exceeds the limit within 4 seconds which is very fast when compared to other modules.
5. This module can be very helpful for police to decrease the drunken drive accident cases.
6. The app can be installed by mobile users and enter the channel ID to see the current status.

V. Conclusion And Future scope

In conclusion, the proposed IoT-based health monitoring system with alcohol detection and control provides an efficient and reliable way of monitoring alcohol intake and preventing drunken drive cases. With the help of this module, the respective mobile number users can monitor their alcohol consumption using the Think's View App and by using the GSM the SMS sends to the user Contact numbers.

In future, GPS can be added to this module to send the geographical location of the drunken driver to the nearby police stations to take prior actions before any disaster happens to the lives of people.

VI. References

1. Mugila.G, Muthulakshmi.M, Santhiya.K, Prof. Dhivya.P- smart helmet system using alcohol detection for vehicle protection International Journal of Innovative Research in Science Engineering and Technology, ISSN: 2395-5619, Volume – 2, Issue – 7, July 2016, 820-827.
2. Pavan Shukla, Utkarsh Srivastava, Sridhar Singh, Rishabh Tripathi, Rakesh Raushan Automatic Engine Locking System Through Alcohol Detection. International Journal of Engineering Research & Technology, ISSN: 2278-0181,Vol. 9 Issue 05,May-2020,637 – 640.
3. Pramod.P.Gadekar, Divya Prashad, Rutika Sabale, Gauri Gagare, Manisha Jori, Priyanka Dethe -Alcohol Detection System Using Arduino,ISSN:2395-4396 Vol-6 Issue-4, 2020,52 - 58.
4. Viswanatha V, Venkata Siva Reddy R, Ashwini Kumari P, Pradeep Kumar S. Internet of Things(IoT) Based Multilevel Drunken Driving Detection and Prevention System Using Raspberry Pi 3. International Journal of Computer Science and Information Security, Vol. 18, No. 3, March 2020, 131-137.
5. S.Diwakaran, M.Venkata Rahul, P .Naveen Gandhi P. Kranthikumar Reddy, P.Lakshmi Narayana.
6. Android based alcohol detection system using an IoT, ISSN: 2320- 2882, Volume 9 Issue 5, May 2021, 108 -112.

7. Gupta, Abhishek, Shriram Ojha, Vikash Kumar, Vikrant Singh, Vipin Malav, and Ramnagariya Gramothan. Alcohol Detection with Vehicle Controlling. International Journal of Engineering and Management Research 6 (2016),1-6.
8. Goswami, Tanmoy D., Shrinivas R. Zanwar, and Zafar Ul Hasan. Android based rush and drunk driver alerting system. International Journal of Engineering Research and applications, Page (s) (2014),1 to 4.
9. J. Dai, J. Teng, X. Bai, Z. Shen and D. Xuan, "Mobile phone based drunk driving detection," 2010 4th International Conference on Pervasive Computing Technologies for Healthcare, 2010,1-8.
10. Piyush Vinay Phalak, Shashank Kowekar and Shruti Joshi, Department Of Computer Engineering, Vishwakarma Instititute of Information Technology Pune, Savitribai Phule University, Pune, India. Smartphone and Sensor Based Drunk Driving Prevention System. international journal for research in emerging science and technology, volume-2, issue-9, sep-2015,53 to 58.
11. Dwipjoy Sarkar, Atanu Chowdhury, A Real Time Embedded System Application for Driver Drowsiness and Alcoholic Intoxication

Detection ,International Journal of Engineering Trends and Technology – Volume 10 Number 9 - Apr 2014, 461 to 465.

12. M.Dhivya, Srinivasan, Kathiravan. . Driver Authentication and Accident-Avoidance System for Vehicles. The Smart Computing Review. 10.6029/smartcr. doi 2015.01.04,1-7.
13. S. Parameswaran, P. Anusuya, M. Dhivya, A. Harshiya Banu, D. Naveen Kumar, 2016, Automatic Vehicle Accident Detection and Messaging System, international journal of engineering research & technology cocodantr – 2016 (Volume 4 – Issue 11), 1 to 3.
14. .P.Baskett, Yi Shang,M. V. Patterson and T. Trull, Towards a system for body-area sensing and detection of alcohol craving and mood dysregulation,2013 IEEE 10th Consumer Communications and Networking Conference ,

2013, 875-87

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Study of Data Logger

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Abstract— This paper describes a detail explanation about data logger system. A data logger is an electronic device that combines analog and digital measurements with programming methodology to sense temperature, relative humidity and other parameters such as voltage and pulse. The data loggers take input from the thermocouple temperature and humidity and other sensors. Knowledge of temperature and relative humidity course during a certain time is needed in scientific, medical and industrial applications.

Keywords— Introduction, History of Data logger system, Operation of Data logger, Characteristics of Data logger and its advantage & applications, future scope, References.

I. Introduction

In today's world there are many systems whose data is needed to be continuously collected. This data should be in form of log by which time, occurrence and other specifications can be collected at one place. All of this information is collected manually on field which consumes both time and workforce. In some situation it is not possible to retrieve this data because of extreme environment or remote location. Data logger is a different than typical data acquisition. It has ability to log data automatically on a 24-hour basis. Once it deployed and left unattended to measure and record information for the duration of monitoring period A complete data logging application generally requires most of the elements or components illustrated below.

1) Sensors: The inputs from various sources are given to the data logger through various sensors to measure various parameters such as temperature, humidity where electrical signals are converted to temperature and humidity values.
2) User Interface: The interface for interaction with the software and sensors is provided and using implemented algorithm analysis is done for storage of data.
3) Software: It displays the information stored from sensors for and also maintains data for long time storage.

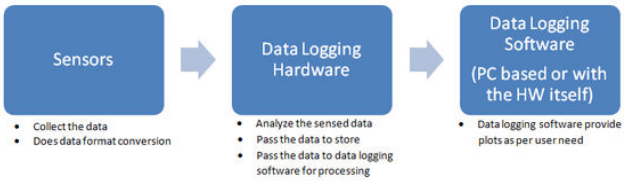


Fig.1: Data Logging System

II. History of Data Logger

Chart recorders are electromagnetic devices that monitor and record conditions using built-in pens that chart the data on paper. The most famous example of these devices is the polygraph machine which was used in real life and could sometimes be seen in a TV show or movie.

*The first data loggers: Data loggers have greatly improved on the capabilities of the chart recorder. The main upgrades include their small size, their ability to run constantly on battery power, and the improved accuracy of the sensors. The biggest upgrade though is that data loggers

can gather data and process it into a digital format. This eliminates the need for the pens and paper used by chart recorders and the physical storage space needed to save all the data from these earlier devices run constantly on battery power, and the improved accuracy of the sensors. The biggest upgrade though is that data loggers.

*Today's digital data loggers: Data loggers have continued to get smaller and provide more capabilities as the 21st century moves along Early data loggers included a display on the device itself or users had to plug into the device to download the data. This is no longer necessary. Many modern data loggers are Bluetooth-connected or are directly connected to the internet.

III.Operation of Data logger

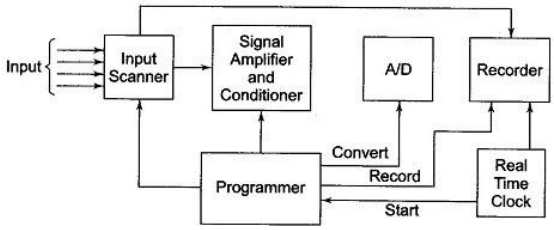


Fig.2: Block Diagram of Data logger system

3.1 Input Scanner: The various input signals fed to the input scanner are temperature, pressure, vibrations, ON/OFF signals etc. The input scanner
is an automatic switch that can select only one input signal at a time. In modem scanners the rate of scanning is up to 150 inputs.

3.2 Signal Amplifier and Conditioner: The input signal selected by scanner is a low-level signal. Hence a signal amplifier is used to amplify the low-level signal so that the input signal is maintained at 5 V level. The signal amplifier should possess certain characteristics like precise and stable D.C gain, high signal to noise ratio, good linearity, high impedance etc. The signal conditioner is placed between scanner and analogy to digital converter. It is a linearising circuit i.e., if a signal varies nonlinearly with respect to the measured parameter, then linearization of signal is done by the signal conditioner.

3.3 Analog to Digital Converter: The data loggers handle the data only in digital form and hence the analogy signal, if any, must be converted into digital form by employing analogy to digital converter The digital technique is used because it measures very small signals without loss of accuracy. The analogy signals that are converted to digital form are suitable to drive the digital recorders.

3.4 Recorder: The data logger drives the output recorder which prints the signals obtained from the analogy to digital converters. The recorder may consist of either typewriter or a punched tape. The typewriter provides a conventional log sheet with results in tabular form. Punched paper tape is used when the recorded data must be analysed further in a digital computer.

3.5 Programmer: It controls the sequence of operation of all other units of data logger. It takes information from input scanner, analogy to digital converter and recorder. The programmer performs various functions like starting analogy to digital conversion, selecting input signal by scanner, recording, and displaying reading, resetting logger etc.

3.6 Clock: The logging sequence is started automatically by a clock. The clock is used to automate the entire data logging system. When the clock signal is generated the scanning operation is started then the data logger advances ahead by time. The clock gives command to the programmer to start logging sequences at the intervals selected by the user.

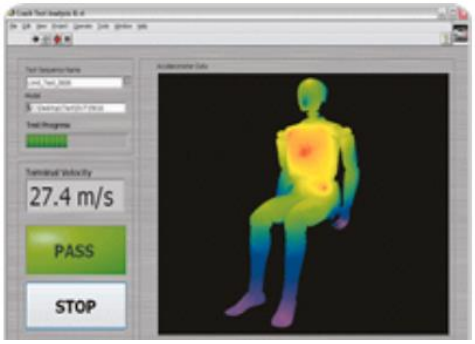
IV. Characteristics of Data Logger

1) Modularity: Data loggers can be expanded simply and efficiently whenever required, without any interruption to the working system.
2) Reliability and Ruggedness: They are designed to operate continuously without interruption even in the worst industrial environments.
3) Accuracy: The specified accuracy is maintained throughout the period of use.
4) Management Tool: They provide simple data acquisition and present the results in handy form.

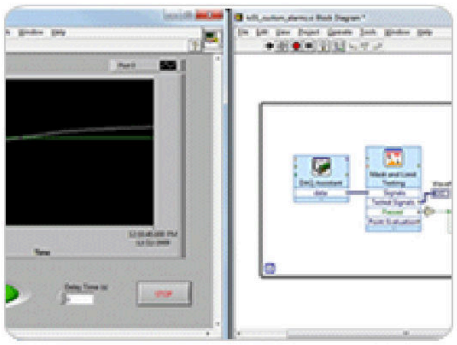
4) Easy to use: These communicate with operators in a logical manner, are simple in concept, and therefore easy to understand, operate and expand.

V. Advantages

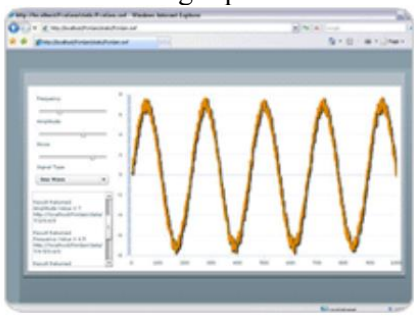
1. Inline Analysis:
Data analysis with a traditional stand-alone data logger is typically performed offline only after the data has been transferred to the PC. Using a Paused data logger, you can take advantage of multicore processors and increasingly available RAM in the PC to perform signal processing and analysis on your data as you acquire it. LabVIEW includes many common math and signal processing functions that use configuration wizards and make it easy to add analysis to your measurements.



2.User Defined Functionality:
With a traditional stand-alone data logger, you are generally limited to hardware and software functionality defined by the vendor. These functions are good for accomplishing general-purpose tasks, but they may not help you meet your unique application requirements. For example, you may want to log data only under certain conditions or generate custom alarms that aren't built into the data logger. PC-based data loggers are software defined instruments. This means the functionality of the device is defined by the software, and you can customize the software to meet your specific application needs. Using LabVIEW, you can easily build functionality for custom alarms, logging conditions, report generation, and signal analysis. You can log data to virtually any file format for importing into other tools and sharing data with others.



3. Terabytes of Data Storage:
Data storage is an important component of a data logger. You can log only as much data as you can store in your data logger. Traditional stand-alone data loggers are limited by the amount of memory built into the device. Because the PC is a part of a PC-based data logger, you are limited only by the amount of hard drive space on the PC. Today, it's not uncommon to find a PC hard drive with terabyte capacity that provides ample space for your current measurements as well as permanent storage space.



4. Network Connectivity:
For applications that require long-term monitoring over days or weeks, you may have difficulty continually checking results. Remote monitoring is useful because you can see results from a remote location. Using a PC-based data logger, you can take advantage of the PC's network connectivity to transmit results over a network for remote viewing. With LabVIEW, you can create custom alarm conditions that send e-mails or even design a Web service that you can visualize over a Web-based application.

5.1 Applications:
1) In unattended recording at weather stations to record parameters like temperature, wind, speed / direction, solar radiation and relative humidity.

2) For hydrographic recording of water flow, water pH, water conductivity, water level and water depth.
3) In the recording of soil moisture levels.
4) To record gas pressure and to monitor tank levels.
5) Transportation monitoring, troubleshooting, educational science, quality studies, field studies and general research.
6) Remote collection of recorded data and alarming or unusual parameters are possible with the help of data loggers where these are connected to modems and cellular phones.

VI. Future Scope

Using data logging, scientists and engineers can evaluate a variety of phenomenon, from weather patterns to factory performance. PC-based data logging systems provide most flexibility, customization, and integration. To define a data logging system, we must evaluate all the requirements for acquisition, analysis, logging, display, and report generation. Based on these requirements, we can customize data logging software and hardware to meet any needs.

VII. References

1. Suman Saha, Md. Tofiqul Islam and M Zakir Hossain, "Design of a Low Cost Multi Channel Data Logger," Bangladesh University of Engineering and Technology, ARPN. Journal of Engineering and Applied Science, Vol.1, June 2006.
2. Dogan Ibrahim, "Data Logger for Teaching Data Capturing and Analysis to Engineering Students," Department of Computer Engineering, Near East University, Nicosia, Cyprus, Wiley Inter Service DOI 10.1002/cae.20281
3. Peter Roberson, "Using data loggers", science teachers' workshop, 2004, north Sydney.
4. http/www.loggingtutorial/dr.saulgreenburg/htm.
5. DNA technology, "Data logger controller", http://www.dnatechindia.com
6. http://www.hanwell.com/index.html
7. http ://en.wikipedia.org/wiki/chart-recorder
8. www.ni.com/datalogger
9. S. J. Perez, M. A. Calva, R. Castaneda, "A microcontroller-based data logging System" Instrumentation and Development Vol. 3 Nr. 8, copyright 1997, Journal of the Mexican Society of Instrumentation.

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Weedinator- Weed Identification and Removal Using Image Processing

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Abstract –

Agriculture is facing crisis in terms of production due to unwanted weed among the crops. The main objective of this work is a weed control system that differentiates the weed from crops and restricts weed growth alone by the precise removal of it. This is implemented in real time by capturing the images of the field at regular intervals and processing them with a Raspberry Pi board by making use of an image processing algorithm to differentiate the desired plants from the weeds. This is based on features like color and size of the crop and weed. Once the weeds are identified and located correctly through image processing, a signal is transmitted from the Raspberry Pi board to turn on the weed cutting system and spraying herbicides for required area only.

Index Terms: Agriculture, Crop, Image Processing, Raspberry Pi, Weed Detection, Weed Removal.

I. INTRODUCTION

In olden days weed detection was done by employing some men, especially for that purpose. They were detecting the weed by checking each and every place of the field. Then they were plucking them out manually using their hands. But to detect the weeds they were still using manual power. Then they started using image processing for this purpose. In this proposed system our main aim is to detect the weed in the crop by using image processing as shown in figure 1.

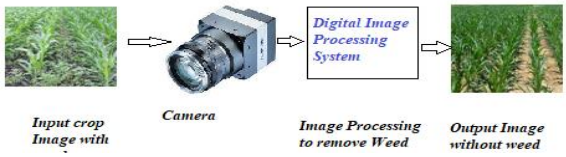

Fig 1: Proposed system

This system is implemented on Raspberry Pi for real time use. Here the identification and removal of weeds are performed through image processing. The weed management system performs image acquisition from the field. Image processing is then performed in the Raspberry Pi board using Open source Computer Vision which is a library of pre-written functions. An appropriate algorithm for weed detection is developed. Based on the results, the activation of the weed removal mechanism is controlled.

II. RELATED WORKS

The automatic weed detection and smart herbicide sprayer robot developed in [1] uses an image processing algorithm toprocess the images captured by the Raspberry Pi Camera at regular intervals and upon identifying the weeds, anarrangement is made to spray the herbicide directly and onlyon the weeds. In [2], Ajinkya Paikekari *et.al* implemented weed removal by spraying herbicides only in the areas where weed is present. The system detects and separates out the weed affected area from the crop plants in an image taken from the fields by using MATLAB to implement imageprocessing.

The system implementation of an image processingtechnique for weed detection and removal is introduced in [3].It involves simple edge detection techniques using various filters like the Gaussian filter and Laplacian filter. After certain steps, an output image is obtained where the weeds are separated from the crop. In paper [4], Amir H. Kargar B *et.al* developed a weed detection andclassification method that can be applied for autonomousweed control robots. The acquired images are processed in the LabVIEW environment to find locations of weeds in theimage. Finally, herbicides are sprayed on desired spots.

III. PROPOSED SYSTEM

This work aims to develop an automatic system for weed detection and removal based on image processing in Raspberry Pi. The block diagram of the proposed system is shown in figure 2. In this proposed system, IR sensor will detect the obstacle and then Pi will capture crop image in the field. In Raspberry Pi, this captured image is processed to identify the weed. Mechanical Assembly unit contains different processes like weed removal, wheel motor rotation, cutting tools operation and battery switching system. If weed is detected, then weed cutting is done with the help of cutting mechanism. If weed

is too small to cut then herbicide spraying will be activated. Then system will continuously work through the field to detect and remove the weed.

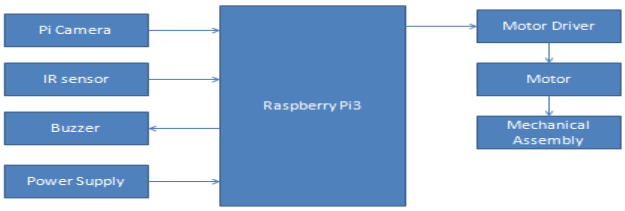

Fig 2: Block Diagram of the Weed Detection andRemoval System

IV. IMPLEMENTATION

A. *Work Flow*

The workflow of the system is shown in the figure 3.

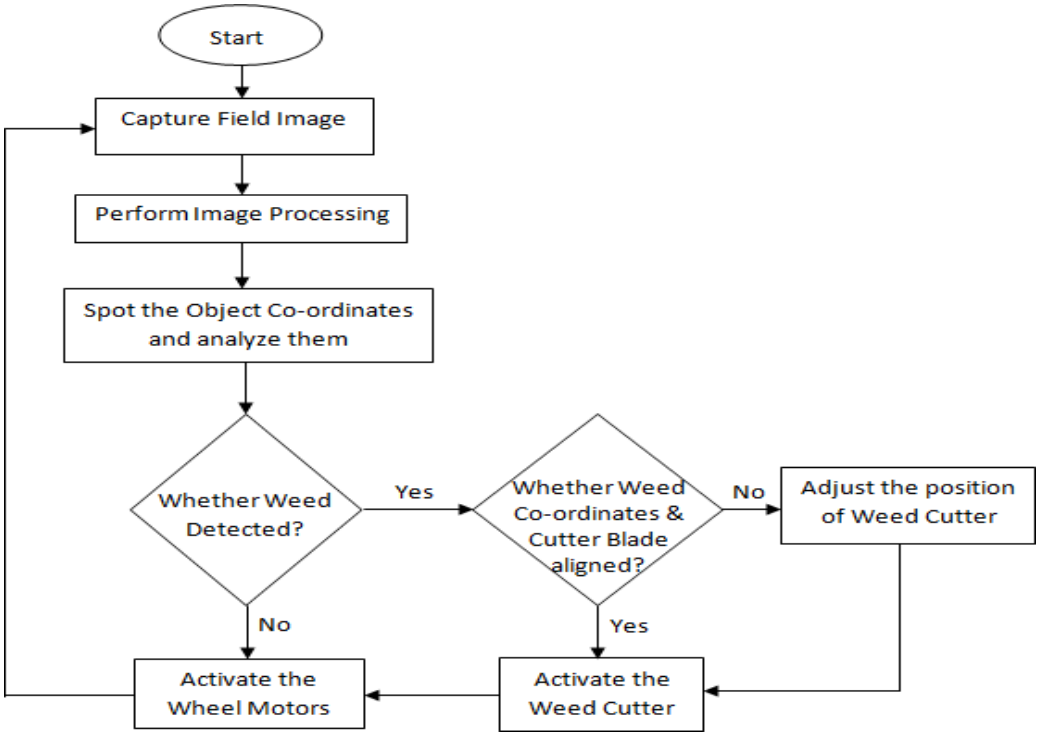

Fig 3: Flow chart

B. *Image Processing Algorithm*

The field image captured is processed by the Raspberry Pi board. The image passes through various stages of processing. Initially, image pre-processing is performed to suppress unwanted distortions and to enhance some image features important for further processing. The pre-processing stages include blurring, colour space conversion, masking within a range, erosion and dilation.

Step 1:	Image pre-processing
Step 2:	Find contours of entire plant region
Step 3:	Obtain co-ordinates of plant region from contour values
Step 4:	Bound the contours using rectangles and number them
Step 5:	Consider each bounded area and analyze the co-ordinate values to determine size
Step 6:	Classify contours on lower half with smaller size as weeds and those on upper half and larger size as crops
Step 7:	Check if there is enough space between the co-ordinates of classified weed and crop
Step 8:	Confirm the presence of weed when criteria in step 6 & 7 are met
Step 9:	Use the confirmed weed's co-ordinates for alignment of weed cutter

C. *Hardware Setup*

The entire system is mounted on a four-wheeled robot. Thestructure comprises of aluminum chassis and wheels with geared motors are attached to the robot for movement as shown in figure.4

Fig 4: Overall System Implementation

The weed cutter is moved from the base position to the crop row upon identifying weed as a result of image processing. To implement this movement rackand pinion arrangement is made. When the weed cutting motor is activated by the signal from Raspberry Pi board, the blade attached to the motor shaft rotates at very high speed causing the weed in the region tobe cut off.

V. RESULTS

A sample weed is taken in front of raspberry Pi camera. Image capturing is performed by Pi Camera to detect weed as shown in figure 5**.**

Fig 5: Weed Image Captured by robot

The captured image then goes through different stages of processing like blurring, colour space conversion, thresholding, erosion and dilation to detect the presence of weed. The final result of the various images processing stages is shown in Fig.6.

Fig 6: Image after Processing

Figure 6 shows the final result after detecting weed the cutting action has been taken on that weed using cutting mechanism.

CONCLUSION

Automatic weed detection and removal based on image processing addresses this issue. The proposed system for weed management is set up on a four-wheeled robot. The systemis deployed in the field where crop is cultivated row- wise. The robot movement in the real field can be achieved. Colour images with required quality are obtained from the field using Pi Camera. Images are captured sideways, unlike the usual practice of taking the top view of plants. Image processing focuses on the plant size and colour rather than their shape and is done by the Raspberry Pi board. Weeds growing among the crops are detected successfully. The alignment of cutter and its activation based on the image processing result is also carried out efficiently.

ACKNOWLEDGEMENT

We would like to express our deepest appreciation to all those who provided us the possibility to complete this project. A special gratitude we give to our Principal Prof. Dr. N. G. Narve, whose contribution in stimulating suggestions and encouragement, helped us to coordinate this project.

REFERENCES

[1] Aravind R, Daman M, and Kariyappa B. S., "*Design and Development of Automatic Weed Detection and Smart Herbicide Sprayer Robot*," IEEE Recent Advances in Intelligent Computational Systems (RAICS), Trivandrum, Dec. 2015, pp. 257-261.

[2] Ajinkya Paikekari, Vrushali Ghule, Rani Meshram, and V.B. Raskar, "*Weed Detection using Image Processing*," Int. Res. J. of Engg. & Tech. (IRJET), vol. 3, no. 3, Mar. 2016, pp. 1220-1222.

[3] R. Anirudh Reddy, G. Laasya, T. Sowmya, P. Sindhuja, and Mudasar Basha, "*Image Processing for Weed Detection*," Int. J. Engg. Tech., Mngmt & Applied Sci.(IJETMAS), vol. 5, Apr. 2017, pp. 485-489.

[4] Amir H. Kargar B, and Ali M. Shirzadifar, "*Automatic Weed Detection System and Smart Herbicide Sprayer Robot for corn fields*," Proc. 2013 RSI/ISM Int.Conf. Robotics &Mechatronics, Tehran, Feb. 2013, pp. 468-473.

[5] G. Y. Rajaa Vikhram, Rakshit Agarwal, Rohan Uprety and V. N. S. Prasanth, "*Automatic Weed Detection and Smart Herbicide Sprayer Robot*," Int. J. Engg. & Tech., 2018, pp. 115-118.

[6] Riya Desai, Kruti Desai, Shaishavi Desai, Zinal Solanki, Densi Patel, and Vikas Patel, "*Removal of weeds using Image Processing: A Technical Review*," Int. J. Adv. Comp. Tech. (IJACT), vol. 4, no. 1, pp. 27-31.

[7] Amruta A. Aware, Kavita Joshi, "*Crop and Weed Detection Based on Texture and Size Features and Automatic Spraying of Herbicides*," Int. J. Advanced Research in Computer Science and Software Engg., vol. 6, no. 1, Jan. 2016, pp. 344-350.

[8] A Book by Rafael C. Gonzalez and Richard E. Woods, "*Digital Image Processing*", 3rd edition.

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IOT Based Solar Street Light Intensity Control System

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Abstract - This project presents the IOT based solar street light intensity control system. The Sunlight Tracker Solar Powered IOT Based Light Control System is the subject of this project's abstract. This idea aims to save energy and lessen pollution brought on by finite resources. Due to its low cost and open source nature, it is implemented using an Arduino Uno. The purpose of this system is to interact with the Arduino Uno board to control the lighting system while using IR sensors to detect human presence in the immediate area. The intelligent system operates in accordance with presence and sets up the lighting's dimmer and control system while also operating the solar tracker concurrently. By following the sun's path, the solar tracker receives sunlight more effectively than a traditional solar panel. Key words: LCD, IR emitter, and LDR.

I. Introduction

The project involves automating lighting systems that are powered by solar trackers for effective lighting system use. The current energy crisis is a serious problem because of the rising demand for electricity. Currently, smart lighting guarantees a decrease in energy usage. The IOT-based auto sunshine tracker driven light control system encourages the use of renewable energy in addition to reducing power usage through light management. We accomplish this by continuously monitoring ambient lighting conditions and human presence using IR sensors and LDRs. Compared to a standard solar panel that is stationary, the solar tracker is 30% more efficient. Using the solar energy captured by solar panels will also help us to solve that problem.

II. Methodology

The implementation of an IoT-based Automatic Street Lighting System is the primary goal of this project. As traffic gradually decreases during the late hours of the night, the intensity gradually decreases until morning in order to conserve energy; as a result, street lights turn on at dusk and automatically turn off at dawn. Every day, the procedure is repeated. Traditional HID bulbs are replaced with White Light Emitting Diodes (LED) in the street lighting system to include a dimming capability. The high intensity discharge (HID) lamp, which is typically used in metropolitan street lights, cannot be utilised to modulate the intensity. Because of their high lifespan and minimal energy use, LED lights are the lighting of the future. Due to the ability to alter intensity, LED lights are quickly replacing traditional lighting.

Block Diagram Description:

- Solar panels generate electricity during the day, which is then stored in batteries. Light sensor commands the Arduino controller from dusk to sunrise.
- When there is no motion beneath the streetlight, the programme is carried out, and the LED is turned on to 30% of its maximum intensity. Motion sensor turns on when a human or vehicle approaches a nearby streetlight, and then instructs the Arduino to increase brightness to 100%.

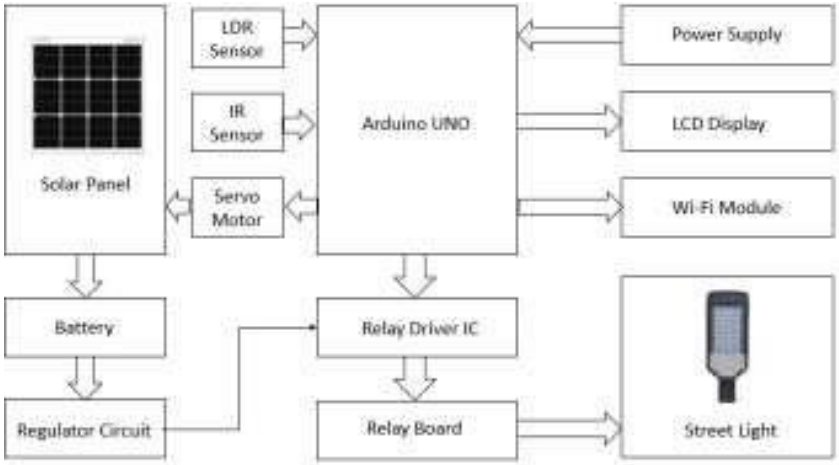

Fig 1 Block Diagram

- If there isn't any movement after a predetermined amount of time, the intensity progressively drops to 30%. When morning comes, LDR will instruct Arduino to turn off the street light.
- Typically, streetlights run on electricity that is stored in the battery. Because of the overcast weather, if the battery is not fully charged, the streetlight will shut off automatically.

Hardware Details

- Arduino Uno
- LDR Sensor
- LED
- Solar Panel
- Battery
- Wi-Fi Module
- Relay
- LCD Display

Software Details

1) **Arduino IDE**

All software development is done in the Arduino Integrated Development Environment (IDE). The Arduino IDE is free software that makes writing code and uploading it to the device straightforward.

2) Blynk App

Blynk is a platform that allows users to operate devices like Arduino, Raspberry Pi, and others remotely via iOS and Android apps. By simply dragging and dropping widgets, you may create a graphic interface for your project on a digital dashboard. You can start fiddling in less than 5 minutes after setting everything up because it's so simple. There is no board or shield that Blynk is bound to. Blynk will get you online and prepared for the Internet of Things whether your Arduino or Raspberry Pi is connected to the Internet by Wi-Fi, Ethernet, or this new ESP8266 chip.

III. Flowchart

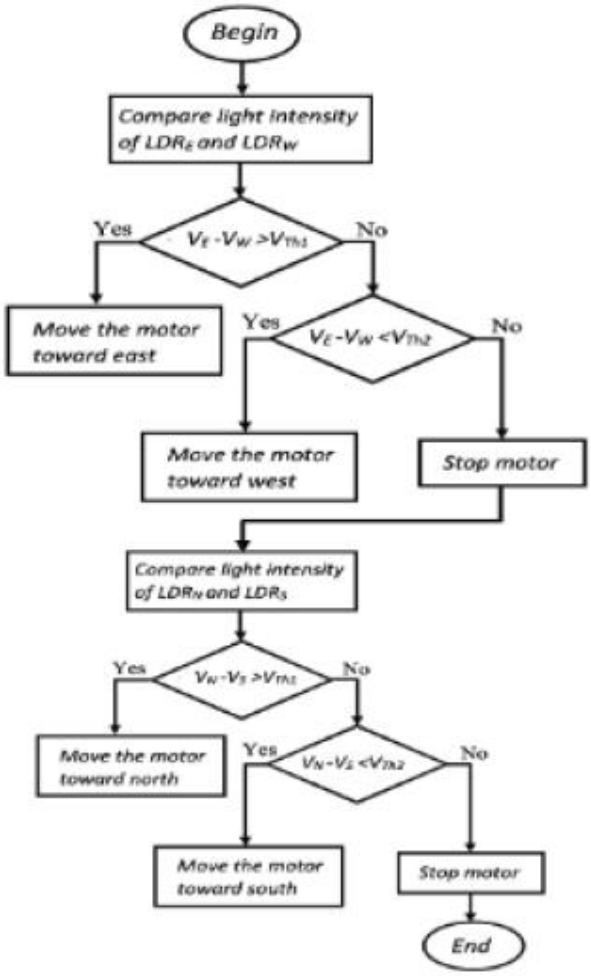

Fig 2 Flowchart

IV. Result

Fig.3 shows as the sun moves 45 degrees, LED brightness becomes high.

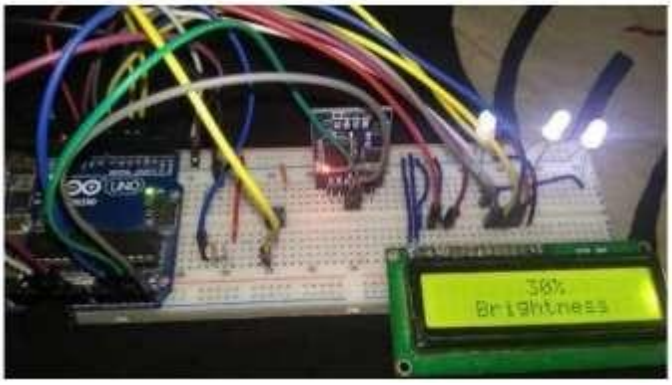

Fig.3. Overall System Implementation

Fig.4 shows output of project on ThingSpeak and on Mobile phone when the LED condition is high and low.

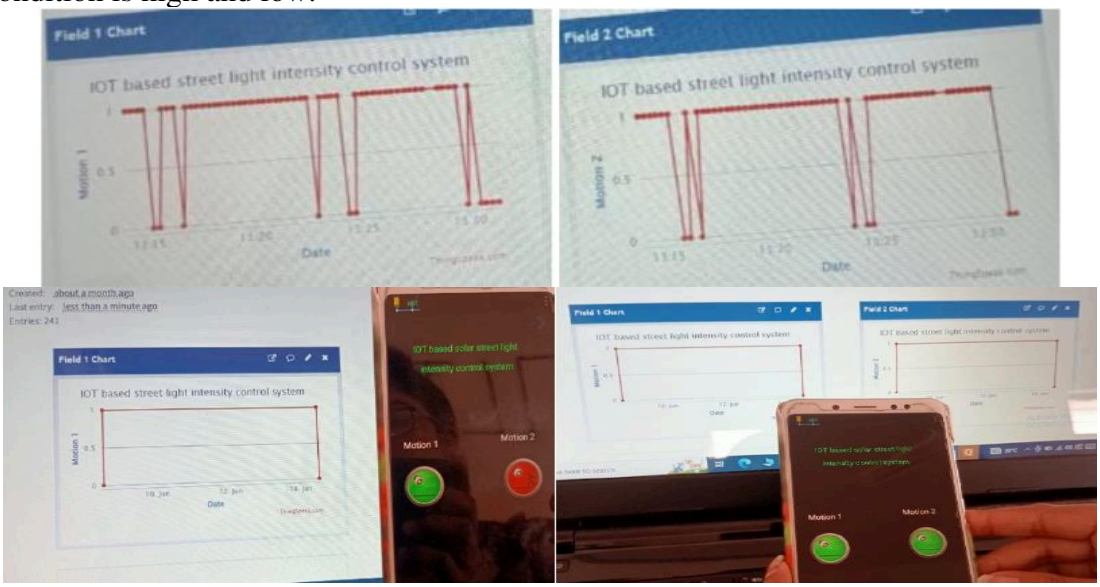

Fig. 4. IOT Based Solar Street Light Intensity Control System Output

V. CONCLUSIONS

Solar tracking systems work by detecting the sun's position and connecting the panel to sunlight in the opposite direction. This project depicts a smart road lighting framework utilizing LED provided by sunlight based energy and with a control system for effective administration. These elements turning ON the lights just when needed, expanding the energy saving and lamp's lifetime.

ACKNOWLEDGMENT

We would like thank our guide Prof. Dr. N.G. Narve for his guidance. We would also like to thank Head of the Department Prof. D.D. Jadhav for his constant motivation and Support. We would also like to thank our principal Dr. N.G. Narve who encourages us.

REFERENCES

[1] Ms. M. Kokilavani, Dr. A. Malathi "Smart Street Lighting System using IOT" Government Arts College, Coimbatore, Tamilnadu.
[2] K.Tamilselvan, K.S. Deepika, A.Gobinath, S.Harhini, S.Gokhulraj "IOT Based Street Light Monitoring System" Nandha Engineering College, Erode, Tamilnadu.
[3] Nithyashree CM, Vinutha TS, M. Dakshayini, P. Jayarekha "IOT-Smart Street Light System" BMSCE, Bengaluru, Karnataka, India
[4] Jessin Mathew, Riya Rajan, Rangit Varghese "IOT Based Street Light Monitoring & Control With loRa/LoRaWAn Network" Mount Zion College of Engineering, Kadammanitta, Kerela, India.
[5] Dr.A.S.C.S.Sastry, K.A.S.K.Bhargav, K.Surya Pavan, M.Narendra "Smart Street Light System using IOT" K L E F, Andhra Pradesh, India.

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REUSE OF WASTE BRICK AS A SUSTAINABLE CONSTRUCTION MATERIALS: A REVIEW

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Abstract

The application of recycled clay brick can not only solve the disposal problem of demolished solid waste but also reduce ecological environment damage caused by the excessive development of resources. The eco-friendly brick is made from recycled industrial waste materials, an environmentally and economically sustainable alternative to clay fired bricks. The application of recycled clay brick can not only solve the disposal problem of demolished solid waste but also reduce ecological environment damage caused by the excessive development of resources. The eco-friendly brick is made from recycled industrial waste materials, an environmentally and economically sustainable alternative to clay fired bricks. Several million tons of solid waste are produced each year due to construction and demolition activities world wide,and brick waste is one of the wide twastes.

Recently, a growing number of studies have been conducted on using recycling brickwaste(RBW)to produce environmentally friendly concrete.

These of brick waste(BW)as potential partial cement or aggregate replacement materialis summarized in this study.It involves a compressive strength test to compare RBA concrete and conventionalconcrete. Trial mixes of RBA concrete were prepared by replacing with 20%, 40%, &60% crushed bricks by volume.

Introduction (TNR -12)

The application of recycled clay brick can not only solve the disposal problem of demolished solid waste but also reduce ecological environment damage caused by the excessive development of resources. The eco-friendly brick is made from recycled industrial waste materials, an environmentally and economically sustainable alternative to clay fired bricks. Several million tons of

solid waste are produced each year due to construction and demolition activities world wide,andbrickwaste isone ofthewidestwastes.

Recently, a growing number of studies have been conducted on using recycling brickwaste(RBW)toproduceenvironmentallyfriendlyconcrete.Theuseofbrickwaste(BW)aspotentialpartialcementor aggregate replacement materialis summarized in this study.

The concept of sustainable development includes energy conservation, environmental protection, and protection of nonrenewable natural resources. Because of limited landfill space and costly natural aggregates, the application prospect of crushed clay bricks as a new civil engineering material must be investigated. Waste reuse and recycling is a method of energy conservation in modern society. Reuse of clay bricks as aggregates not only reduces the problem of waste storage but also helps to preserve natural aggregate resources.

OBJECTIVES

- To study the suitability of recycled brick as cement replacement to natural coarse aggregate.
- To study the behaviour of compressive strength.
- Make a suitable concrete for construction by using brick waste.
- To promotes sustainable development and minimizes the exploitation of finite resources.
-

LITERATURE REVIEW

1.NaraindasBheel,KRajeshKuma,AshokKumar,RehanaBhagam,Adeyemi Adesina , ShankerLal Meghwar and Noor Ahmed Memon "Innovative use of brick wastes as coarse aggregate in concrete" Coarse aggregates occupy the largest volume in concrete which is one of the mostwidely used construction material as per industry surveys. The depleting supply of coarse aggregate coupled with the high greenhouse gassese Missions from its processing and transportation has resulted in a need to find alternatives that can beutilized as coarse aggregate. Of such materials that are available in abundance locallyin Pakistan are brick wastes that are generated from the construction and demolitionprocesses. In order to evaluate the feasibility of using brick wastes as coarse aggregatein producing concrete, this study wasundertaken. Six concrete

mixtures were madeby incorporating brick wastes as a replacement for the natural coarse aggregates and the corresponding properties evaluated. The properties evaluated are the slump, density, compressive strength and flexural strength. Results from this study indicated that the use of brick wastes as coarse aggregates in concrete resulted in a decrease in the slump and mechanical properties. However, concrete mixtures incorporating brick wastes up to 100% replacement of natural coarse aggregate exhibited flexural and compressive strength higher than 2 MPa and 10 MPa respectively.

3.Duaa Jabbar Abdullah, Dr. Zena K Abbas, Dr. Suhair kadhem abed
"Study of Using of Recycled Brick Waste (RBW) to produce Environmental Friendly Concrete"
Study of Using of Recycled Brick Waste (RBW) to produce Environmental FriendlyConcreteSeveralmilliontonsofsolidwastearepro ducedeachyearduetoconstruction and demolition activities worldwide, and brick waste is one of the widestwastes.Recently,agrowingnumberofstudieshavebeenconductedonusingrecyclingbrickwaste(RBW)toproduceenvironmentallyfriendlyconcrete.Theuseof brick waste (BW) as potential partial cement or aggregate replacement materials is summarized in this review, where the performance is discussed in the form of the mechanical strength and properties related to the durability of concrete. It was found that, because of the pozzolanic activity of clay brick powder, it can be utilized as acementsubstituteinreplacementlevelsupto10%.Where as for natural coarse aggregate, recycled aggregate can be used instead of it, but at a limited replacementlevel.Concretemanufacturingfromrecycledaggregatecangiveadequate strengthand can be suitable for producing medium or low strength concrete. On the other side,the utilization of fine recycled brick waste as aggregate in concrete manufacturing provides development of the properties of concrete. It develops the durability of concrete in some cases when used with replacement level up to 10% by the weight offine aggregate.

4.Farid Debib and Said Kenai studied the effect by partially replacing the studied the effect by partially replacing the fineandcoarse aggregate with crushed clay brick in concrete.

The compressive strength and split tensile tests were conducted on concrete at the replacement levels of 25, 50,75 and 100%. The authors reported a relatively low density for crushed brick concrete than normal concrete. The substitution levels of 25% for coarse aggregate and 50% for fine aggregate were ported from the test results.

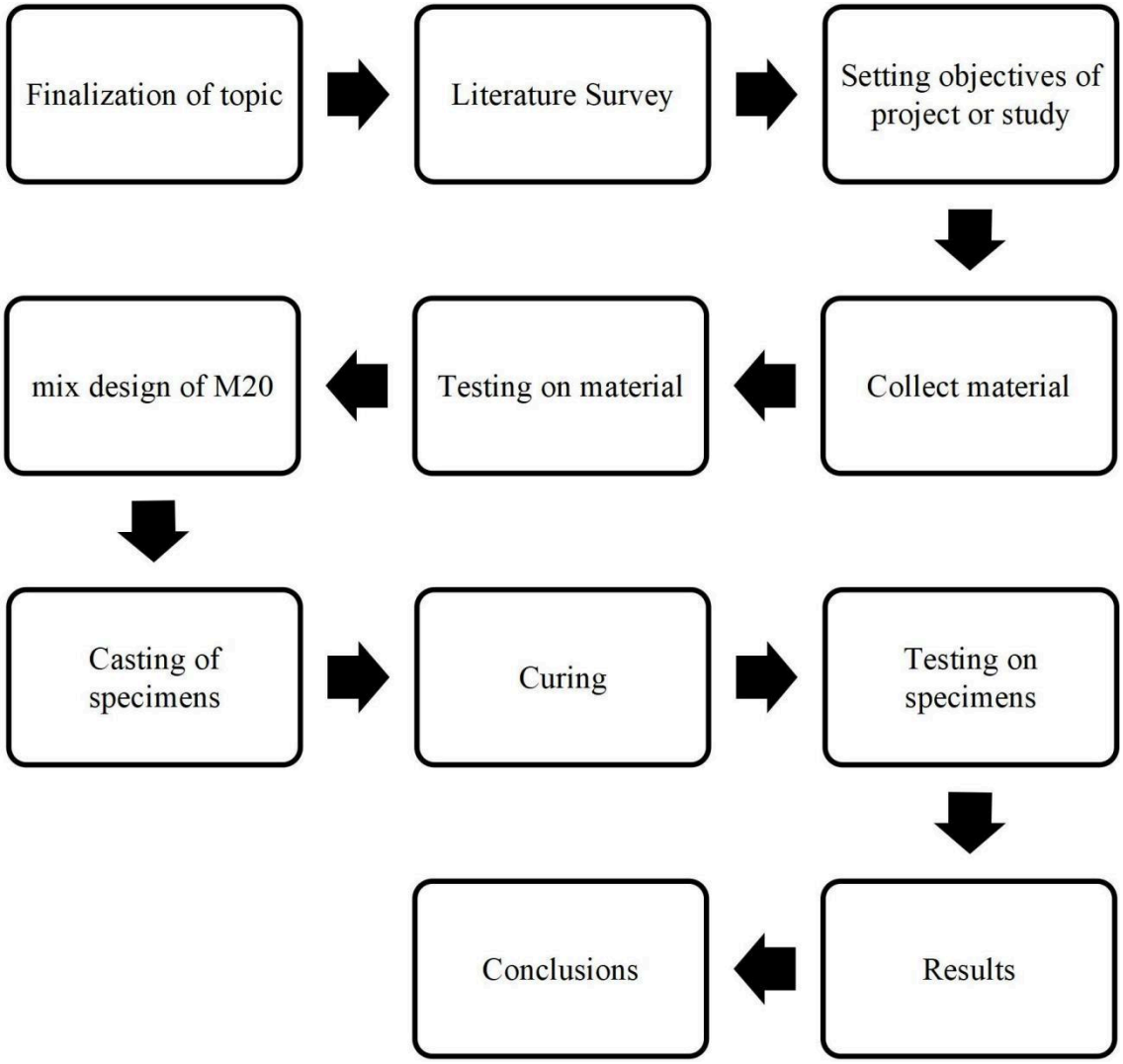
and split tensile tests were conducted on concrete at the replacement levels of 25, 50,75 and 100%. The authors reported a relatively low density for crushed brick concrete than normal concrete. The substitution levels of 25% for coarse aggregate and 50% for fine aggregate were ported from the test results.

5.Vikash Kumar Gautam, Mr. Devesh Jaysawal "Use of over burn crushed Brick as Coarse Aggregate in Concrete mix"

The study during this paper is administered to check the practicability of exploitation crushed overburn bricks to alternate the coarsemixture(gravel) inconcrete.2kindsof concrete intermixture are ready. the primary one may be a mixture of 1:2:4 whilenot crushed over burn bricks and is employed as a reference mixture .The other isformed of various weight of crushed over burnbricks(asaproportionfromtheloadof the coarse aggregate). a complete of thirty numbers of concrete specimens arecasted with and while not crushed over burn bricks and tested below compression and split tension as per relevant to British commonplace specifications. Take a look at results indicated that mistreatment crushed bricks reduces the strength of concrete. Also, the proportion of water to cement magnitude relation will increase for constant slump once the proportion of crushed bricks augmented. The results indicate that the crushed over burn brick are appropriate to switch the granite mixture in concrete production.

Trial mixes of crushed over burn brick concrete were by substitution the Granite Aggregate with 25%, 50%, 75% and 100 percent crushed over burn bricks by volume. M20 grade of each Granite aggregate and crushed over burn brick concretes were ready and tested to match the compressive strength. The take a look at results showed that it's do able to provide crushed over burn brick concrete with characteristics like those of Granite aggregate concrete with 25 % replacement.

Methodology



Conclusion

The recycled brick waste (RBW) together with partial replacing a part of natural aggregate in the specified concrete mixture composition are declared as materials suitable for the production of concrete.

Compressive strength of recycled brick aggregate is decreases with increase in percentage of replacement.

RBA is suitable for parking area, partition wall, footpath; cycle path etc.By using this method waste can be optimized it is good for sustainable development.

References

[1] A. Rao, K. N. Jha, and S. Misra, "Use of aggregates from recycled construction and demolition waste in concrete," Resources, Conservation and Recycling, vol. 50, no. 1, pp. 71–81, 2007.

[2] Z. Xiao, T.-C. Ling, S.-C. Kou, Q. Wang, and C.-S. Poon, "Use of wastes derived from earthquakes for the production of concrete masonry partition wall blocks," Waste Management, vol. 31, no. 8, pp. 1859–1866, 2011..

[3] S.Manfredi, R. Pant, D. W. Pennington, and A. Versmann, "Supporting environmentally sound decisions for waste management with LCT and LCA," The International Journal of Life Cycle Assessment, vol. 16, no. 9, pp. 937–939, 2011..

[4] R. A. Robayo Salazar, P. E. Mattey Centeno, Y. F. Silva Urrego, D. M. Burgos Galindo, and S. Delvasto Arjona, "Construction and demolition wastes: analysis of its management and reuse in Cali," Revista Tecnura, vol. 19, no. 44, pp. 157–170, 2015.

[5] M. Lennon, Recycling Construction and Demolition Wastes: A Guide for Architects and Contractors, Commonwealth of Massachusetts, Department of Environmental Protection, Boston, MA, USA, 2005.

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THD analysis using Three and Five Level Inverter

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Abstract-**The main disadvantage of Inverters is total harmonic distortion (THD) and harmonics. In this article, harmonics and THD are examined. A stepped multilevel inverter topology is used to suppress the harmonics generated at the inverter output. Cascading multilevel inverters are most useful for fuel cell orbattery storage power. The rated voltage of the battery is low and the cascade inverter input must be low voltage to get 230 v output. The harmonics of the single-phase load and the inverter output are investigated. Compare the harmonics and THDs of 3 and 5-level stepped multilevel inverters with conventional inverter drives. The multilevel inverter topology suppresses harmonics and THD. The result was analyzed using hardware with a spartan-3 FPGA board.**

Keywords— Inverter, Total Harmonic Distortion, cascaded multilevel inverter, 3 and 5- level MLI, Spartan-3 FPGA.

I. Introduction

Normal inverter drive or two-phase inverter drive is the most common inverter drive. Inverters have built-in harmonics that can cause the electrical power or load to heat up and shorten the life of the equipment. These concessions must be removed or eliminated and the easiest or first measure to remove the concessions is to filter the load and the inverter. filters are capacitors and inductors connected in different ways , these filters are very large and expensive. It is difficult to design and create the necessary filters. For high voltage and high power applications, multilevel (ML) inverter is a promising inverter topology and the delay introduced by these filters should be calculated . This type of inverter makes different steps of DC voltage to produce a stepped AC output that is almost a pure sine wave. Multilevel, better performance, reduced switching and switching frequency, strong power waveform, reduced dv/dt stress, low harmonics**,** low voltage measurement, etc. has advantages. Compared with 2-level inverters, the multiphase is more reliable in speed. Multilevel inverters will limit harmonics, thus reducing filter size and cost. The switching device is switched on and off in a special pattern using different DC levels to form a multi- stage device to obtain the AC output voltage and obtain the appropriate voltage from the elimination of various relationships that would cause the AC voltage output. The amount of harmonic distortion is the smallest [1]. In this paper, a multilevel inverter topology (cascade) is used to suppress harmonics. The simulation works with 3-level and 5-level inverter topologies. The idea of H bridge inverter is connected in series to get sinusoidal output voltage. The voltage produced at the output is the sum of the voltages produced by each cell. 2n+1 output voltage levels are generated, where n

represents the number of batteries. Cascading ML inverter has the advantage of using less material co mpared to terminal ML or clam-ping diode, which means the inverter is heavier than the previous two types. The number of transformers required for the n-level cascade H-bridge multilevel inverter is 2(n-1), where n represents the number of output voltage levels. Due to scarcity of fossil resources and environmental concerns, there is an increasing demand for renewable energy systems in today's world climate [2]. The most common renewable energy sources are photo-voltaic systems. The challenge is to match the output voltage and frequency to connect these systems to the grid. In photovoltaic (PV) or fuel cell (FC) applications, copper is used to lower or increase the differential and lower output voltage of the fuel cell or photovoltaic panel. The voltage and frequency req uired for the grid connection can be obtained via an inverter. Multilevel inverter can use renewable energy as it can get high power. When the multilevel inverter output voltage increases, the voltage rating of the drive does not increase. For static var generation recording, stepwise multilevel inverters hav e been proposed as renewable energy and suitable for battery use. These inverters allow renewable energy systems to be connected directly to the grid without the use of large and expensive equipment [3]. Compa red with the traditional inverter, the output voltage of the multistage inverter is stepped using the DC bus voltage, which is close to the sinusoidal voltage. The sign of a stepped output voltage suppresses the harm onic content, thereby reducing the size of the output filter. In this case, an induction motor is used as the load. Asynchronous motors consume 40% of the power and in all applications the body speed is not the measured speed. The most common control method is to use v/f, which obtains the desire d motor power by varying the frequency and voltage [12]. In this study, the simulation of the motor operat ing at 7Hz frequency was also carried out and the simulation results were obtained.

II. Multi-Level Inverter

A. Three Level Inverter

A 2-level and 3-level inverter design is nearly similar. There are two times as many regulators required in phase-leg each. The diodes are connected between upper and lower two valves. These diodes act as clamping diodes. They are connected to "n" midpoint among capacitor C1 and capacitor C2, as shown in the below figure. The "n" is neutral point. The DC-bus is built by using capacitor C1, and C2. These capacitors charged and store maximum voltage up to half i.e., Vdc/2. By using additional phase-leg, line-to-line voltage output can be obtained with additional levels. To build 0 voltages at output, the two switches are on which are closer to the midpoint and diodes (clamping) hold the voltage to 0 with respect to ground point. For getting additional voltage levels, more pairs of valve, capacitors, and diodes (clamping) are needed to be add in the design.

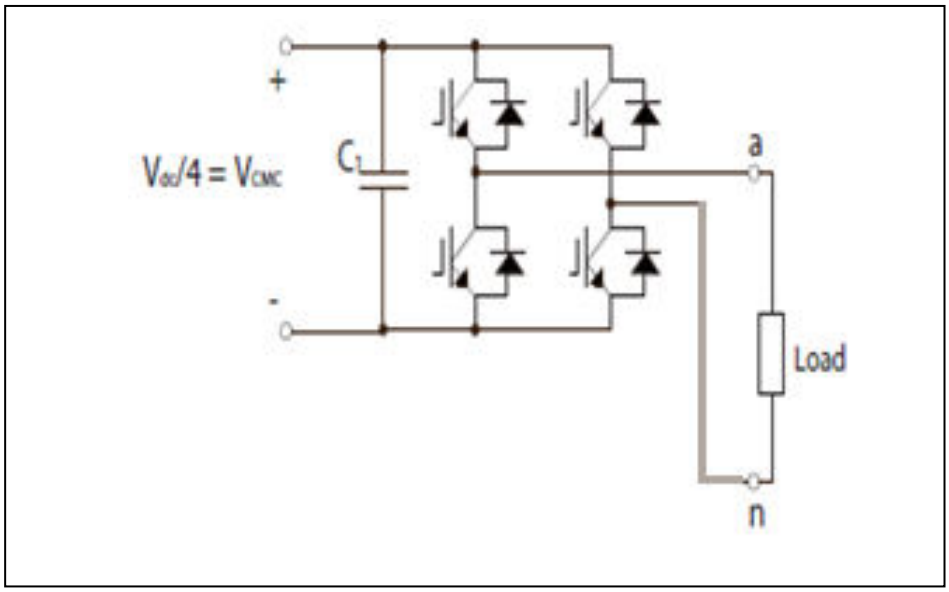

Fig. (1) 1-phase, 3-level inverter

Output Voltage	Switch state			
	S1	S2	S3	S4
0	0	0	1	1
+ Vdc/4	1	0	1	0
- Vdc/4	0	1	1	0

Table 1: States of Switches in a 3-level Cascaded Inverter.
"1" represents turned on and "0" represents turned off.

B. Five Level Inverters

In Figure (2) a base of a 5-level cascade multilevel inverter is drawn. Each Module considered as a full bridge. Hence only these modules form the CMLI topology. A full-bridge module is having at least a 3-level CMLI, and all modules cascaded to it extend the inverter to two voltage levels. In Figure 3.5b, the 2full-bridge modules produce 5 different voltage levels that can be used. Suitable applications for CMLI are, for example, where battery, photovoltaic or fuel cells are used. One example is an electric vehicle that has multiple numbers of cells (power).

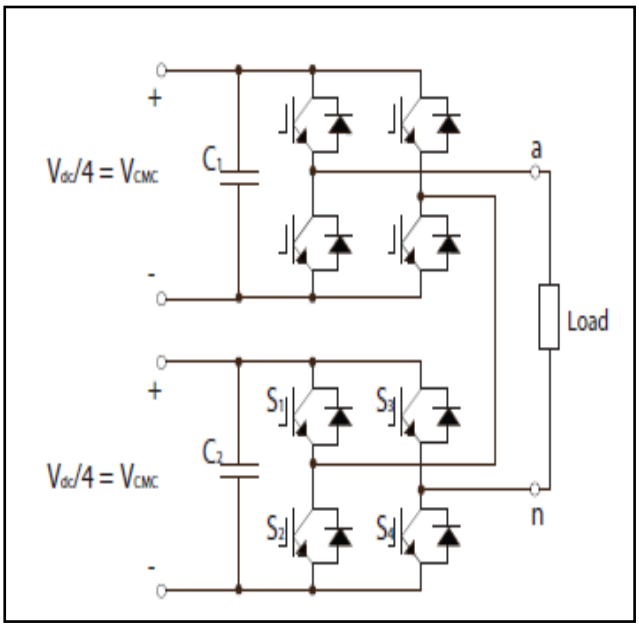

Fig. (2) 1-phase, 5-Level inverter

If adding outputs of all modules of full bridge in the inverter results in getting total voltage output and all full bridges can produce 3 voltages VCMC, 0 volt and -VCMC. CMLI turns a switch of a full-bridge module on (and off once) to change a phase output voltage level. For full-bridge modules that add VCMC voltage, switches number S1 and S4 are on, and for -VCMC, switches number S2 and S3 are turned on. 0 V if current is flowing via the full bridge. This is accomplished by turning on the 2 switches in the upper half of the full bridge (S1 and S3) or the 2 switches in the lower half (S2 and S4). Some full bridges can create stepped stepped waveforms. The maximum value of voltage output is

$$1/2\ (m-1) * VCMC = s\ VCMC = 1/2\ Vdc$$

and the minimum value of voltage is

$$1/2\ (m-1) *(-VCMC) = s\ (-VCMC) = (-1/2Vdc)$$

Where m indicates number of output levels and s indicates the number of modules of full bridge. Note that the CMLI can output total value of the voltage source in both positive and negative directions. The magnitude of the total source (voltage) is DC bus that is why the sum of the DC side voltages In Figure 2.5, it is Vdc/2, not Vdc. All connected full-bridge inverters can give the same voltage, creating the very scalable topology.

The output voltage with switch status is shown below. In this table, some output voltages are repeated and are called redundant states.

Output Voltage	Switch state							
	S1	S2	S3	S4	S1'	S2'	S3'	S4'
0	0	0	1	1	0	0	1	1
+ Vdc/4	1	0	0	1	0	0	1	1
- Vdc/4	0	1	1	0	0	0	1	1
+Vdc/2	1	0	0	1	1	0	0	1
-Vdc/2	0	1	1	0	0	1	1	0

Table 2: States of Switches in a 5-level Cascaded Inverter.
"1" represents turned on and "0" represents turned off.

III. Results

The above circuit is built using FPGA board Spartan-3 Family. This family of FPGA is mainly designed to as per needs like high-volume and applications in cost-sensitive consumer electronics. The device used here is FPGA XC3S400PQ208.

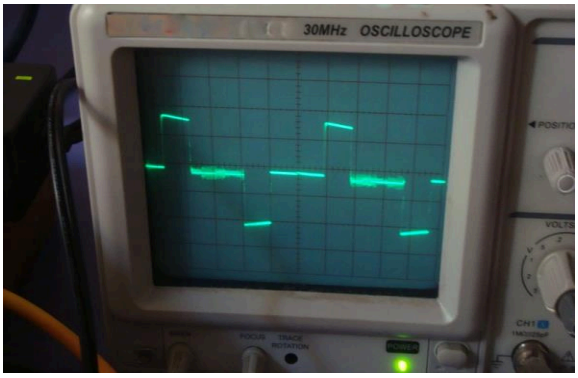

Fig. (3) output of 1-phase, 3-level inverter

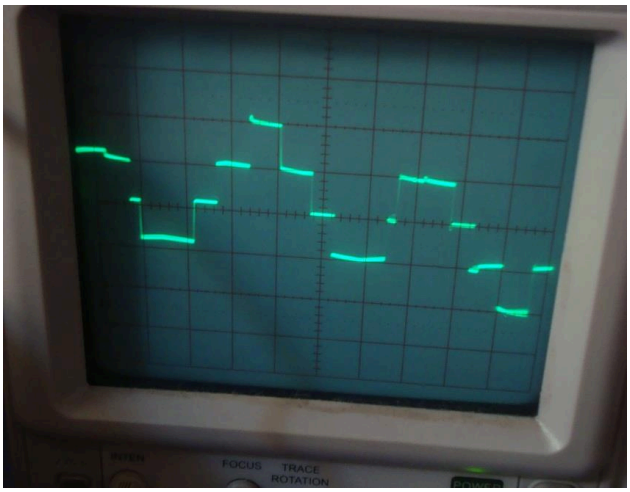

Fig. (4) output of 1-phase, 5-level inverter

Figure (3) and (4) shows output waveforms of 3 and 5 level inverters respectively. Fig. (5) and (6) shows the harmonics results of 3-level and 5-level cascaded H-bridge ML Inverter respectively.

Fig. Harmonics generated by 3-level Inverter across resistive load

Fig. Harmonics generated by 5-level Inverter across resistive load

Hence the Total Harmonic Distortion generated as

Type	% of THD
3-Level	80.10
5-Level	29.6

IV. Conclusion

The harmonic analysis and THD of 3-level and 5-level inverters using Spartan-3 hardware are examined and the results are compared with 1-phase 3 and 5-levels H-bridge multilevel inverter drivers. The results show that the harmonic can be reduced by increasing the number of levels in voltage of the

inverter. From this we conclude that H-bridge stepping ML inverters are used to drive the harmonics and THD can be reduced by increasing the level.

References

[1] Rajesh B, Manjesh, 'Study and analysis of THD and content of Harmonics in Three Phase PWM Inverter with Filters," International Journal of Advance Electrical and Electronics Engineering, Vol.3, Issue 3, 2014

[2] Ananda A S, Manjesh, "Analysis and comparison of THD in Five Phase PWM Inverter drive using Resonant Filter," International Journal of Advance Electrical and Electronics Engineering, vol. 3 issue. 3, 2014

[3] Dr. Manjesh and Ananda A S, "Study and analysis of THD & Power factor in Single phase Inverter with Flyback Thyristor Converter", International Journal of Advance Electrical and Electronics Engineering (IJAEEE) ISSN (Print): 2278-8948, Volume-3 Issue-4, Pg 5-8, 2014.

[4] Okelola, M.O and Ajenikoko, G.A, "Investigation of Total Harmonic Distortion; A Case Study of some office equipment", International Journal of Advanced Scientific and Technical Research ISSN 2249-9954, Issue 8 volume 4 July-August 2018, Pg 17-23.

[5] Neerparaj Rai, Sandeep Chakravorty, "Evaluation and Minimization of Total Harmonic Distortion in Three-Phase Two-Level Voltage Source Inverter with Low Switching Frequency", International Journal of Power Electronics, Vol. 16, No. 1-July-2022

[6] Ms. Sritika Shadev Haldar, Mr. Rushikesh kishore Zagade, Mr.Digvijay Popat Pawar, Ms. Sanjana Macchindra Shete, Prof.Pranita chavan, "Harmonics Detection and Measurement in Power System" International Journal of Innovative Research In Technology, ISSN: 2349-6002, Volume 6 Issue 12, Pages: 411-416

[7] Liqaa Alhafadhi, Jiashen Teh, "Advances in reduction of total harmonic distortion in solar photovoltaic systems: A literature review", International Journal of Power Electronic, International Journal of Energy Research, Volume: 44, Issue: 4, Pages: 2455 – 2470.

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Demand side Load Management Using AT 89s52 Microcontroller with renewable energy

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Abstract:

High power consumers, such as industries, require substantial electricity loads for their production processes. They are assigned a maximum demand limit by the electricity board, which represents the highest power drawn from the grid by the consumer during any 30-minute interval within the billing period. It is the responsibility of these consumers to ensure that their power consumption remains within this limit. Failure to do so results in significant penalties. Monitoring consumption manually is challenging and prone to errors, leading to additional charges on bills, which can be substantial. Therefore, controlling the maximum demand is crucial. To address this issue, the industry has categorized its loads as vital and non-vital. We propose a system that effectively manages maximum demand. When the demand exceeds the predefined maximum value, a sensor detects it and sends a signal to a microcontroller, specifically the AT89S52 model. The microcontroller then transfers non-vital loads from the main power supply (MSEB) to renewable energy sources instead of turning them off completely. The system utilizes renewable energy generated from solar panels and/or windmills. By doing so, we can ensure that the maximum demand remains within safe limits without cutting power to non-vital loads.

Introduction:

Voltage and frequency stability are critical concepts in the operation of a power system. Instability in these parameters poses significant threats to the overall security of the system. Factors such as short circuits, increased load, and insufficient generation capacity can disrupt both voltage and frequency, potentially leading to a complete system blackout. As the demand for electrical energy continues to rise in developing countries like India, efficient energy management becomes paramount. It is crucial to ensure that every load connected to the grid receives an adequate energy supply. Currently, there is an imbalance between the

demand for and supply of electrical energy. In this paper, we propose a system that manages electrical loads by categorizing them as vital or non-vital. Existing solutions typically involve turning off non-vital loads when the system approaches maximum demand in order to maintain the limit. However, we have developed an innovative solution that eliminates the need to shut down non-vital loads. Instead, we leverage renewable energy sources, such as solar panels and windmills, to address this challenge. The energy generated from these sources is intelligently stored in batteries and used during periods of maximum demand. By shifting non-vital loads to renewable energy, we gain better control over the maximum demand while ensuring a continuous power supply.[1]

Design of the system:

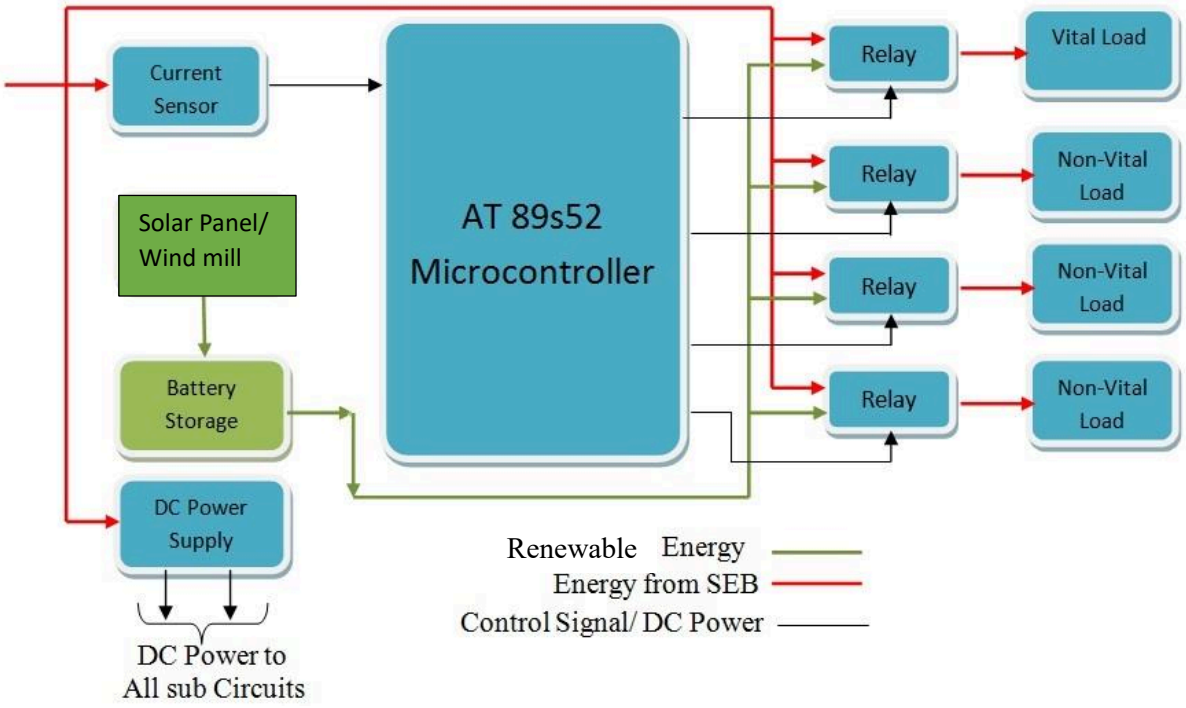

Figure 1 Block diagram of Maximum Demand Controller Using AT89s52

Working:

Here energy generated from solar panel and wind mill is stored inside batteries. The incoming supply is given to all loads through CT. The priority loads are controlled through relays connected to port P2. The maximum demand is sensed with the help of CT. The output of CT is interfaced with the microcontroller at pin P1.1 through the signal conditioner circuit. If the

CT output exceeds the set value, the Load1 connected to pin P2.0 is shifted on renewable energy. The microcontroller then again compares CT output to the set value of maximum demand. If it finds the maximum demand greater than set value then, Load2 connected to pin P2.1 is shifted on renewable energy. The process is carried out continuously. If the maximum demand is greater than set value after shifting of load4 then, microcontroller trips the critical load itself. If microcontroller finds that the CT output is less than set value of maximum demand then, the loads connected to port P2 are turned according to reverse priority.[2]

Flow chart

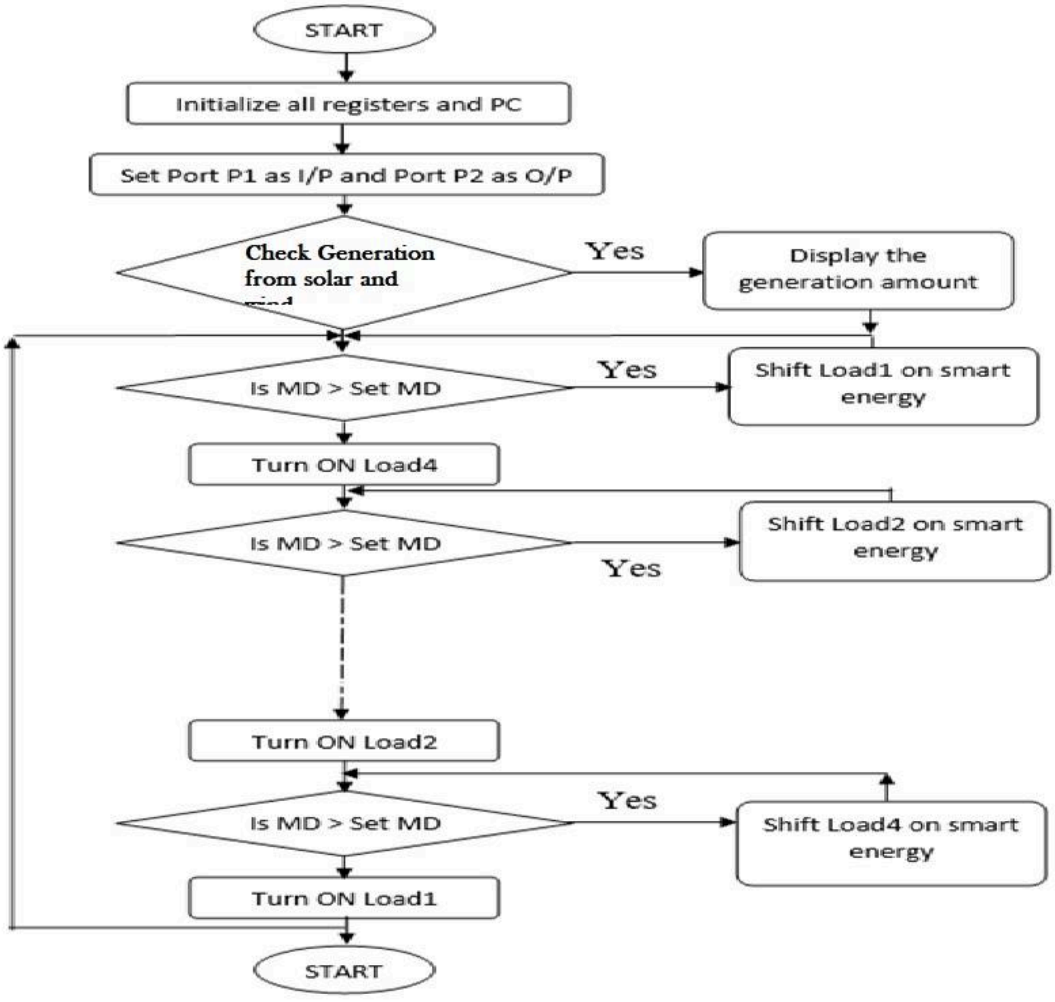

Figure 2 Flowchart of Maximum demand controller using AT 89s52

Controller:

The microcontroller used here is AT 89s52 and is having features like

- Compatible with MCS-51® Products
- 4K Bytes of In-System Programmable (ISP) Flash Memory – Endurance: 1000 Write/Erase Cycles
- 4.0V to 5.5V Operating Range
- Fully Static Operation: 0 Hz to 33 MHz
- Three-level Program Memory Lock
- 128 x 8-bit Internal RAM
- 32 Programmable I/O Lines
- Two 16-bit Timer/Counters
- Six Interrupt Sources
- Full Duplex UART Serial Channel
- Low-power Idle and Power-down Modes
- Interrupt Recovery from Power-down Mode
- Watchdog Timer
- Flexible ISP Programming (Byte and Page Mode) [3]

Conclusion

The aim of this system is to design and implementation of "Demand side Load Management Using AT 89s52 Microcontroller with renewable energy". It senses the maximum demand with the help of Current Transformer, and maintains the continuous supply to the critical load by shifting low priority loads on to a renewable energy, instead of turning it OFF. The system is applicable at the firms and organisations where two-part tariff is applied.

References

[1] E Vinod Arun Kumar[1], U Ramesh Babu[2], P Venkata Sarath[3] "MAXIMUM DEMAND CONTROLLER FOR HT INDUSTRY" *INTERNATIONAL JOURNAL OF CURRENT ENGINEERING AND SCIENTIFIC RESEARCH (IJCESR) ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-6, ISSUE-3, 2019.*

[2] Apurva A. Bhagwat[1], Shraddha A. Bhagwat[2], Priyanka S. Deshmukh[3], Yatin P. Bisne[4], Chandrakant L. Bhattar[5] "Maximum Demand Control using Microcontroller AT89c51" *IOSR Journal of Electrical and Electronics Engineering (IOSR-JEEE) e-ISSN: 2278-1676, p-ISSN: 2320-3331, PP 18-23*

[3] Datasheet of Atmel AT89s52 from Atmel corporation 2001 Rev.1919A-07/01/xM

[4] E Vinod Arun Kumar[1], U Ramesh Babu[2], P Venkata Sarath[3] "MAXIMUM DEMAND CONTROLLER FOR HT INDUSTRY" Technical Research Organisation India ISSN (PRINT): 2393-8374, (ONLINE): 2394-0697, VOLUME-6, ISSUE-3, 2019

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Workshop Inventory Management System

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Abstract:
Inventory management involves overseeing and organizing goods in a facility, managing the flow of goods from manufacturers to warehouses and to the point of sale. It includes acquiring and maintaining merchandise assortment, handling orders, logistics, returns, and controlling costs. It is crucial for business operations.
Advancements in technology and software applications have revolutionized inventory management. Functions in an organization are interconnected, making inventory management important for marketing managers and finance controllers. It impacts the supply chain and financial health of the balance sheet.
Maintaining optimum inventory is vital for organizations to meet requirements and avoid over or under inventory. Inventory is dynamic, requiring constant evaluation of internal and external factors through planning and review. Dedicated inventory planners monitor and control inventory, collaborating with production, procurement, and finance departments. They ensure effective inventory management.

Overall, inventory management is the backbone of business operations, ensuring smooth flow of goods and influencing financial figures. It requires continuous evaluation, careful control, and collaboration among different departments to maintain optimal inventory levels.

Keywords: *Inventory Management System (IMV), Java, Xampp Server, Database.*

I. INTRODUCTION

The present scenario offers manual data entry. A lot of time is wasted in creating the reports as well as maintaining them. In case, if you want to manage the inventory of products i.e. totals products coming and no. of remaining products, the whole report is re-typed or xeroxed. This seriously affects the authentication of the system. This kind of Inventory Management System is totally outdated and involves high risk of ambiguity and redundancy. Managing inventory can be very challenging, and when you are a growing business it can be really painful.

If you are facing issues in tracking your inventory and if it is getting difficult for you to optimize your warehouses and storage facilities then you have come to the right place. The problem of competition is increasing in global market place. It has forced the firms to consider

ways of improving the inventory control system. Severe competition makes it necessary to continuously introduce new products and new designs of products.

Now a day every company will face the competition, because of that every company maintains flexible inventory system. It will depend on how the company will respond to the fast changing market needs, customer expectation and technological advancement.

The company will focus on improvements on the following measures :-

- The Inventory Level and work-in-progress
- Quality of the Product and Technological advancement
- Flexibility and responsiveness of the production process.

To meet the increased demand of the product, it iis necessary to increase the capacity of existing construction facility.

Need of System :

The necessity of effective inventory management is being increasingly realized in industrial and non-industrial organization both in India and abroad. The realization has come about because of increasing complexity of the task of managers and administrators. In most organization, the problem of effective inventory control is now viewed as the most critical problem with changes in social climate.The project aims at providing an efficient interface to the restaurants or any shops for managing their grocery inventory based on each item sold and manages their regular customers on the basis of their purchase to provide discount offers.

The basic idea involved here is that each item is linked to its atomic ingredients which are stored in a database. At the end of each day, the system analyzes the total sale of menu items and proportionately deducts appropriate amount from the resource database. Then it compares the current available resources with the threshold level of each ingredient. If it finds that certain ingredients are below the threshold, it will generate a purchase order for those item(s) and send it to the manager (admin) for approval.

Our Inventory Management System is an offline software application which fulfills the requirement of a typical Stock Analysis in various godowns. It provides the interface to users in a graphical way to manage the daily transactions as well as historical data. Also provides the management reports like monthly inwards, monthly deliveries and monthly returns. This application maintains the centralized database so that any changes done at a location reflects immediately. This is an online tool so more than one user can login into system and use the tool simultaneously.

The aim of this application is to reduce the manual effort needed to manage transactions and historical data used in various godowns. Also this application provides an interface to users to view the details like the daily Stock Statements of all godowns.

1.3 Software Aim :

This proposed project aims at inventory control in the restaurant , shops and catering Industry. Such a large domain would result in an equally as large scope of development. Our target domain is full of software to track sales of food items, but lacks in this area of inventory management. Our software can be scaled from large corporate dining all the way to small privately-owned restaurants or shops. It is also fairly domain specific: the database runs off recipes which generate the necessary ingredients. It also updates the inventory based off of the sale of those recipes.

This requirement focuses our product to our domain and makes it more appealing to those looking for a solution to this specific problem It is crucial for an organization today to understand its inventory to achieve both efficient and fast operations, that too, at an affordable cost. An effective management of inventory helps in reducing costs which further keeps accounts and finances in check. From a customer's point of view, it helps you to provide better customer services through fast delivery and low shipping charges, hence, meeting customer expectations.

I. LITERATURE SURVEY

Existing System:

We have analyzed other existing web applications, software's and android applications related to our desktop application "Inventory Management System ". and there we conclude the pros and cons of these existing system and compare our website with them and try make our website suitable beyond these existing system. Current system is a manual one in which users are maintaining ledgers, books etc to store the information like suppliers details, inwards, deliveries and returns of items in all godowns, customer details as well as employee details. It is very difficult to maintain historical data. Also regular investments need to purchase stationary every year

The disadvantages of existing inventory management can be listed as under:

1. Expensive:

Although the system provides such great features and makes the entire business a lot better and efficient, all this comes at a cost. Big time businesses can cover up the cost or the one time investment in some time but in the case of small or medium-sized businesses, it is at times not feasible to maintain such software.

2. Complexity :

Although the use of an inventory management system makes handling the inventory quite easy but learning how to operate it is quite a task. Special training sessions and manuals should be adhered to, to successful.

3. Malicious Hacks:

Hackers look for any way to get company or consumer information. An inventory system connected to point-of-sale devices and accounting is a valuable resource tohack into in search of potential financial information or personal details of owners,vendors or clients.

Proposed System:

Inventory management refers to the process of handling inventory, starting from sourcing materials to fulfilling customer orders. It involves the science of purchasing, supervising, controlling, and distributing stock for sale, all of which is stored in a facility.

The proposed system is a software application that aims to simplify inventory management by reducing the need for manual record-keeping and report generation. This application stores data in a centralized manner, allowing all users to access it simultaneously. Managing historical data becomes effortless with the database. Additionally, no specific training is required for employees to use the application. They can easily utilize the tool, saving time on routine tasks and improving overall performance. With centralized data, maintaining stock levels for various items in multiple warehouses becomes highly convenient.

III. SYSTEM SPECIFICATION

1. It allows admin to manage two types of users, hold their details, authenticate these users at the time of login and accordingly provide different options. Smart Inventory Management System.
2. It holds the details of all the godowns which are part of our organization.
3. It holds the details of all Product Stocks held in the ware-house of thecompany.
4. The system allows the godown manager to log into the system and enter theirinwards entries related to their godown.
5. It also allows them to view the list of inward entries.
6. The system allows the godown manager to log into the system and enter theiroutward entries and their purpose related to their godown..
7. It also allows them to view the list of Outward entries.
8. Whenever an inwards entry is entered then accordingly the stock number will be automatically updated.

IV. Working

The Workshop Inventory Management System is a software application designed to efficiently manage and track inventory in a workshop or manufacturing setting. This system streamlines the entire inventory management process, from receiving and storing materials to tracking usage and reordering.

The system begins with the receiving process, where incoming materials or parts are logged into the system. Each item is assigned a unique identification number, and relevant details such as quantity, supplier information, and date received are recorded. This information helps maintain a comprehensive record of all inventory items.

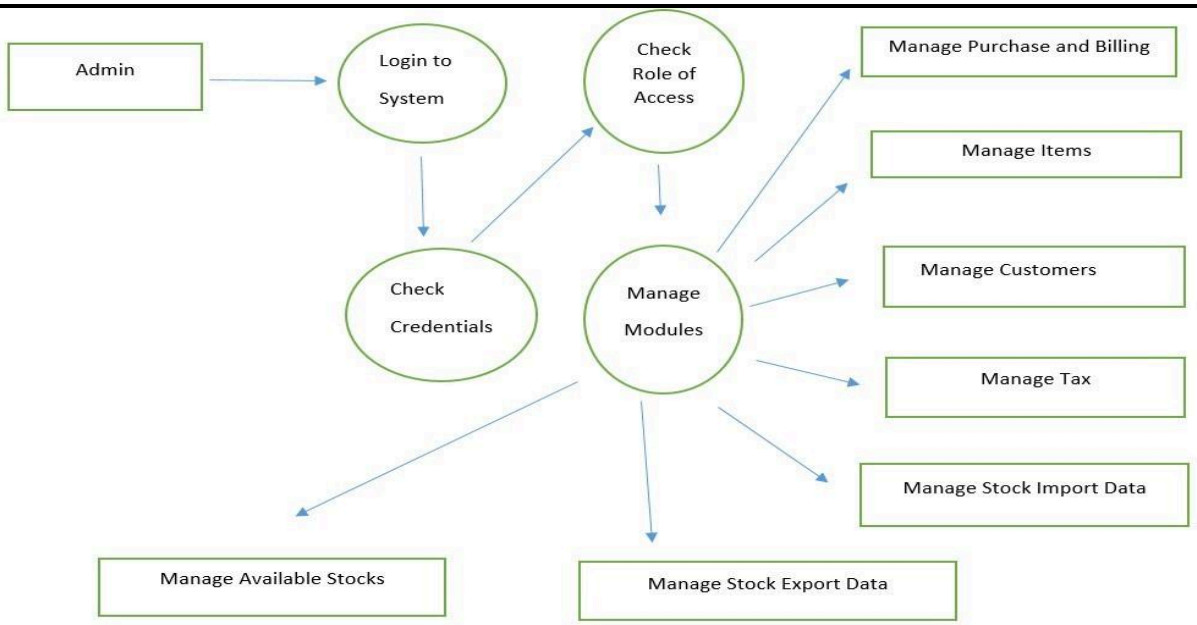
Once the materials are logged into the system, they are stored in designated locations within the workshop. The system provides the ability to define specific storage areas and assign items to these locations for easy retrieval. This ensures that inventory is organized and easily accessible when needed.

When materials are used in the workshop for production or repairs, the system tracks the usage. The inventory is automatically updated, reducing manual effort and eliminating the risk of errors. This real-time tracking feature allows for accurate monitoring of stock levels and helps in avoiding stockouts or overstocking situations.

To optimize inventory levels, the system generates notifications when stock reaches predefined reorder points. This enables timely reordering of materials, ensuring that there is no disruption in workshop operations due to insufficient inventory. Additionally, the system can generate reports and analytics on inventory usage, stock levels, and reorder patterns, providing valuable insights for inventory planning and cost optimization.

The Workshop Inventory Management System also facilitates inventory audits and stock reconciliation. It allows for periodic physical counts of inventory to verify the accuracy of the system's records. Any discrepancies can be identified and addressed promptly, ensuring data integrity and minimizing inventory discrepancies.

Overall, the Workshop Inventory Management System simplifies the entire inventory management process, from receiving to usage tracking and reordering. It improves efficiency, reduces manual effort, minimizes stockouts, and provides valuable insights for better inventory control and cost management in a workshop environment.



Data Flow Diagram

V. Final Result:

Figure : Output

It displays the final result of sotware interface, it includes Purchase and Billing, Tax Management, Customer management & Digital History of Records.

VI. Conclusion

While developing the system a conscious efforts has been made to create develop a software package making use of available tools, techniques and resources, that would generate a proper system.

While making the system, an eye has been kept on making it as user- friendly, cost-effective and as flexible as possible. As such one may hope that the system will be acceptable to any user and will adequately meet his/her needs.

As in case of any system development processes where there are a number of shortcomings, there have been some shortcomings in the development of this system and that is why the project still under modification.

VII. Future Scope

The scope of the project include that what all future enhancements can be done in this system to make it more feasible to use :

1. To add more and more exciting Function for both customers and workers.
2. To add more trustworthy that we can provide in many ways accordingly.
    a. Manage & backup versions of documents online.
    b. More graphics can be added to make it more user- friendly andunderstandable.
    c. Databases for different products range and storage can be provided.
    d. Multilingual support can be provided so that it can be understandable by the person of any language.
3. To add more reliable improvement in our application if its needed in future.
4. To make an android application for this desktop application.
5. To add more modulus.

VIII. References

1] Java jdk Downloads | Oracle. 2015. Downloads | Oracle. [ONLINE] Available at: https://www.oracle.com/downloads/index.html

2] DFD, Flowchart concept from the book of Software Engineering by Roger S. Pressman.

3] Java Developer Tutorials and Online Training. 2015. [ONLINE] Available at: http://www.oracle.com/technetwork/java/index-jsp-135888.html SQL Tutorial. 2015. [ONLINE] Available at: http://www.w3schools.com/sql/default.asp

4] MySQL Downloads. 2015. [ONLINE] Available at: http://www.mysql.com/downloads/

5] NetBeans Downloads 2015. [ONLINE] Available at: https://netbeans.org/downloads/

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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OPTIMIZATION OF WALL MATERIAL FOR MINIMUM HEAT LOSSES FOR INDUCTION FURNACE BY FEA

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ABSTRACT

Induction furnaces are commonly employed for melting metals, and to prevent losses, silica ramming mass is typically used as a refractory material. Consequently, it is crucial to optimize the thickness of the refractory material.

This research paper focuses on optimizing the wall thickness and material to minimize heat losses during the iron melting process. Calculations involve determining thermal properties and physical parameters for heat loss calculations. Theoretical heat loss and temperature distribution calculations are then compared to actual measurements obtained from an existing furnace, which experiences significant losses.

To perform the optimization, ANSYS Software was utilized, providing more accurate results in a shorter timeframe. The problem was approached in an axi-symmetric manner since it exhibits symmetry about the Y-Axis. Ultimately, it was concluded that optimizing the thickness of the refractory material could reduce losses by 35%, while optimizing the thermal properties could lead to a reduction of 73% in losses. By employing the proper thickness and material properties for the refractory material in the induction furnace, losses can be ultimately reduced by 70%.

Key words: Induction heating, optimization, coreless induction furnace, thermal conductivity, silica ramming compound, micasil.

1. INTRODUCTION

In today's world, the demand for electric power is increasing, and there is a focus on its economical utilization. This has led to the development and production of energy converters with higher power capacities. Additionally, minimizing electric power losses and protecting the environment have become crucial considerations, particularly in terms of reducing heat losses. These heat losses primarily occur through conduction, convection, and radiation. Therefore, it is necessary to enhance the refractory material and optimize the wall thickness of the refractory material [1] and [2].

The optimization of power equipment geometry is highly relevant in the present time, and numerous studies have addressed the issue of heat loss [3]. Both core type or channel furnaces and coreless induction furnaces are well-established designs in the industry. The existing furnace under consideration is one of the largest commercial units capable of melting approximately 12 tons per hour, with a high-power density of around 1800 kWh/ton, enabling the melting of a cold charge within 50 to 60 minutes [1].

The primary objective of this paper is to identify issues related to the induction furnace and calculate heat losses across the temperature distribution using analytical methods. The analytical results are compared with actual measurements taken from the existing furnace, which are further validated using APDL Ansys software. A model is created in ANSYS software based on the existing dimensions and is verified against the calculated results [4] and [5]. Optimal changes in the geometry of the induction furnace and the properties of the wall material are made using ANSYS software to minimize heat losses. This paper aims to study the impact of process parameters on energy consumption and identify potential optimizations for the refractory material of the induction furnace.

2. LITERATURE SURVEY

Prof. N. C. Mehta and colleagues conducted a thorough examination of thermal fatigue in Induction Melting Furnaces, which are extensively utilized for melting various materials in modern times. They utilized ANSYS software to analyze the ramming mass and determined the stress distribution across the refractory wall. Their findings indicate that critical stress can be reduced, leading to an improved lifespan of the refractory wall. Additionally, they observed that the refractory material tends to lose its thermal properties within a lifetime of 200-400 hours.

Hong-Seok Park, Xuan-Phuong Dang, and their team focused on enhancing the efficiency of the manufacturing process. They worked on optimizing the operating parameters of the induction heating system and proposed the use of thermal insulation to minimize heat losses. Their research concluded that energy efficiency can be

increased by up to 6%. Furthermore, by implementing insulating devices to reduce radiation and convection, an additional 4% of energy can be saved after optimization.

M. M. Ahmed, M. Masoud, and their collaborators reviewed the design of coreless induction furnaces specifically for melting iron. They determined the electrical parameters of the furnace, such as the number of turns in the coil, coil inductance, coil resistance, and maximum flux density, based on the transformer concept. They then compared their design results with the existing design to evaluate their effectiveness.

3. STUDY OF EXISTING FURNACE

A. Geometry

The coreless induction furnace consists generally a Crucible, inductor coil, shell, cooling system and tilting Mechanism. The crucible is formed from refractory material. This crucible holds the charge material and subsequently the melt. The choice of refractory material depends on the type of charge, i.e. acidic, basic or neutral. The durability of the crucible depends on the grain size, ramming technique, charge analysis and rate of heating and cooling the furnace [4]. The geometric shape like width, height of each material of the Furnace is shown in fig.1

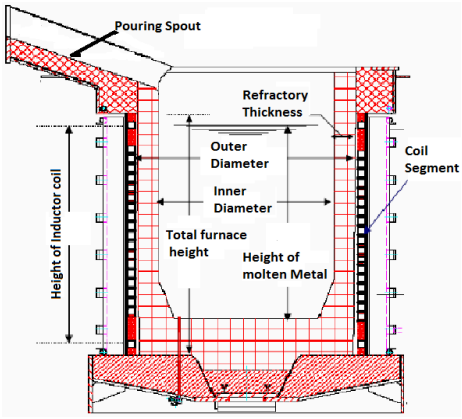


Fig.1.The geometry of the furnace

B. Analytical study

In this study, it has been determined that calculating heat conduction through a composite cylinder is the suitable approach for evaluating heat losses and temperature distribution in the furnace [6], yielding precise outcomes. Occasionally, assumptions may be necessary during heat loss calculations.

Mathematical calculations require temperature measurements at the inner and outer walls of the furnace, as well as the thermal conductivity of each material involved. Hence, it is essential to employ appropriate instruments for temperature

measurement and accurately determine the physical dimensions. The measured temperatures are presented in Table 1.

Table1. Temperature distribution in existing induction furnace

Notation	Content	Temperature °C
Ti	Inner wall temperature	1500
To	Ambient temperature	40
Tw	Outer wall temperature	40 to 75
Twi	Inlet water temperature	25 to 35
Two	Outlet temperature of water	40 to 75

Following are measured geometrical dimensions on existing furnace and the properties of material at 1500°C have presented in table2.

Table 2. Dimensions and properties of existing furnace:

Material	Dimensions in mm		Thermal Properties	Units
	Diameter	Thickness		
Coil core cement	1550	10	K = 1.39	w/m ^{0}C
			h = 30	W/m2 ^{0}C
Micasil	1530	3.5	K = 0.12	w/m ^{0}C
Ramming mass	1200	160	K = 11	w/m ^{0}C
			h = 200	W/m2 ^{0}C

4. HEAT LOSS CALCULATION:

Heat loss can be calculated by referring electrical circuit for steady state condition of composite cylinder [6]. From given data in table1 and table2 we can calculate conduction, convection and radiation losses with temperature distribution.

A. Heat loss calculation:

1. Calculation of resistance $\mathbf{R = \ln (r2/r1) / 2\pi Lk}$
   Total resistance $\mathbf{\sum R = R1+R2+R3}$
2. Conduction losses $\mathbf{Q = (Ti - To) / \sum R}$
3. Radiation losses $\mathbf{Q = \varepsilon A \sigma (Ti^4 - To^4)}$
4. Convection losses $\mathbf{Q = h A (Ti - To)}$
5. Total heat losses from furnace **Q = Q convection + Q radiation + Q conduction**
6. **Total heat flux = Heat generated / 2πrl**

Q = Total heat loss from furnace in W
To, Ti = Temperatures at outlet and inlet in °C
K = Thermal conductivity of material of wall in w/m °C
h = Heat transfer coefficient from outer surface of wall in W/m2 °C
b = Thickness of wall in mm
ε = Emissivity of red-hot body = 0.43

A = C/S area of the furnace
σ = Stefan Boltzmann constant = 5.669 x e-8

Table 3. Calculated heat loss and temperature distribution is shown in following table

Heat loss kWh			Total loss kWh	Temperature °C			
Conduction	Convection	Radiation		T1	T2	T3	T4
309	297	140	746	1500	435	265	76

B. Comparison between Actual and analytical results:

To verify the design results, a comparison between total heat loss and temperature distribution of calculated results and actual results of induction furnace were carried out, which are tabulated below in table 4. From this table it can be seen that the analytical values are close to the actual ones.

Table 4. Verification of calculated value with actual value

Method	Temperature °C				Heat loss kWh
	T1	T2	T3	T4	
Actual Value	1500	-	-	76	720
Analytical value	1500	436	265	72	746

Table indicates that there are very huge losses in furnaces. So, there is potential to reduce heat losses with optimization of geometry and properties of refractory material. If these losses of 746 kWh are considered economically then there will be huge losses. Economic rate is 7.28 Rs/unit, so per year directly crores of rupees is going to be wasted with the power losses.

5. MODELING IN SOFTWARE

The accurate analysis of Induction melting furnace refractory wall is done for finding out temperature distribution, heat flow [1]. These conditions include initial and boundary conditions, material properties and assumptions (if required).

5.1 Analysis of existing model of furnace

Based on drawing and dimensions a model of existing furnace is developed using APDL Ansys. Problem is symmetric about Y-Axis so for better result and accuracy we can achieve with Axi-symmetric condition. Analysis is done with static thermal analysis because of its actual measurement and parameter which is collected at steady state[6]. We have done three kinds of meshing i.e. course, normal and fine meshing [1]. Then we had selected normal mesh density which gave 25806 nodes and 25181 elements. In FEA, Axi-symmetric modeling of furnace geometry with the three

materials with APDL Ansys for Static thermal analysis is carried out. All materials were modeled by quad mesh types with smart size 1 for all areas.

PLANE55 can be used as a plane element or as an axisymmetric ring element with a 2-D thermal conduction capability. The element has four nodes with a single degree of freedom, temperature, at each node. The element is applicable to a 2-D, steady-state or transient thermal analysis. The element can also compensate for mass transport heat flow from a constant velocity field.

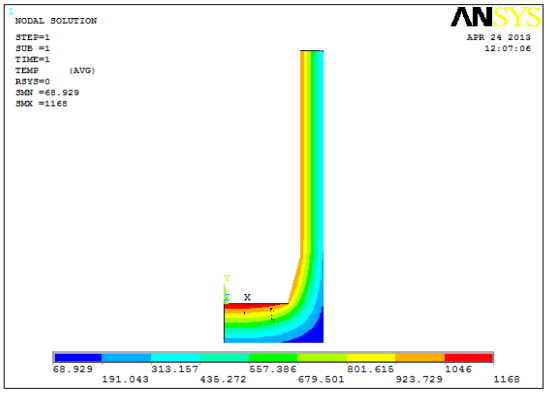
5.2 Boundary condition

To solve this heat transfer problem of induction melting furnace wall, the following initial and boundary conditions, material properties are made:

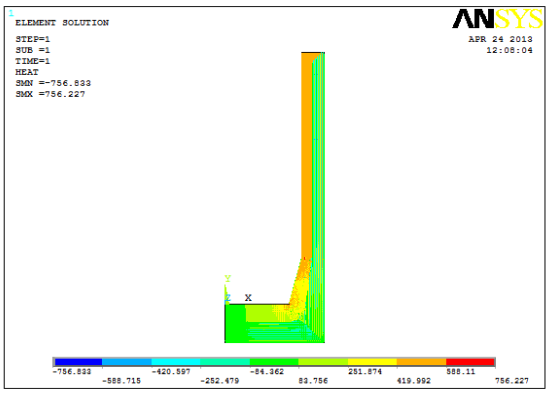
- Ambient Temperature is 40 °C.
- Apply heat convection over the inner and outer wall.

The boundary conditions are introduced into module ANSYS by Choosing the static mode of analysis. First of all, define the physical dimensions of material and then thermal properties. At boundary condition the convection at inner and outer wall of the furnace should be applied.

Results of existing induction furnace with the APDL Ansys software:



A. Temperature distribution curve



B. Heat flow

If we go for very fine meshing or very course meshing accuracy is not obtained. So normal mesh density is selected which will give closer value to actual value. Thus, mesh density is found. It was found that meshing does not affect temperature distribution but affected the heat flow and heat flux.

5.3 Verification with the analytical results

It is needed to verify analytical and software results. Once verification is done, we can optimize the geometry and properties for to minimum heat losses

from the induction furnace. Table 5 shows the verification of analytical and software results.

Table 5 Analytical and software Result verification

Method	Temperature ^{0}C			Heat flow kWh
	T2	T3	T4	
Software	436	191	68.92	756.22
Analytical	436	265	76	746

The verified values of calculated results by using software are closer to actual measured values.

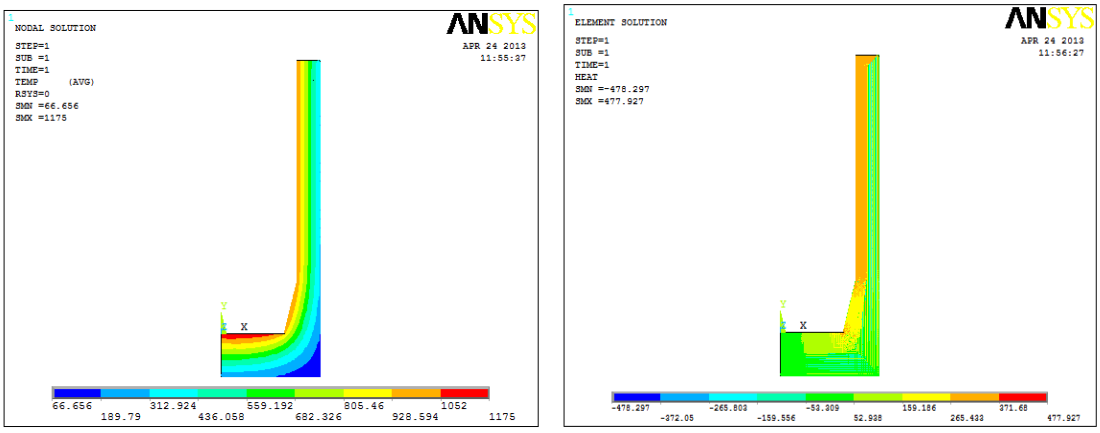
6. OPTIMIZATION OF GEOMETRICAL PARAMETER:

Induction heating is a complex electromagnetic and heat transfer process because of the temperature dependency of electromagnetic, electrical, and thermal properties of material as well as skin effect. The temperature profile of the heated work piece and the energy consumption are complicated functions and depend on characteristics of the power supply. So, it reduces with the optimum geometry of refractory material.

Table 6. Optimum geometrical parameter

Material	Ramming mass	Micasil	Coil core cement	Heat loss kWh	Temperature ^{0}C
Thickness in mm	165	3.5	10	757	66.70
	170	3.5	10	649	66.63
	175	3.5	10	478	66.67
	180	3.5	10	493	66.65
	185	3.5	10	506	65.30

Results with optimum geometry analyzed in APDL ANSYS software.



A. Temperature distribution curve B. Heat flow

Optimization of geometrical parameter is effective to reduce the heat losses, and reduces 35% losses from furnace.

Total heat loss calculated with the optimum geometry is 477 kWh. So we have saved 260 kWh with 175 mm optimum thickness of the ramming mass.

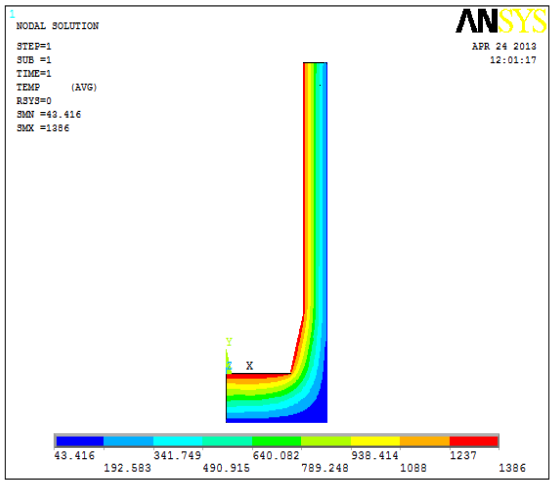
7. OPTIMIZATION OF MATERIAL PROPERTIES:

Optimization of the geometrical parameter is reducing heat losses up to certain limit, but this is not sufficient because of its huge losses.

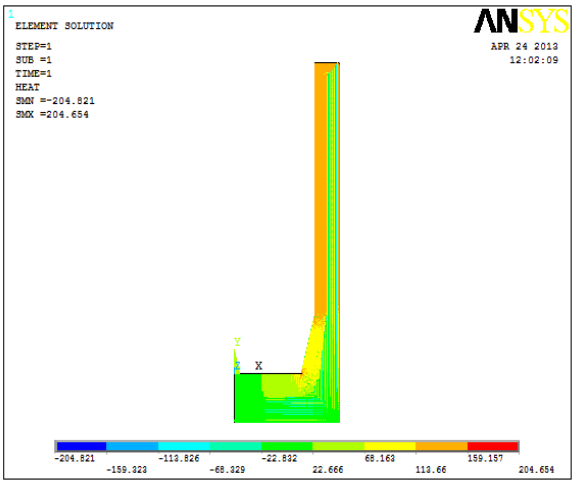
Table 7 Optimum thermal properties

Material	Ramming mass	Micasil	Coil core cement	Heat loss kWh	Temperature ^{0}C
Thermal conductivity w/m ^{0}C	3	0.12	1.39	204	43
	3.5	0.12	1.39	226	44.12
	4	0.12	1.39	254	45.59
	4.5	0.12	1.39	273	46.56
	5	0.12	1.39	298	48.10
	5.5	0.12	1.39	316	49.15
	6	0.12	1.39	337	50.85

Analysis has done with material optimization of induction furnace. Following are the Optimum result with taking optimum properties drawn in table 7 and with the optimum geometry.



A. Temperature distribution



B. Heat flow

This examination demonstrates that optimizing both the geometric parameters and material properties can contribute to the reduction of thermal losses and improvement in temperature distribution. By utilizing the optimal properties of the ramming mass, the total losses from the furnace amount to 204 kWh. Comparatively, properties optimization proves to be more effective than geometrical optimization in reducing heat losses from the furnace, resulting in a savings of 542 kWh. Ultimately, this approach allows for a reduction of 70% in losses.

Table 8. Result of optimum property and geometry

Material		Optimum Geometry	Optimum Properties
Ramming mass		175 mm	3 w/m ^{0}C
Micasil		3.5 mm	0.12 w/m ^{0}C
Coil core cement		10 mm	1.39 w/m ^{0}C
Heat flow		477 kWh	271 kWh
TFV sum	Nodal	69e3 kWh	31e3 kWh
	element	73.12 kWh	33.4e3 kWh

These conditions constitute the initial conditions of our simulation. After having fixed these parameters

8. RESULTS AND DISCUSSIONS

Following graph shows the effect of optimum geometry on heat losses and temperature distribution for induction furnace. Effect of increasing in thickness of

refractory material is reduced heat losses and temperature distribution with 175mm thickness. Following graph shows its behavior against thickness fig 2.

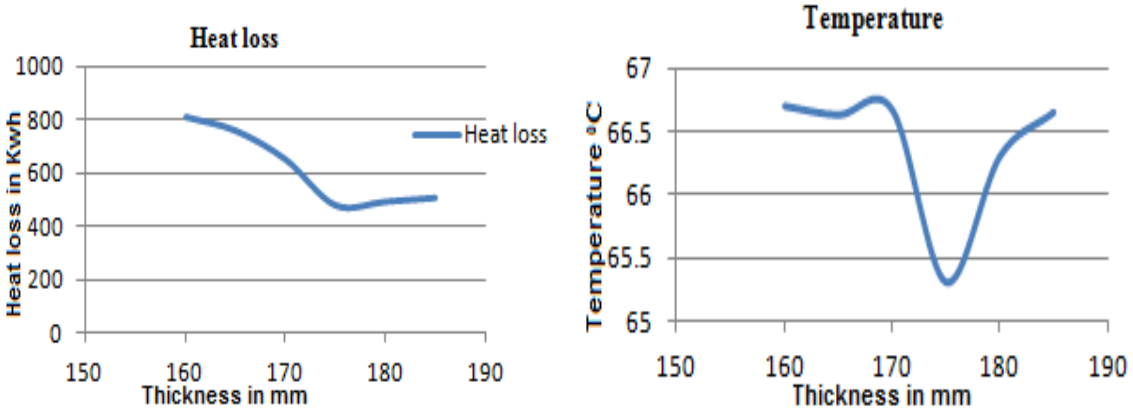


Fig 2. Heat loss and temperature distribution profile for optimum thickness of refractory

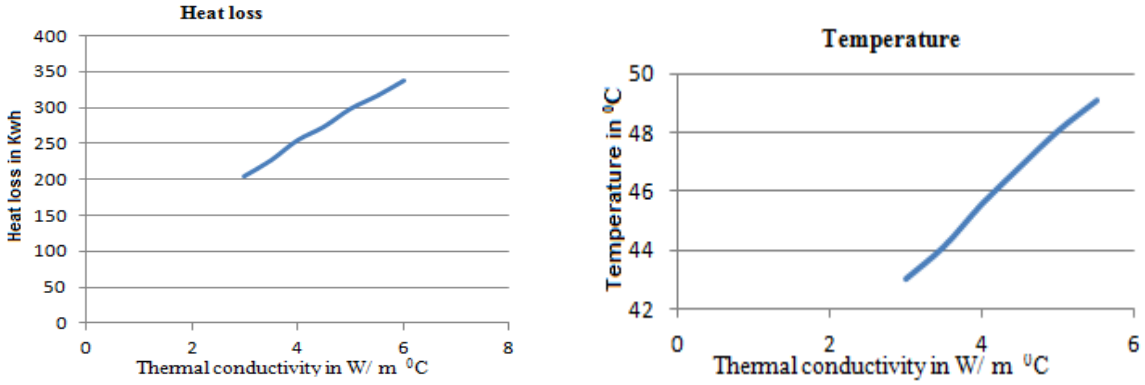


Fig 3. Heat loss and temperature distribution profile for optimum properties of refractory

The accompanying graph illustrates the impact of optimal material properties on heat losses and temperature distribution in an induction furnace. The ideal thermal conductivity significantly influences the reduction of losses and leads to a decrease in temperature distribution. The increase in thermal conductivity directly affects the temperature and losses experienced by the furnace, emphasizing the importance of minimizing it. Figure 3 portrays the relationship between thermal conductivity, losses, and temperature distribution within the furnace.

9. CONCLUSION

In this paper, the paper presents an examination of the stationary thermal behavior of the induction furnace. The optimization plays a crucial role in diminishing losses and offering a favorable temperature distribution profile.

The findings of the analysis reveal a decrease in the temperature field and heat flow during the melting process. The sum of the thermal flux vector at the nodal and element levels of the furnace increases.

Based on the obtained results, it can be concluded that they align with the findings commonly reported in the literature. It would be intriguing to employ Ansys software for resolving the static thermal analysis problem. It is necessary to validate the analytical calculations with the results obtained from the software.

Therefore, according to the aforementioned results, a 73% reduction in losses can be achieved through properties optimization and a 35% reduction through geometrical optimization. Ultimately, by attaining optimal geometry and properties of the ramming mass, total losses can be reduced by 70% while considering the optimum thickness and material properties of the induction furnace.

REFERENCES

1. Prof. N. C. Mehta, Mr. Akash D. Raiyani, Vikas R. Gondalia" Thermal Fatigue Analysis of Induction Melting Furnace Wall for silica ramming mass", International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 2, February 2013).
2. Laszlo Koller, Balazs Novak, "Ridged surface for reducing eddy-current losses in ferromagnetic shielding", Electr Eng (2009) 91:117–124, DOI 10.1007/s00202-009-0124-z.
3. K. C. Bala, "Design Analysis of an Electric Induction Furnace for Melting Aluminum Scrap" Mechanical Engineering Department, Federal University of Technology Minna, Niger State, Nigeria AU J.T. 9(2): 83-88 (Oct. 2005).
4. Hong-Seok Park and Xuan-Phuong Dang, "Optimization of the In-line Induction Heating Process for Hot Forging in Terms of Saving Operating Energy" International journal of precision engineering and manufacturing vol. 13, no. 7, pp. 1085-1093

5. M. M. Ahmed, M. Masoud and A. M. El-Sharkawy, "design of a coreless induction furnace for melting iron" international conference on communication, computer and power (icccp'09) muscat, february 15-18, 2009.
6. Kalinchak, V. I. Sadkovskii, and S. G. Orlovskaya, "Influence of internal response on the critical conditions of heat and mass transfer of carbon particles" Journal of Engineering Physics and Thermophysics, Vol. 71, No. 5,1998.

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Design Steps of Online Leave Management Application System for Academic Institution

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Abstract
An Online web-based employee's leave management application system integrates various processes and systems to automate and simplify the management of employee data, leave requests, and tracking, as well as the approval of leave. In many organizations, employees are entitled to different types of leave, which are allocated based on institutional policies. However, the manual management and approval of leave requests can be time-critical, time-bound, time-consuming, error-prone, paper-based, and challenging to handle.
To address these issues, an automated leave management system is being developed using technologies such as HTML, PHP, and MySQL. The implemented system will successfully fulfil its intended purpose, demonstrating satisfactory functionality and error-free operation. The system enables employees to request leave in a timely manner, ensuring efficiency and accuracy. This automated solution is suitable for both academic staff and the administrative department of an institution, facilitating effective and efficient management of employee leave. It reduces paperwork, streamlines processes, and provides a reliable platform for leave management.
Keywords: Leave Request, Leave Tracking, Approval, HTML, PHP, and MySQL.

Introduction

The employee's leave management system is a user-friendly web-based application accessible to both staff and administration within an institution. This system simplifies the process of requesting and tracking leave for employees. Additionally, the administrative department can efficiently allocate, grant, and manage all leave requests using this system. The application also ensures that relevant staff members are notified about approved leaves, enabling the administrative department to effectively coordinate leave schedules and manage employee absences. When an employee's leave approves, the system automatically deducts the approved leave from their total entitlement. Furthermore, the system provides comprehensive information to all involved parties, including the total leave taken, the remaining leave balance, and the day and date of the leave, load adjustment in compliance with the institution's policies. This automated approach enhances transparency and streamlines the

overall leave management process, benefiting both employees and the administrative department.

Problem Statement

Manual management of employee records presents numerous challenges. For example, in processes like leave management, employees often encounter delays as their leave forms can take considerable time to be approved. Additionally, many organizations store employee records in physical in the files/ rooms located within administrative blocks, creating difficulties in accessing information remotely or retrieving accurate leave records.

To overcome these challenges, the implementation of a web-based employee's leave management application system is recommended. This system securely stores and manages employee records in a database that is accessible only to authorized administrators. The primary objective of the "web-based employee leave management application system" is to develop a computerized solution for efficient leave management. By replacing the existing manual paper-based process, this system aims to reduce storage requirements and ensure that all records are digitally stored for convenient future reference. This aims to paperless work (to save papers) and green initiative by the institution.

Design Methodology

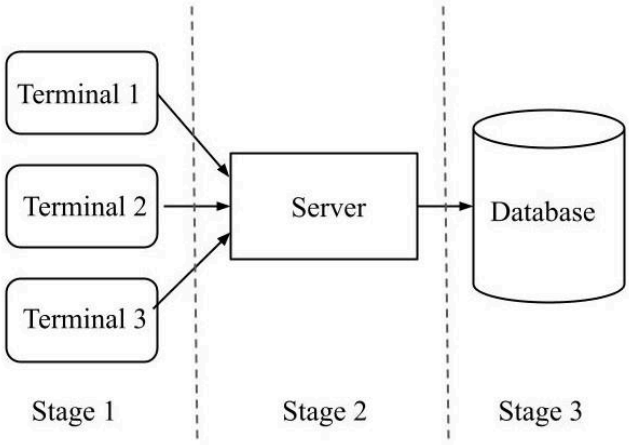

Fig.1 Three Stage Diagram

The employee's leave management system follows a three-stage system model which is developed using different programming languages. This architecture operates on a client/server model, with the web server serving as a vital component. The first stage, known as the presentation stage, involves the client-side of the system. It showcases the Graphical User Interface (GUI) developed using HTML, CSS, and JavaScript. All HTML forms and content displayed on the client's browser are part of this stage. CSS is applied through the web browser, which communicates with the business stage and data through API calls. The second stage, also referred to as the business logic stage, acts as the middle layer. It comprises the application server built using a web server and is responsible for executing the actual data processing. This stage incorporates PHP coding and handles the communication between the presentation and data stages. The third stage, known as the data stage, is developed using MySQL and encompasses methods and classes that handle data storage and retrieval within the database (storage layer). Queries are utilized to access data and perform other database

operations. Data received from the presentation stage is stored in the database, and this stage manages all read and write interactions with the database.

Proposed Architecture

The faculty user applies for leave using the application on their terminal PC or mobile device. They can then check the status of their leave in the status tab. Additionally, a notification is sent to the load adjusting faculty. The load adjusting faculties can choose to accept or reject the workload adjustment.

Once all the faculties have accepted the load adjustment, the leave application is forwarded to the Head of Department (HOD) with a notification sent to their phone number.

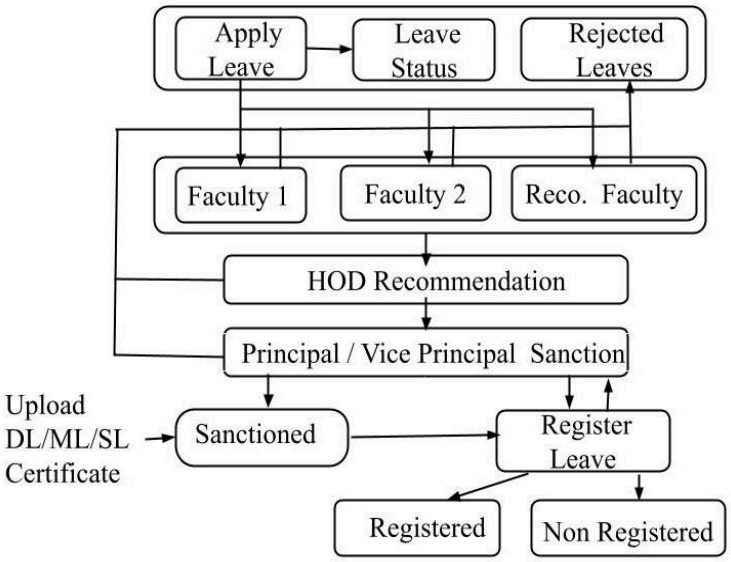

Fig.2 Architecture of Leave Management System

Subsequently, after the HOD's recommendation, the leave application is forwarded to the principal's login, where the leave is officially sanctioned, and a notification is sent to the user.

Flow Chart of system

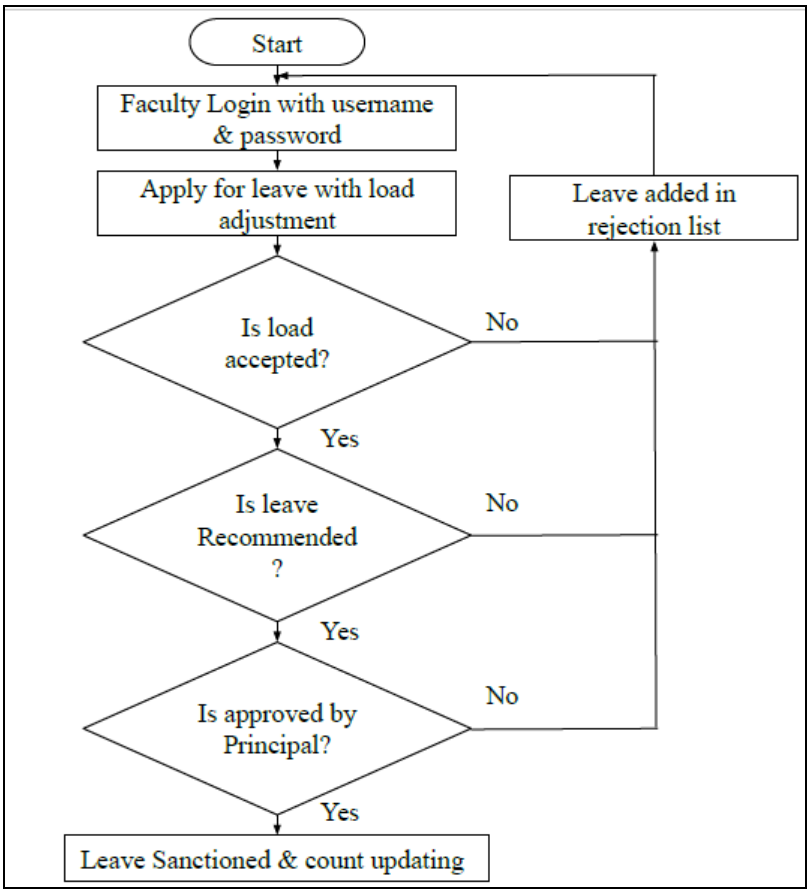

Fig.3 Flow Chart

Algorithm

Step 1: Faculty will login into the system with login credentials
Step 2: Faculty will apply the leave with load adjustment
Step 3: Once leave received to adjutant faculty he/she will accept or reject the load.
Step 4: After load acceptance, it will be forwarded to the HOD for recommendation.
Step 5: Finally leave will reaches into principal login for final decision.
Step 6: Leave approved status & count will be reflected in faculty login for further notification

Advantages:

After implementation of Leave management system following are the advantage

1. User friendly
2. Paperless system
3. Maintain Leave record automatically
4. Faculty easily knows the status of the leave
5. Simple, saves time
6. Leave can be applied by 24x7

Conclusion

The Leave Management System is an invaluable tool for institutions, enabling them to effectively maintain and track employee leave records. This comprehensive system not only handles the management of staff leave records but also facilitates the submission and processing of leave applications. By incorporating an approval process, it allows higher authorities to accept or reject staff leave requests, thus streamlining the institution's leave management workload.

Furthermore, this system actively works towards reducing unnecessary formalities and delays that often occur during the leave approval process. It empowers faculty members to swiftly and efficiently seek approval for their leaves, eliminating unnecessary paperwork and delays.

In summary, the Leave Management System serves as a crucial asset to institutions, easing the burden of leave record maintenance and simplifying the leave application and approval process for staff members.

References

[1] Prajakta R. Palase, Mina D. Waghela, Pooja M. Dandage, Anuradha H. Dhope, Dr. S. B. Thigale, "Review on Case Study of Employee Leave Management System using PHP", International Journal of Advanced Research in Science, Communication and Technology (IJARSCT), Volume 2, Issue 1, June 2022, Pg. 361-362

[2] Rajan Deshmukh, Saurav Avhad, Adarsh Maid, Abid Dhankwala, "Leave Management System", Journal of Emerging Technologies and Innovative Research (JETIR), ISSN-2349-5162, April 2022, Volume 9, Issue 4, Pg. 561-567

[3] Mishal Raj1, Prity Satbhaya2, Prachir Chauhan3, Arhant Chatterjee4," Employee Leave Management System", IJARIIE-ISSN(O)-2395-4396, Vol-3 Issue-5 2017, Pg. 1273-1277

[4] Ms. Linda Malomo, "Leave Management System", The International Journal of Multi-Disciplinary Research, ISSN: 3471-7102, ISBN: 978-9982-70-318-5, Pg. 1-47

[5] Nameera Choudhary1, Aynas Khalfe2, Yaman Khan3, Mukhtar Ansari4, "Leave Management System for AIKTC.", International Research Journal of Engineering and Technology (IRJET), e-ISSN: 2395-0056, p-ISSN: 2395-0072, Volume: 07 Issue: 03 | Mar 2020, Pg. 1715-1717

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Lead Time Reduction in Planning & Procurement

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Abstract
A Lead time is the latency between the initiation and execution of a process. In terms of Supply Chain Management lead time can also be defined as the time from the moment the customer places an order to moment it is ready for delivery. In manufacturing sector lead time includes the time required to ship the parts to the supplier. In project management lead time is the time it takes to complete a task or a set of interdependent tasks. In this paper, we interpret the causes for excess lead time and suggest practical, inexpensive strategies and procedures for reducing it. Our recommendations are based on detailed study of many manufacturing industries. Interpreting the differences between work in process, flow time variance and lead time, we systematically review potential methods for lead time reduction by reducing lead time or flow time variance

Keywords –Lead Time , 6 sigma , Parito Chart , Lean Manufacturing

Introduction

we will be shouldering responsibilities of executive of tomorrow so it is to understand methods, plans, various techniques that are essential to operate the effectively and efficiently. For this purpose, we must have the knowledge of PPC. This is also true that this subject intervene into many departments of industrial organization, their relations with these departments are explained in first few topics. This basic objective of creating the manufacturing organization is to make the products. Thus the production is the nucleus or the centre of entire business operations. It must be emphasized, however, that on signal system of forecasting, planning and control is suited to all industrial enterprises, no matter how well it may meet the needs of this on that special company. PPC functions look after the manufacturing activities PPC comprise the planning, routing, dispatching in the manufacturing process so that the movement of material, performance of machines and operation of labour however are subdivided and are directed and coordinated as to quantity, quality, time and place.

Planning and control are two basic and interrelated managerial functions. They are so interrelated that they can be and often are considered as being one function. Planning is the preparation activity while control is the post-operation function. Both of them are so

closely related that they are treated as Siamese twins. Planning sets the objectives, goals, targets on the basis of available resources with their given constraints. Control is the integral part of effective planning. Similarly control involves assessment of the performance, such assessment can be made effectively only when some standard of is set in advance. Planning involves setting up to such standard. The controlling is made by comparing the actual performance with these present standard and deviations are ascertained and analysed.

Overview

Production is an organized activity of converting raw materials into useful products but before starting that work of actual production, production planning is done in order to anticipated possible difficulties and decide in advance as to how the production should be carried out in the best and economical way. Since mere planning of production is not only sufficient, hence management takes all possible steps to seethat project or plan chalked by the planning department are properly adhered to and the standards set are attained in order to achieveit, control over production is exercised. The aim of production control is to produce the products of right quality, in right quantity at the right time by using the best and least expensive methods.

PPC thus defines as the process of planning the production in advance, setting the exact route of each item give "production order" to shops and lastly to follows up of progress of produces according to order. The principles ofPPC gives in the statement, "First plan your work, then work your plan". There are few other departments associated with PPC are personnel department, manpower planning, costing department etc. Design department is important one as "The design is the problem of anticipating or trying to do what will be required in future and improving what is being already produced.

2.1 PRODUCTION PLANNING

Production planning is deciding how to go about producing a particular product. This includes deciding what product to produce,when to produce it, what resources arerequired for producing it, scheduling these resources for production

- To determine capacity of all manufacturing departments and to plan systematically coordinated and related production activities within the scope of the enterprise to meet sales requirements.
- To translate orders received from sales department into orders on the works department and to ensure steady plans of production activities.
- To find ways and means through which product manufacturing requirements such as materials and their necessary constituents such may be available in right quality and quantity at the right time To coordinate a number of different department groups so that a fine balance of activities may be maintained.
- To promote fuller utilization of plants.

- To assist labor towards right and greater earnings.
- To train staff in the effective performance of their duties

3.Literature Review

In this section we study different works done and their methodologies adopted by various people in order to improve lead time in their respective industries. Before doing the analysis, we have also studied different research papers related to this context.

1.Planning and Scheduling in the Automotive Industry: A Comparison of Industrial Practice at German and Japanese Makers Thomas Staeblein, Katsuki Aoki (July 2014) discussed that providing customization of products is an important way of attracting customers, but it can increase the complexity of planning and scheduling processes in the order fulfilment system. In order to improve this understanding, they compared the order fulfilment system of German and Japanese auto makers as a sample of industrial practice. However, contrary to common perception, planning and scheduling processes differ much less between auto makers even in the light of regional differences concerning order fulfilment, different levels of product variety and mixed-model line manufacturing practice. The implications on the design and management of planning and scheduling functions vary between makers in our case study, but do not follow the traditional theoretical path. There are two limitations that need to be acknowledged regarding the present paper. The first limitation concerns the cross-disciplinary nature of this research.

2.Florin Buruiana, MihaelaBanuintroduced Value Stream Map is used as an improving method to progress in implementing '**lean thinking'** and as a leading formula in the improvement activities. As an improvement tool, VSM simplifies the measurement of times without added- value, so the calculation of lean coefficients is much easier and it is possible to improve the operative actions with strategic results

3.**G Saranya, Mr. S.B. Nithyananth** have implemented value stream mapping (VSM) is helpful in lean implementation and to develop the road map to tackle improvement areas to bridge the gap between the existing state and the proposed state of a manufacturing firm. In This paper they compares the current state and future state of a manufacturing firm and witnessed 20 % reduction in TAKT time, 22.5 % reduction in processing time, 4.8 % reduction in lead time, 20 % improvement in production, 9 % improvement in machine utilization, 7 % improvement in man power utilization, objective improvement in workers skill level, and no change in the product and semi-finished product inventory level

4.Value Stream Mapping to Reduce The Lead-Time Of Product Development Process**:Satish Tyagi, AlokChoudhary, XianmingCai, Kai Yang (Nov 2014)** have analyzed that product development (PD) is a broad field of dealing with the planning, design, creation, and marketing of a new product. The main focus of this paper is to exploit lean thinking concepts in order to manage, improve and develop the product faster while improving or at least maintaining the level of performance and quality. This research

discusses the objective and associated problems with product development process for a case study unit of a Gas Turbine manufacturer. All the proposed changes will result in the reduction of lead time for the design stage reducing thus the overall PD lead time by 50%. Investigation of the human element factor in analyzing the performance of future state process is clearly a topic for future search.

5.According to **Jafri MohdRohani** In this article identify and eliminate waste by using some lean techniques change over time and 5s and decreased lead time from 8.5 days to 6 days and value-added time decrease from 68 minutes to 37 minutes**. Tomas Rohacet**.(2015) to demonstration with value stream mapping on the plastic product of healthcare to applying lean tools are 5-why & Ishikawa chart, and reduce the leadtime and inventory control.

4.PRODUCTION CONTROL

- Production control is the task of predicting, planning and scheduling work, taking into account manpower, materials availability and othercapacity restrictions, and cost so as to achieve proper quality and quantity at the time it is needed.
- Issuing the necessary orders to the concerned personnel, so that the production plans may be put into action.
- To arrange necessary items like materials, machines, tools, jigs, fixtures and manpower in quantity andquality at a time as planned
- To see that orders arefollowed so that goods with required quality and quantity may be manufactured and delivered at the promised time.
- The resources are used in the best possible manner in such a way that the cost of production is minimized and delivery date is maintained.
- Proper co-ordination of the operations of various sections/departments responsible
- To ensure regular and timely supply of raw material at the desired place and of prescribed quality and quantity to avoid delays in production

5.ORGANISATION WORK FLOW

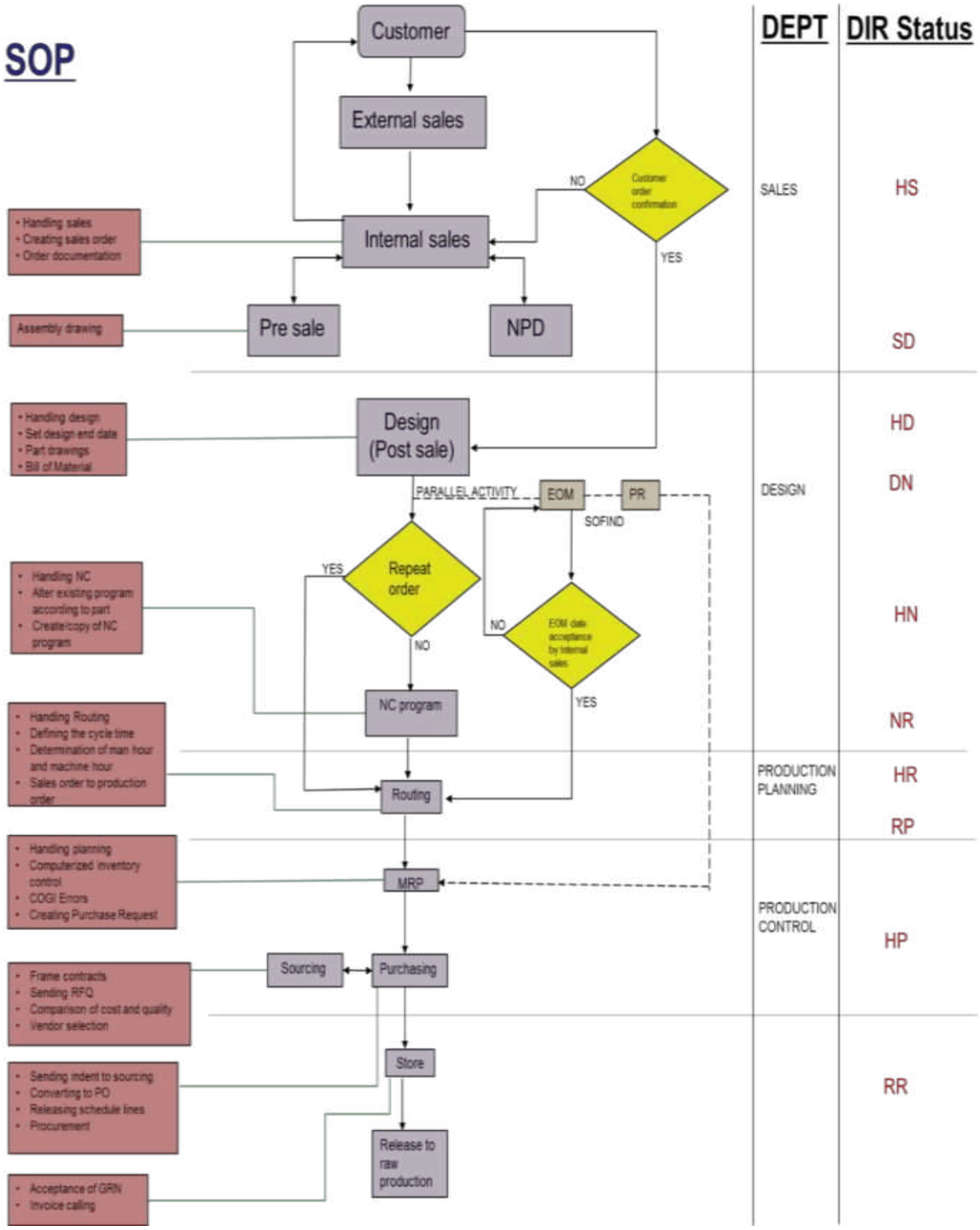
Six Sigma's aim is to eliminate waste and in efficiency, thereby increasing customer satisfaction by delivering what the customer is expecting

Six Sigma follows a structured methodology and has defined roles forthe participants

- Six Sigma is a data driven methodology and requires accuratedata collection for the processes being analyzed.
- Six Sigma is about putting results on Financial Statements.
- Six Sigma is a business-driven, multi- dimensional structured approach for:

1.Improving Processes
2.Lowering Defects
3.Reducing costs
4.Increasing customer satisfaction
5.Increased profits
6.Reducing process variability

ORGANISATION WORK FLOW

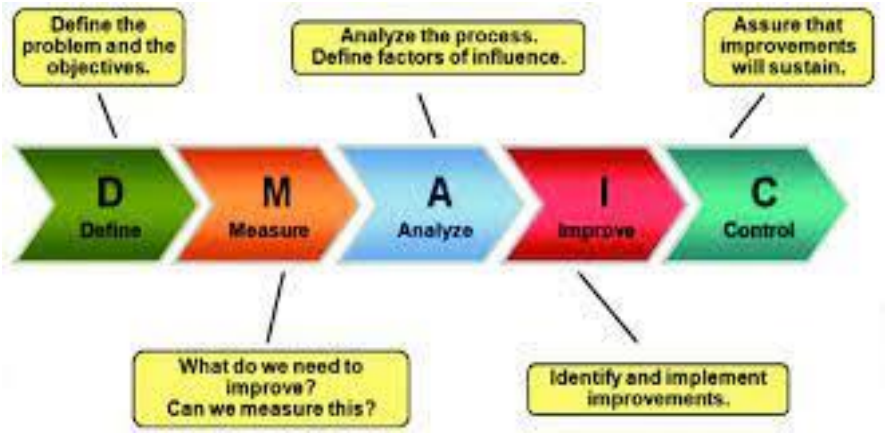


SIX SIGMA METHODOLOGIES

6.1. Introduction.

Six Sigma is a methodology for pursuing continuous improvement in customer satisfaction and profit. It is a management philosophy attempting to improve effectiveness and efficiency

6.2 SIX SIGMA METHODOLOGIES



7.PARITO ANALYSIS

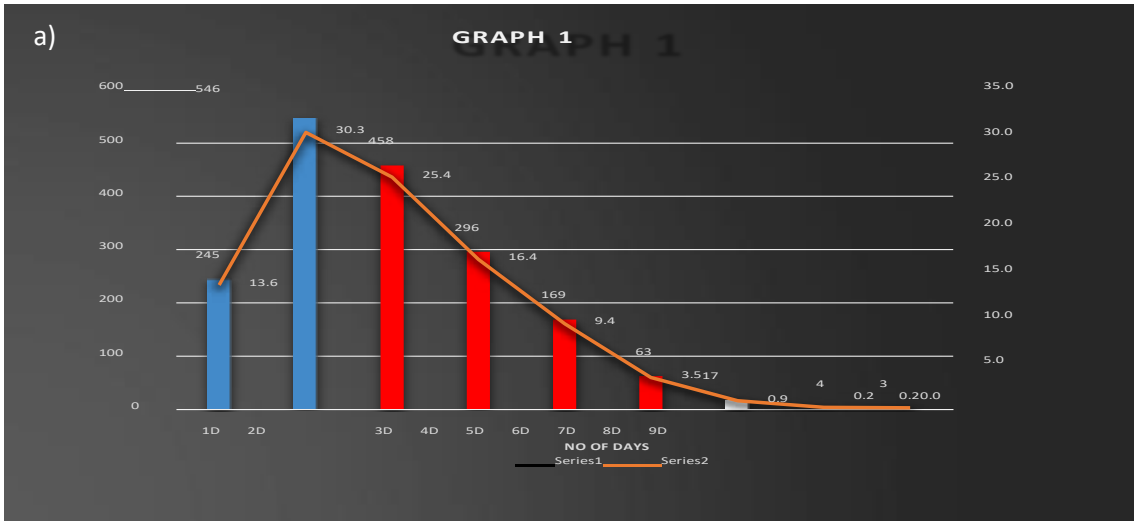
- Pareto analysis is a statistical technique in decision making used for the selection of a limited number of tasks that produce significant overall effect.
- Targeted values for Productionplanning is 2 days and Production control is 18 days.
- "OUTLIERS" are those which are beyond the targeted values.

By considering data from DEC-16 to FEB-17, Pareto graph are shown

Table. 1 : Order Details and Days taken in Production Planning

PP						
NO OF DAYS	COUNTS				Percentile	
	dec	jan	feb	total		
1D	34	40	171	245	13.6	13.6
2D	222	116	208	546	30.3	43.9
3D	177	130	151	458	25.4	69.4
4D	132	99	65	296	16.4	85.8
5D	49	56	64	169	9.4	95.2
6D	15	42	6	63	3.5	98.7
7D	8	7	2	17	0.9	99.6
8D	0	3	1	4	0.2	99.8
9D	3	0	0	3	0.2	100.0
				1801		

- In graph 1 by considering Average time for production planning as 2 days, outliers are highlighted in Red Columns.



From graph 2 about 43.9% of orders (Dec-16 to Feb-17) are processedwithin average time i.e., 2 days

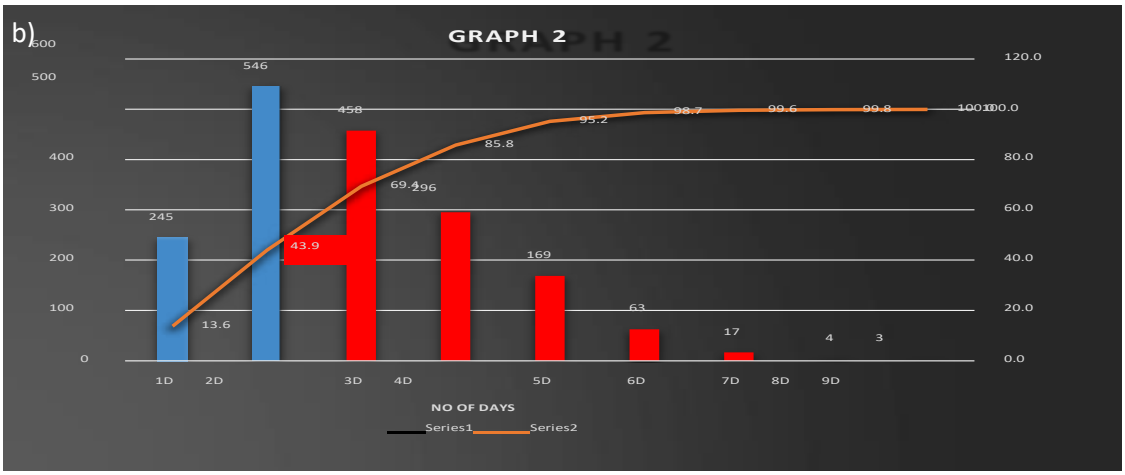


Fig. 4 (a&b): Pareto Analysis for Production Planning

5. CONCLUSION

- At the conclusion of the design phase, you should know who the customer or end-user is, their resistance issues, and requirements.
- You should also have a clear understanding of goals and the scope of the project including budget, time constraints, and deadlines.
- Reduction in time makes a big difference in production management

REFERENCES

1. Emil, Mihai, Ionela Roxana "Value Stream Mapping - A Lean Production Methodology", The Annals of the "ŞtefanCel Mare" University of Suceava. Fascicle of The Faculty of Economics and Public Administration Vol. 11, No. 1(13), 2011.
2. G. Saranya, Mr. S.B. Nithyananth, "Improvement of Crankshaft Assembly Supply Chain Using Lean Techniques-A Case Study", International Journal Of Modern Engineering Research (Ijmer), Vol.2, Issue.2, Mar-Apr 2012 Pp-403-406.
3. Nitin Pandhia* And Sanjeev Verma," Value Stream Mapping In An Automotive Industry", International Automotive Industry", International
Journal Of Current Engineering And Technology, Vol.2, No.3 (Sept. 2012)
4.Anjard Ron, "process mapping: a valuable tool for construction management and other professionals."Facilities, Vol.16, No.3/4, pp.79-81, 1998
5.Aguiar, M.W.C and Wetson R.H.,"CIM-OSA and stochastic time Petri nets for behavioral modeling and model handling in CIM system design and building", proceeding of the institution of mechanical engineering, Vol207, Part B: Journal of engineeringmanufacturing, , pp. 147-85, 1993
7.[2] Catarina Teixeira, Isabel Lopes,and Manuel Figuiredo, Multi-criteria Classifi-cation for Spare Parts Management: A Case Study Procedia Manufacturing Volume 11,2017, pp. 1560-1567.
8.[3] R.H.Teuntera, AA SyntetosandM..Z Babai, Stock keeping unit fillrate speci-fication, European Journal of Operational Research Volume 259, Issue 3, 16 June 2017, pp. 917-925.

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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Influence of Relative Stiffness on Bending Moment in Raft Foundations

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Abstract— **This research article delves into the impact of raft and soil stiffness on the seismic behavior of soil-structure systems. Understanding soil-structure interaction under seismic loading is crucial for designing and analyzing structures in earthquake-prone regions. The stiffness of both the raft and the underlying soil significantly affects the dynamic response and overall performance of the system. To achieve the research objectives, an extensive numerical study employing advanced finite element analysis is conducted. Various scenarios are explored by systematically varying the stiffness properties of the raft and soil. The seismic response is assessed through structural displacements, accelerations, and stresses, as well as soil settlement and lateral soil pressures. The study's findings highlight the noteworthy influence of raft and soil stiffness on the seismic response of soil-structure systems. Higher raft stiffness tends to reduce structural displacements while increasing stress levels in the structure. On the other hand, softer soil stiffness amplifies the structural response, resulting in larger deformations. The outcomes of this research provide valuable insights for designing and optimizing soil-structure systems subjected to seismic forces. Engineers and researchers can utilize these findings to enhance the seismic performance of structures by appropriately selecting and adjusting the stiffness of the raft and soil, while considering site-specific conditions and design requirements.**

Index Terms—**soil-structure interaction, seismic response, raft stiffness, soil stiffness, finite element analysis.**

I. INTRODUCTION

Foundations play a crucial role in the safe transfer of loads from the superstructure to the underlying subsoil. Raft foundations, also known as mat foundations, offer an economical solution when faced with low soil bearing pressures, large coverage areas, or potential differential settlements. These rafts are commonly designed as reinforced concrete flat slabs, providing a wide base for load distribution. Traditionally, the design of rafts has been based on assumptions that consider the pressure exerted by the soil on the raft as uniformly upward; assuming the center of gravity of the loads coincides with the centroid of the raft. However, this approach does not account for moments and shears induced by potential differential settlements, resulting in heavily reinforced rafts. In contrast, an alternative method subdivides the raft into a series of continuous strips, considering the shear and moments of each strip for design purposes. This allows for a more accurate design, especially when using an inverted flat slab configuration with a combination of beams and slabs. The determination of contact pressure distribution beneath the foundation is a complex task influenced by the rigidity of the superstructure, the raft itself, and the supporting soil. The pressure distribution is dependent on various factors, including the foundation rigidity and soil characteristics. By understanding the pressure distribution, engineers can calculate the bending moments and shear forces acting on the foundation.

In seismic regions, raft foundations exhibit advantages due to their continuity and inherent rigidity. However, seismic forces introduce additional complexities, leading to significant changes in load distribution and soil pressure. These changes result in large eccentricities of loads relative to the centroid of the raft, inducing additional moments that can cause differential settlement. Therefore, it is crucial to consider the effects of seismic loading when designing raft foundations. This research article aims to investigate the influence of seismic loading on the design of raft foundations. By analyzing the changes in load distribution, soil pressure, and potential differential settlements, a better understanding of the behavior and design considerations of raft foundations under seismic forces will be achieved. This knowledge will assist engineers in developing more effective and reliable design approaches for seismic regions.

II. LITERATURE REVIEW

In the field of raft foundation design, Sharat Chandra Gupta's book on "Raft Foundations Design and analysis with a practical approach" [1] provides valuable insights. This resource offers a practical perspective on the design and analysis of raft foundations, covering essential considerations for engineers. Gupta's book serves as a comprehensive guide, equipping professionals with the knowledge and techniques necessary to tackle challenges related to raft foundation design. A study by Sekhar Chandra Dutta, Rajib Saha, and Sumanta Haldar [2] delves into the inelastic seismic behavior of soil-pile raft-structure systems under bi-directional ground motion. By examining the response of these systems during seismic events, the research sheds light on the behavior and performance of piled raft foundations. Dutta et al.'s study enhances

our understanding of soil-structure interaction and provides valuable insights for engineers aiming to design more resilient and robust foundations in seismic regions.

Francesco Basile's study on "Non-linear soil-structure interaction in disconnected piled raft foundations" [3] investigates the behavior of disconnected piled raft foundations under varying loading conditions. This research focuses on understanding the non-linear soil-structure interaction and provides insights into the design and analysis of such foundations. Basile's work contributes to the knowledge base surrounding disconnected piled raft foundations, aiding in their improved design and performance.In their publication, Kyung Nam Kim, Su-Hyung Lee, Ki-Seok Kim, Choong-Ki Chung, Myoung Mo Kim, and Hae Sung Lee [4] explore the optimal pile arrangement to minimize differential settlements in piled raft foundations. Through their parametric study, they investigate the impact of different pile arrangements on the performance of such foundations. This research offers valuable insights into the selection and arrangement of piles, aiming to mitigate potential settlement issues and enhance the stability of piled raft foundations. A parametric study by Dang Dinh Chung Nguyen, Dong-Soo Kim, and Seong-Bae Jo [5] focuses on the optimal design of large piled raft foundations on sand. Through their research, they explore various design parameters and their effects on the behavior and performance of piled raft foundations. Nguyen et al.'s study offers valuable guidance for engineers, contributing to the development of design strategies to ensure the stability and structural response of large piled raft foundations on sand.

Additionally, Jeong and Cho [6] proposed a nonlinear 3-D analytical method for analyzing piled raft foundations, further advancing the understanding of their behavior. Mandolini, Di Laora, and Mascarucci [7] focused on the rational design of piled rafts, considering various design aspects and offering guidance for practitioners. Chaudhari and Kadam [9] explored the effect of piled raft design on high-rise buildings, emphasizing soil-structure interaction. The relevant Indian Standard IS 2950 (Part-I) [10] provides guidelines for the design and construction of raft foundations, while ACI 336.2R [11] offers suggested analysis and design procedures for combined footings and mats.

Jayalekshmi and Chinmayi [12] investigated the soil-structure interaction effect on seismic force evaluation of RC framed buildings with different shear wall shapes, aligning with the broader context of considering soil-structure interaction in seismic design. Collectively, these studies contribute to the understanding of raft foundation design, behavior, and optimization, encompassing aspects such as soil-structure interaction, seismic behavior, pile arrangement, and design guidelines. These insights aid engineers in developing efficient and reliable design approaches for raft foundations in various geotechnical and structural contexts.

The literature review highlights the existing research gap regarding the effects of soil-structure interaction on the seismic response of structures and the practical application of finite element analysis in the design of raft foundations. While significant research has been conducted on the analysis and design of raft foundations, most of it has focused on soil-structure interaction and flexible analysis, neglecting the behavior of the foundation under seismic loading conditions.

The research emphasizes that the current practice of analyzing rafts for gravity loading, following code guidelines, does not fully capture the field conditions. As a result, there is a need for further research to study the seismic/dynamic analysis of raft foundations. This research direction would address the gap in the literature and provide a simple approach to analyzing raft foundations subjected to seismic forces.

III. 3 Analysis of RCC Structure

The conventional design and analysis of rafts primarily focus on static loading conditions, while their behavior under seismic conditions requires further investigation. To address this gap, a comprehensive study is conducted, taking into account the insights gained from the literature survey. The study examines a typical concentrically loaded building with a raft foundation under seismic conditions, considering various load combinations, raft thicknesses, and soil conditions.

The analysis focuses on a ground plus thirteen-storey RC high-rise residential building with symmetrical plan dimensions. The building's height is 46.5 meters, and it does not have any parking floors. In accordance with Clause 7.8.1 of IS 1893 (Part I):2002, the Response Spectrum method is utilized for dynamic analysis. To conduct the building analysis, software such as ETABS and STAAD.Pro are employed, while the raft is analyzed using SAFE. Through this comprehensive study, the seismic behavior of the building and the response of the raft foundation are thoroughly examined. By considering different load combinations, raft thicknesses, and soil conditions, valuable insights can be gained regarding the structural response and performance under seismic forces. The use of advanced software enables accurate analysis and assessment of the building and raft system, aiding in the development of reliable design approaches for seismic conditions.

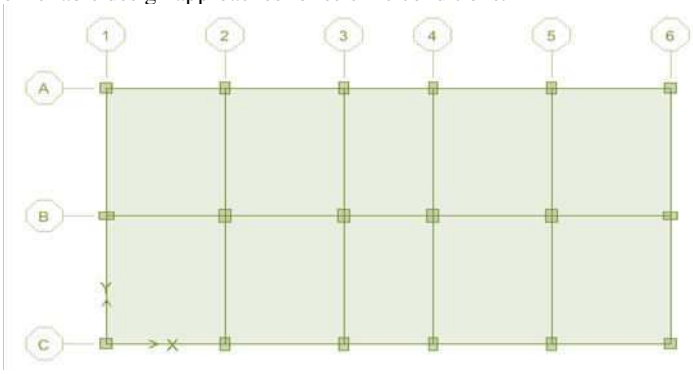

Figure 1: Plan of building

Table 1: Load combinations used for analysis

Factors		DL	LL	EQ
Load Combination	DL+ LL	1.5	1.5	-
	DL+LL*±EQX	1.2	0.25/0.5	1.2
	DL+LL*±EQY	1.2	0.25/0.5	1.2
	DL±EQX	1.5	-	1.5
	DL±EQY	1.5	-	1.5
	DL±EQX	0.9	-	1.5
	DL±EQY	0.9	-	1.5

IV. 4 Analysis of Raft

The analysis of the raft foundation is conducted using the SAFE software. The mat is positioned with a 0.5-meter offset from the column face, allowing the vertical loads and moments on the columns to be transferred as column reaction loads onto the mat. Subsequently, the mat is analyzed for various parameters.

To facilitate the analysis, the raft is divided into three strips, namely A, B, and C. Different thicknesses of the raft, ranging from 0.5 meters to 1.5 meters, are considered, along with various Modulus of Subgrade Reactions values ranging from 5000 to 25000 kN/m^2/m. Deflection results are evaluated for different load

combinations, identifying the worst load combination for further analysis.

In the preliminary analysis, the raft thicknesses of 0.5 meters, 1 meter, and 1.5 meters are initially considered. However, for a more detailed investigation, the raft thickness is adjusted based on the specific requirements of the soil conditions and the relative stiffness parameter. Different modulus of subgrade reactions are utilized, including values of 5000, 10000, 15000, 20000, and 25000 kN/m^2/m. The bending moment results are analyzed for various load combinations, with the worst load combination being identified and used for subsequent analysis.

Effect of seismic/dynamic loading on solid flat raft provided for symmetrical size and shape building is studied under bending moment and its variation w.r.t. relative stiffness

4.1 Relative stiffness

In conventional design practices, building frames are typically assumed to be fixed at their bases. However, in reality, the soil support exhibits some flexibility, allowing for movement of the foundation. This flexibility decreases the overall stiffness of the building frames in relation to the soil, consequently altering the overall response of the building and its foundation [6].To interpret the results of soil-foundation-structure interaction, the flexural rigidities of superstructure and foundation elements, as well as the stiffness of the soil, serve as defining parameters. Equation (i) in line with IS:2950 Part I 1981 [1] is considered for the study, although the code does not explicitly guide how these factors should be utilized. Furthermore, there has been no significant revision to this code since its reaffirmation in 1987.

In practice, raft foundations are analyzed based on gravity loading guidelines provided by codes, which do not fully capture the field conditions. Most of the existing research focuses on soil-structure interaction and the flexible analysis of rafts. However, the literature review and provisions of the IS code emphasize static loading conditions. Therefore, a more comprehensive study is required to investigate the seismic/dynamic analysis of rafts, aiming to determine a satisfactory solution for analyzing raft foundations under seismic forces.

$$K_r = \frac{E}{12\,E_s}\left(\frac{d}{b}\right)^3 \quad \text{....(i)}$$

where Kr < 0.5: Flexible and Kr ≥ 0.5: Rigid

For long beams Vesic (1961) proposed an equation (ii) for estimation of sub grade reaction that can be expressed as

$$K = \frac{E_s}{B\,(1-\mu_s^2)} \quad \text{...(ii)}$$

where,

k = modulus of sub grade reaction, Es = modulus of elasticity of soil, μs = Poisson's ratio of soil

4.2 Relative Stiffness Factor

The relative stiffness [1] values corresponding to thickness and subgrade modules are shown in table 2.

Table 2 Relative stiffness for varying soil modulus and raft stiffness

K in kN/m^3	0.5m	1m	1.5m
5000	0.282(F)	2.25(R)	7.61(R)
10000	0.141(F)	1.128(R)	3.808(R)
25000	0.0564(F)	0.45(SR)	1.523(R)

Where, F- Flexible Raft, R-Rigid Raft.

V. 5 Results and Discussions

The investigation focused on analyzing the behaviour of a divided raft, which comprised three strips labelled as A, B, and C (as shown in Figure 1, with column positions marked with crosses). The key parameters examined were a bending moment in relation to the raft. Additionally, the response of the raft at its threshold thickness was assessed by studying selected parameters. The critical load combination for the raft was determined during the study. It was observed that the load combination 1.5 (DL+EQY) was critical for the edge-strips A and C, indicating a higher vulnerability under seismic loading conditions. Conversely, for the B-strip, the critical load combination was 1.5 (DL + LL), suggesting a greater influence of regular gravity loading.

These findings shed light on the distinct behaviour and response of different strips within the raft system, emphasizing the varying susceptibility of the edges (strips A and C) to seismic forces and the influence of gravity loading on the central strip (B-strip).

Solid raft is analyzed for different thicknesses and soil parameters and results are as below:

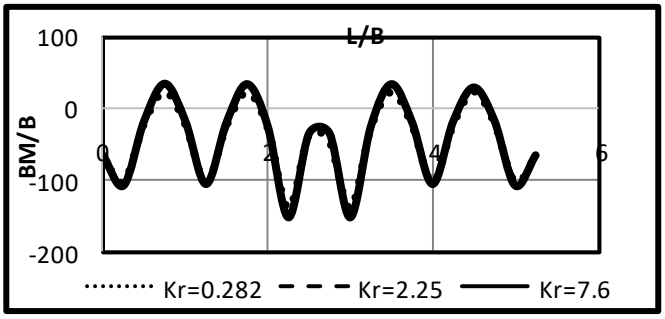

Figure 2 BM results for A and C strip for K=5000kN/m^2/m

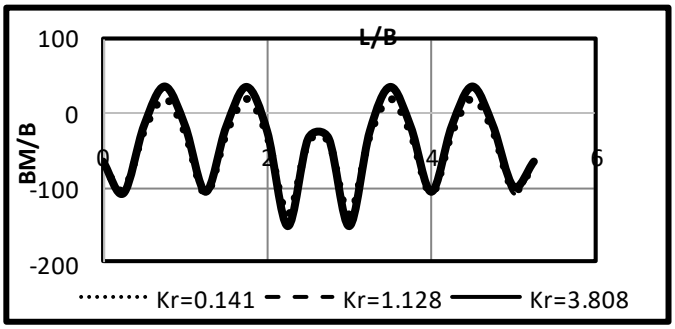

Figure 3 BM results for A and C strip for K=10000kN/m^2/m

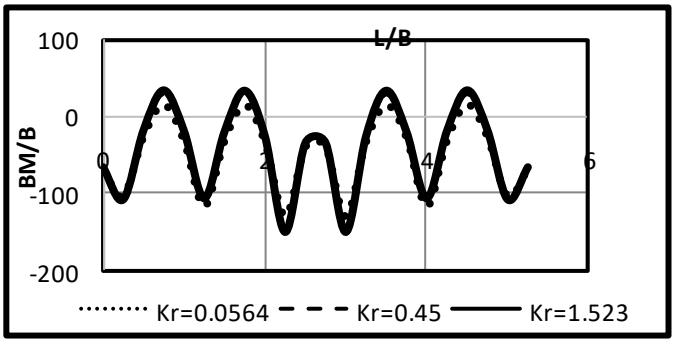

Figure 4 BM results for A and C strip for K=25000kN/m^2/m

Figure 2 – 4 shows that shows the variation of bending moment for different relative stiffness Kr, of the raft in terms of M/B and L/B. From Figure 2-4 it is clear that, there is no substantial variation in bending moment with respect to relative stiffness of raft for strips A & C.

Figure 5 – 7 shows the BM/B and L/B variation for different values of relative stiffness (Kr). For strip B there is

slight increase in bending moment with increase in relative stiffness of raft.

The change in maximum bending moment is substantial for flexible raft (refer figure 8), whereas in case of rigid raft (figure 9) maximum bending moment values are not much altered by changes in relative stiffness.

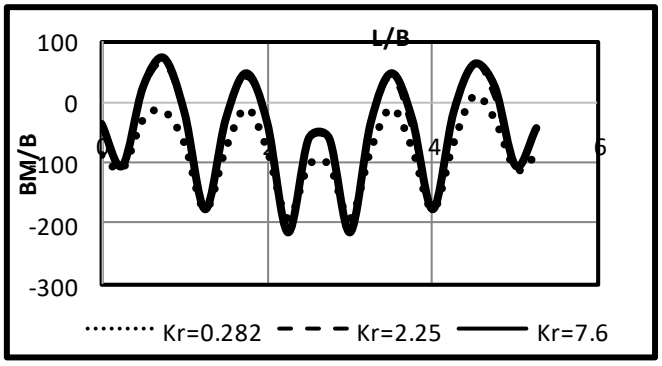

Figure 5 BM results for B strip for K=5000kN/m²/m

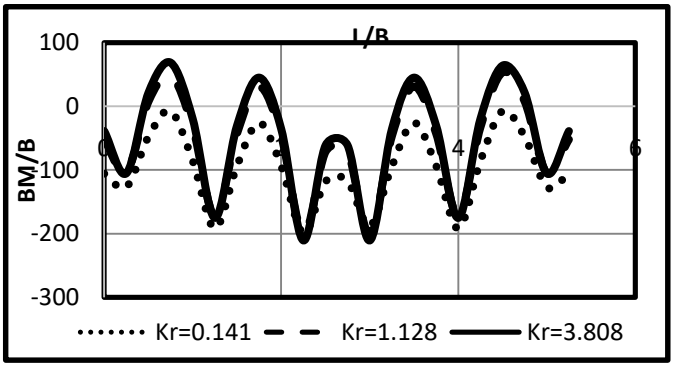

Figure 6 BM results for B strip for K=10000kN/m²/m

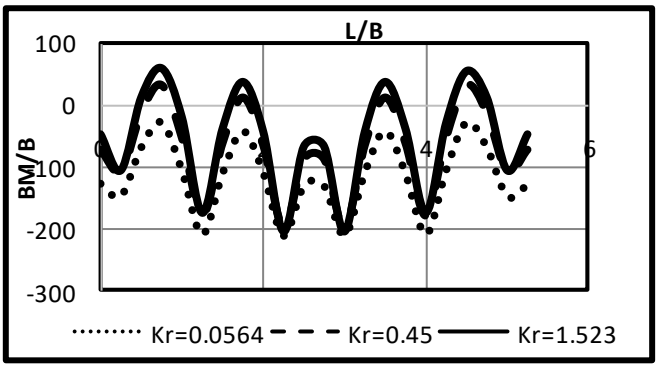

Figure 7 BM results for B strip for K=25000kN/m²/m

These findings demonstrate that the relative stiffness of the raft plays a more substantial role in influencing the bending moment behavior for the mid strip (strip B) compared to the edge strips (strips A and C). Additionally, they indicate that the rigidity of the raft significantly affects the magnitude of the maximum bending moment, with a more pronounced impact observed for flexible raft conditions compared to rigid raft conditions.

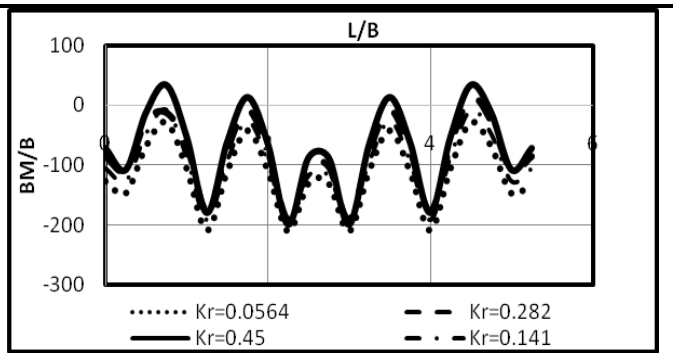

Figure 8 BM results for B strip for flexible raft conditions

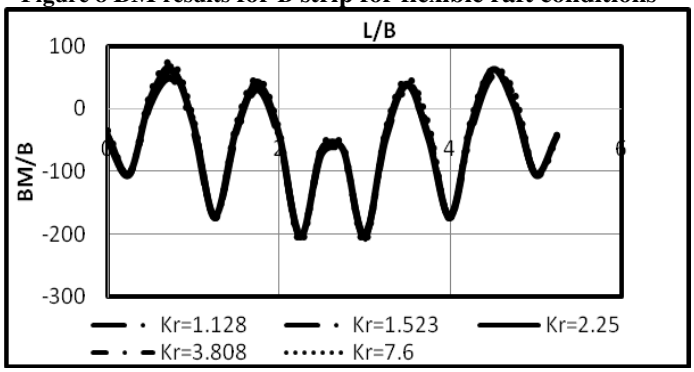

Figure 9 BM results for B strip for rigid raft conditions

VI. CONCLUSIONS

1. The investigation reveals that the bending moment per meter width (BM/B) can be effectively expressed in terms of the relative stiffness factor for different L/B ratios across all three strips.
2. The magnitude of the bending moment exhibits little variation with changes in the relative stiffness of the raft for strips A and C. However, for strip B, there is a noticeable increase in the maximum bending moment (sagging or hogging) with higher relative stiffness values (> Kr = 0.5) of the raft.
3. As the relative stiffness factor (Kr) approaches 0.5, indicating a rigid condition, the bending moment values tend to stabilize at higher levels of relative stiffness (Kr > 0.5).
4. The observed pattern of bending moment variation remains consistent for both rigid and flexible foundations, with the intensities varying based on the relative stiffness. Notably, this pattern is independent of the stiffness of the raft or the stiffness of the soil.
5. The bending moment pattern remains unchanged regardless of whether the loading is static or dynamic.
6. In a flexible foundation, an increase in the relative stiffness leads to a substantial increase in the maximum bending moment (sagging or hogging), whereas in a rigid foundation, the impact of increasing relative stiffness on the maximum bending moment is less pronounced. Once the foundation reaches a rigid state, changes in Kr values have minimal influence on the bending moment values, regardless of the specific strip being analyzed.

Overall, these findings contribute to a better understanding of the behavior of raft foundations and their response under varying degrees of rigidity, providing valuable insights for the design and analysis of such foundations under dynamic loading conditions.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no know competing financial interest or personal relationships that could have appeared to influence the work reported in this paper.

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REFERENCES

[1] Sharat Chandra Gupta, "Raft Foundations *Design and analysis with a practical approach"*, New Age International (P) Ltd, Publishers, First Edition (Reprint):2006
[2] Sekhar Chandra Dutta, RajibSaha, SumantaHaldar, "Inelastic seismic behavior of soil–pile raft–structure systemunder bi-directional ground motion", Soil Dynamics and Earthquake Engineering (Elsevier), 67 (2014) 133–157.
[3] Francesco Basile, "Non-linear soil–structure interaction in disconnected piled raft foundations", Computers and Geotechnics (Elsevier), 63 (2015) 73–82.
[4] Kyung Nam Kim, Su-Hyung Lee, Ki-Seok Kim, Choong-Ki Chung,Myoung Mo Kim, Hae Sung Lee, "Optimal pile arrangement for minimizingdifferential settlements in piled raft foundations", Computers and Geotechnics(Elsevier), 28 (2001) 235–253
[5] Dang Dinh Chung Nguyen, Dong-Soo Kim, Seong-Bae Jo, "Parametric study for optimal design of large piled raft foundationson sand", Computers and Geotechnics (Elsevier), 55 (2014) 14–26.
[6] SangseomJeong, Jaeyeon Cho, "Proposed nonlinear 3-D analytical method for piled raft foundations", Computers and Geotechnics (Elsevier), 59 (2014) 112–126.
[7] Alessandro Mandolini, Raffaele Di Laora, YleniaMascarucci, "Rational Design of Piled Raft", 11th International Conference on Modern Building Materials, Structures and Techniques,MBMST 2013, Procedia Engineering (Elsevier), 57 (2013) 45 – 52.
[8] S. N., G. Narayana, J. Raju, M. A. Dar, and N. L., "Effect of Relative Stiffness on Foundation to Soil on Interaction Behavior of Raft Footing," Int. J. Civ. Eng., no. April, pp. 135–141, 2015.
[9] R. R. Chaudhari and K. N. Kadam, "Effect of Piled Raft Design on High-Rise Building Considering Soil Structure Interaction," Int. J. Sci. Technol. Res., vol. 2, no. 6, pp. 72–79, 2013.
[10] IS 2950 (Part-I) 1981- Code for design and construction of raft foundation.
[11] ACI 336.2R - Suggested Analysis and Design Procedures for Combined Footings and Mats. America, 2002.
[12] B. R. Jayalekshmi, H. K. Chinmayi, "Soil–Structure Interaction Effect on Seismic Force Evaluation of RC Framed Buildings with Various Shapes of Shear Wall: As Per IS 1893 and IBC", Indian Geotech J (July–September 2015) 45(3):254–266

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CFD Analysis of Cylindrical Lithium-ion Battery Pack for BTMS

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***Abstract*— As today's trend, the electrical vehicles are coming in market; EV's are capturing the big share in automobile sector. The Battery is power source for electrical vehicle which giving electric power to motor. In electric battery, electric energy is stored in the chemical form. The battery is charged to store energy and discharged to get energy back. While working of electrical vehicle the battery continuously supplies energy to electric motor by doing chemical reaction in it. During charging and discharging, the heat is generated in the battery due to chemical reaction and resistance; it causes heating of the battery cells continuously. But, cooling of heated cells is necessary to maintain it in required temperature limit (15 to 35 degree celsius). Currently, there is a lack of Battery Thermal Management System (BTMS) which has desired effect on battery temperature. Presently, coolant is used for cooling the battery and it gives good results at initial period, but as time passes, the coolant also gets heated. Due to this, coolant is not able to absorb heat from the battery cells further. So, there is need of system which can absorb heat from coolant for efficient working of BTMS. Currently, there are various methods of cooling of battery which include air cooling, liquid cooling, Phase change materials, etc. As per literature review, liquid cooling has high efficiency, so decided to consider liquid cooling method for the further analysis of the proposed work. Analysis of Cylindrical Lithium-ion Battery Pack is carried out to maintain the temperature in required range, prevent battery deterioration by managing heat generated, stabilize the temperature dissipation and prevent the uncontrolled pressure in the cells and battery pack. Using the Star CCM+ software, CFD analysis is performed with a selection of boundary conditions. For the analysis, two different models of similar battery pack are used by varying size of cooling channels. The cooling performance of battery pack is increased in present work study.**

***Keywords*— BTMS; CFD Analysis; Lithium ion; Battery Pack; Liquid Cooling.**

I. INTRODUCTION

The thermal management of battery is very important in electric vehicles as it help to maintain temperature as result in increased the battery life. Also, the battery efficiency is increased and various hazardous situations (like catching fire & explosion of batteries) can be avoided. The rise of renewable power generation in the current energy market has created an immense potential for different forms of energy storage. At the forefront of these storage technologies are the lithium batteries as they are lightweight with high energy density. The characteristics of Lithium batteries have made thematttractive both for stationary and automotive applications. Temperature has a large effect on the safety, lifetime and performance of Li-ion batteries. The optimum operating range for these batteries is 20-45ºC, otherwise theperformance and lifespan will be reduced and furthermore hazardous incidents such asthermal runaway might occur.

In addition, temperature difference among cells and modules in a battery pack must be controlled; else it will impact the operation and aging of the battery. Thus, an effective battery thermal management system is necessary to dissipate the heat generated inside the batteries. Moreover, in low-temperature scenarios, heating is required to ensure the best performance. As per literature survey [1-9], liquid cooling has high efficiency, so decided to consider liquid cooling method for the further analysis of the proposed work. This paper aims to analyse and compare the performance of liquid cooling usedfor thermal management of lithium batteryconsisting of 21700 cylindrical cells. Thecomparison is done by simulating the performance of a 96-cell pack using Computational Fluid Dynamic Analysis Software- Star-CCM+. The software replicates the flow distribution and properties of the cells and the media around them.

A. Geometry of Battery pack with cooling system

The present work is carried out on the two models, the first one is having cooling microchannel with equal cross-sectional area and another model is our proposed model having decreasing cross sectional area at start after increasing cross sectional at the end. The geometry contains 96 cells arranged in zig-zag manner to save space. Each cell having 1.5 mm spacing which is minimum spacing determined by minimum possible distance between cells provided by Northvolt. The cooling plate is in maximum contact with each cell with curved shape, to give greater cooling performance.

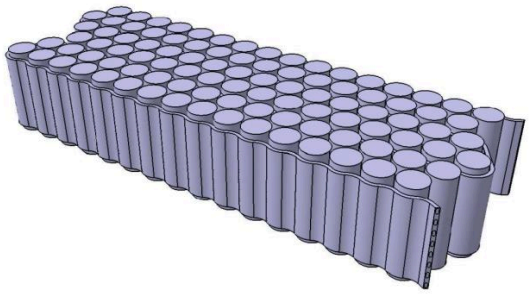

Fig. 1 Geometry of model 1

In this model 1 shown in Fig.1, 8 channels having equal cross section are in cooling plate. The microchannel is elongated holeshape having 2 mm radius and length is 4 mm.

The second model having same dimension of micro channel at starting 50 mm and decreasing up to length 225 mm and having continuous cross section in contact in battery pack and then increasing cross section up to length 225 mm and having equal cross section at last 50 mm length. The fins having 1 mm thickness and 20 mm length are attached at the end of cooling plate so that the heat generated in the fluid can be rejected to the atmospheric air. The model 2 geometry view is shown in Fig.2 below.

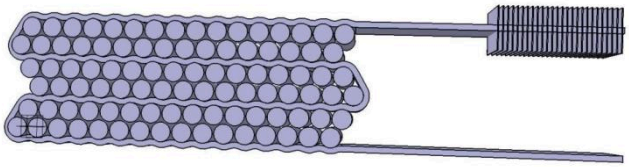

Fig. 2 Geometry of model 2

Due to decreasing cross section of the microchannel the coolant pressure as well as temperature decrease so it can absorb more and more heat, same way as increasing cross section coolant pressure as well as temperature increase as a result it can reject more and more heat to atmosphere. According to Bernoulli's equation, a decrease in temperature can occur due to a change in dimension. Bernoulli's equation describes the relationship between fluid velocity, pressure, and elevation in a flowing system. When fluid flows through a constricted section of a pipe or channel, such as a nozzle, the fluid's velocity increases, and its pressure decreases. This phenomenon, known as the Venturi effect, is based on the conservation of energy principle. As the fluid's velocity increases, its kinetic energy increases at the expense of its potential and internal energies, resulting in a decrease in temperature. Therefore, when there is a change in dimension that causes a flow constriction, such as a narrowing of a pipe or a reduction in cross-sectional area, the fluid experiences an increase in velocity and a corresponding decrease in temperature, as per Bernoulli's equation. Due to the constricted section at inlet the temperature of coolant is decreased around 5 degrees according to the Bernoulli's equation.

Also model 2 is having fins at outlet. When temperature rises above the ambient temperature fins which is exposed to environment air is rejecting heat to atmosphere.

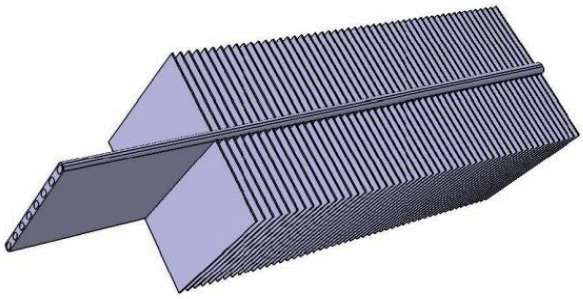

Fig. 3 Geometry of Heat Exchanger

The outlet having 50 fins with 2 mm spacing between them is shown in Fig. 3. These reject heat to atmospheric air to maintain temperature of coolant in optimum range so that it can cool battery cells.

B. Mesh Generation of Geometry

Surface Re-mesher, Polyhedral Mesher, Prism Layer Mesher these methods of mesh are used in such a way that a fine mesh region is obtained. Later, names were assigned to the inlet, outlet, Cooling Plate, Battery, etc. The Battery cells along with cooling plate meshing having fluid domain is shown in Fig.4. Mesh for model 2 having same process and mesh generated is also same. Mesh Generation of Heat Exchanger is revealed through Fig.5.

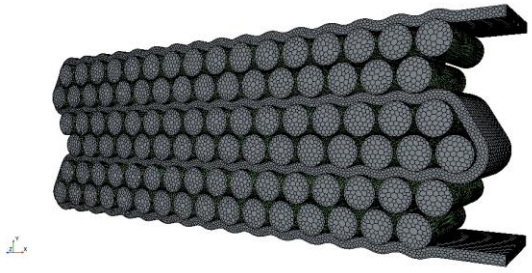

Fig. 4 Mesh Generation of model 1.

Fig. 5 Mesh Generation of Heat Exchanger

II. Process of Analysis of Battery Pack using Star CCM+ Software

A. *Boundary Conditions*

The analysis in STAR-CCM+ incorporates the application of ethylene glycol as a coolant fluid. Ethylene glycol, a commonly used heat transfer fluid, offers excellent thermal properties and is well-suited for managing temperature regulation in various systems. By applying ethylene glycol as the working fluid, the simulation can accurately capture the heat transfer characteristics and performance of the system under realistic operating conditions. This enables comprehensive analysis and evaluation of thermal management, ensuring efficient cooling and optimal performance of the analyzed system. Appropriate properties of Ethyl glycol coolant are taken for further process.

Li-ion cell properties are taken as mentioned below:

Density = 2871.826 kg/m^3
Sp. Heat = 1200.0 J/kg-K
Thermal Conductivity = 11.55 W/ mK
Heat Source = 2 W
Initial condition = 300 K

B. *Process Followed*

The CATIA v5 software is used to create 3D model of battery pack. After completing the 3D part, it is imported in Star CCM+ software as a surface mesh. In Star CCM+ software it is first edited in 3D-CAD where operations like imprinting bodies giving inlet and outlet regions are done. After Geometry edit each part from geometry is assigned to a new region. Then new physics continua are created from continua. Model is selected for every physics continuum. Each continuum is edited according to the specification of model which includes material, material properties, etc. According to model continuum is attached to each part.

Automated mesh from Operations is carried out for that Surface Remesher, Polyhedral Mesher, Prism Layer Mesher are used to get fine mesh.

The coolant used is ethylene glycol 50/50 solution having good thermal properties. For Analysis we have taken the 20 degrees as inlet temperature for coolant and each cell generates 2 W heat. Ambient temperature is applied as 30 degrees Celsius.

III. Result and Discussion

The analysis consists of flow of coolant through channel which absorbs continuously generated heat by battery cells. As the fluid passes through channels, it gets warmer from the heat generated by the cells. As a result, the cells close to the inlet are cooler than the ones at the outlet and the hottest cell is located at the end of the cooling channel. The cells that are at the bends of the cooling channel are further cooled due to the higher contact surface with the cooling channel.

A. *Models 1 results for 1st iteration*

For model 1, the results are calculated at coolant inlet temperature as 300 K, Battery cell generating 2 W heat and ambient temperature is also 300 K. The result for battery cell temperature and coolant temperature is shown as below Fig.6.

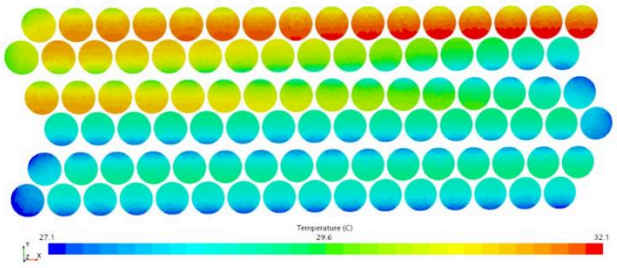

Fig. 6 Temperature distribution of battery cells for 1st Iteration

As shown in Fig.6, temperature of cells is reduced due to low temperature coolant coming from inlet. As coolant flow through channels due to heat absorbed from battery cells, coolant's temperature also continuously increases.

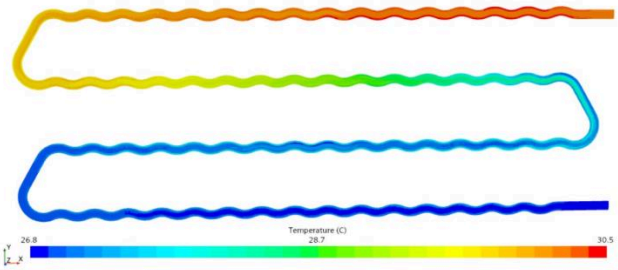

Fig.7 Temperature distribution of flow channel for 1st Iteration

The temperature distribution inside the module (shown in Fig.7) running at 2 W heat generation per cell. As the fluid passes through channels, it gets warmer from the heat generated by the cells. As a result, the cells close to the inlet are cooler than the ones at the outlet and the hottest cell is located at the end of the cooling channel. The cells that are at the bends of the cooling channel are further cooled due to the higher contact surface with the cooling channel.

B. *Models 1 results for 2nd iteration*

From result i.e. Fig. 8, the outlet temperature is around 32 degrees Celsius; so, after some time the coolant temperature become around 30 to 30 degrees Celsius.

By using this as an inlet temperature the result is again calculated which shown below.

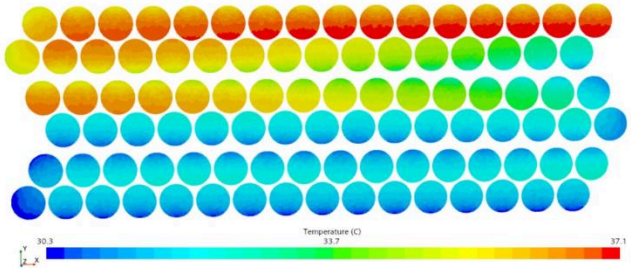

Fig. 8 Temperature distribution of battery cells for 2nd Iteration

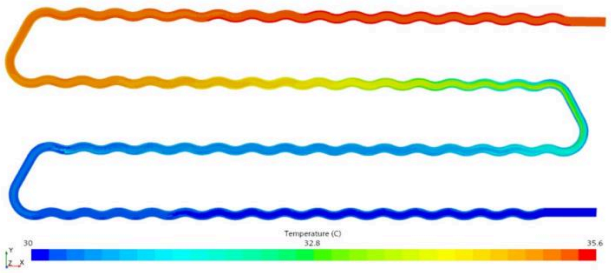

Fig. 9 Temperature distribution of fluid flow for 2nd Iteration

In these above results i.e. Fig.9, clearly seen that, the outlet temperature of coolant will always rise and there is no provision for the dissipation of heat from it.

By recirculating the coolant temperature is always increases and graph for the outlet temperature of coolant is shown below Fig.10.

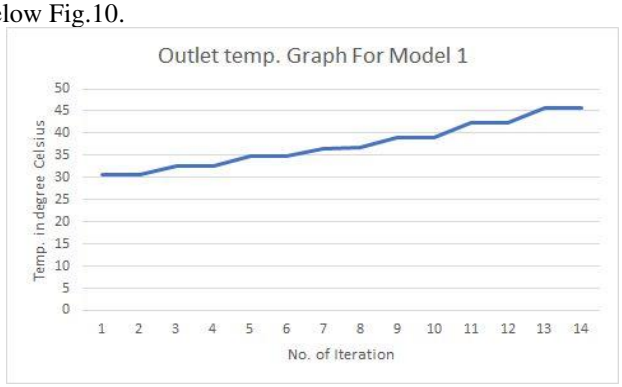

Fig.10 Graph of outlet temperature for model 1

C. *Scalar scene for cooling channel*

For second model, firstly passed coolant through the cooling channel having large cross section at start and decreasing up to 200 mm length; as a result the coolant pressure is reduced and velocity of coolant is increased. The result for the coolant before inlet as shown below.

Pressure is reduced as coolant flow through the cooling channel due to that coolant can absorb more amount of heat from the battery cells. The negligible change is seen in the temperature from Fig.11 & Fig.12.

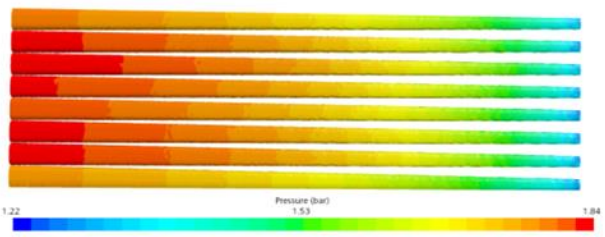

Fig.11 Pressure distribution of coolant before inlet

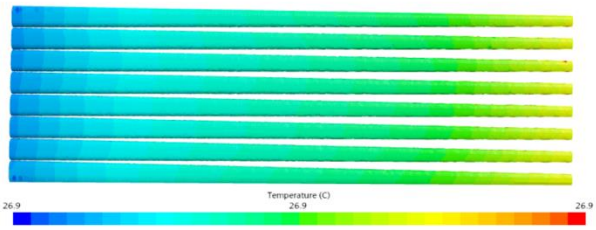

Fig. 12 Temperature distribution of coolant before inlet

D. *Models 2 results for 2nd iteration*

The all conditions of battery cells and coolant are same as model 1 except pressure and velocity which is changed due to throttling process in decreasing cross section at inlet and result is calculated.

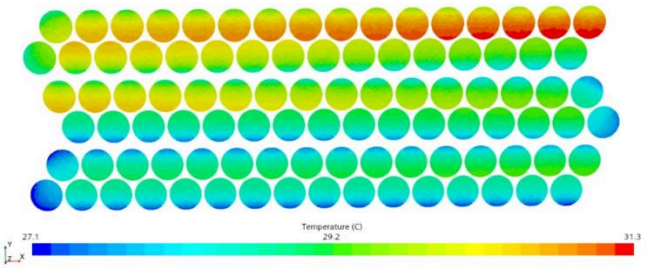

Fig.13 Temperature distribution of battery cells for 1st Iteration

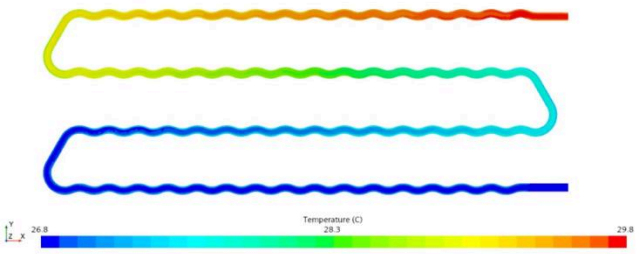

Fig. 14 Temperature distribution of coolant for 1st Iteration

The coolant temperature at outlet of battery pack is around same temperature as for model 2 and it is shown in Fig. 13 & Fig.14. Then coolant is passed through the heat exchanger to reject heat to atmosphere.

E. Heat Exchanger analysis after outlet of coolant

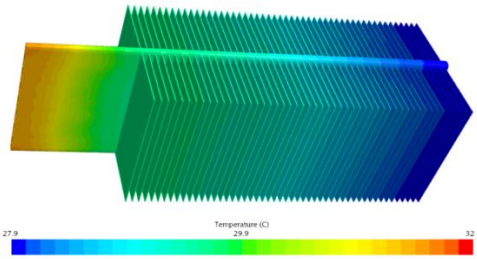

Fig.15 Temperature distribution in Heat Exchanger

Coolant is passed through the heat exchanger as shown in Fig.15; having fins attached to the cooling plate. Due to atmospheric air high temperature coolant is cooled and this coolant can now be used for the next iteration.

F. Heat Exchanger analysis after outlet of coolant

The temperature distribution for 2nd iteration for battery cells and coolant are shown in Fig. 16 and Fig. 17.

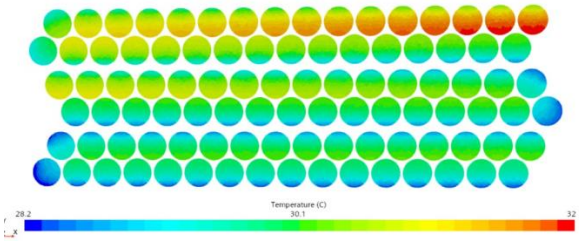

Fig.16 Temperature distribution of model 2 for second iteration

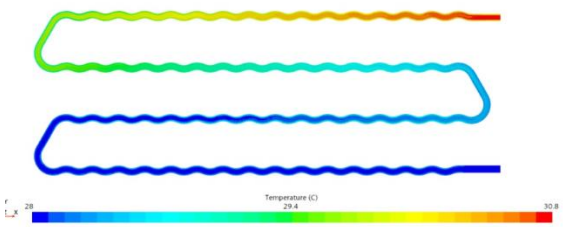

Fig. 17 Temperature distribution of model 2 for second iteration

By using this model, 7 iterations have been calculated using outlet coolant again and graph is plotted as shown in Fig.18.

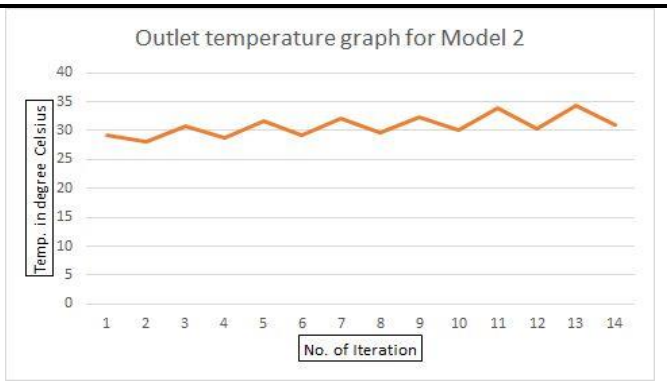

Fig.18 Graph of outlet temperature for model 2

G. Heat Exchanger analysis after outlet of coolant

The graph of model 1 and model 2 is combined and it is shown in Fig. 19 below.

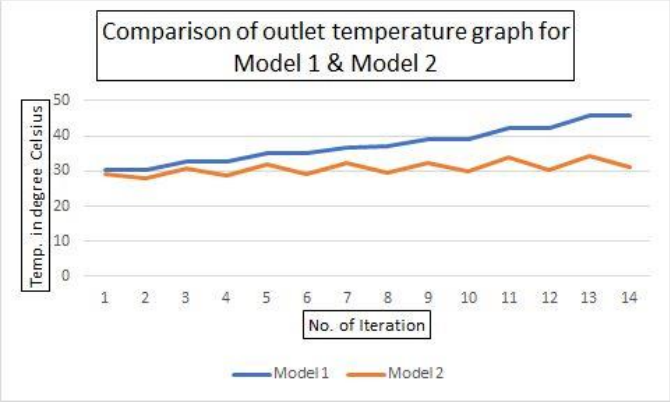

Fig.19 Comparison of outlet temperature graph for Model 1 & Model 2

From above graph, it is clear that, the outlet temperature is continuously and greatly increasing in model 1 while in model 2 it is increasing and then decreasing due to heat exchange.

IV. CONCLUSIONS

Battery Thermal Management System (BTMS) is most important to extend life of battery pack in electric vehicle. Present study represents the CFD analysis of battery pack with and without heat exchanger.

The following key findings from the present study are mentioned as follows:

- From the results, it is seen that, temperature of coolant is greatly increasing in model 1.
- Temperature of coolant in model 2 slowly increasing, due to heat exchanger rejects the heat.
- The cooling performance in model 2 is increased and battery cell temperature is maintained in required

range.

V. FUTURE SCOPE

- In the present study, results are calculated up to 7 iterations only, more results can be carried out.
- Battery cells is limited in touch with the cooling plate, one can design efficient battery pack model.
- We used Ethyl Glycol 50/50 Solution as a coolant, one can use other.

REFERENCES

[1] W. Tong, W.Q. Koh, E. Birgersson, A.S. Mujumdar, C. Yap, *Correlating uncertainties of alithium-ion battery - a Monte Carlo simulation*, Int. J. Energy Res. 39 (6) (2015) 778–788.

[2] M. Ouyang, Z. Chu, L. Lu, J. Li, X. Han, X. Feng, G. Liu*, Low temperature aging mechanism identification and lithium deposition in a large format lithium iron phosphate battery for different charge profiles*, J. Power Sources 286 (2015) 309–320.

[3] S. Ma, et al., *Temperature effect and thermal impact in lithium-ion batteries:* areview, Prog. Nat. Sci. Mater. Int. 28 (6) (2018) 653–666.

[4] K. Darcovich, D.D. MacNeil, S. Recoskie, Q. Cadic, F. Ilinca, B. Kenney, *Coupled numerical approach for automotive battery pack lifetime estimates with thermal management,* J. Electrochem. Energy Convers. Storage 15 (2) (2018) 021004-1–021004-12.

[5] H. Behi, D. Karimi, M. Behi, M. Ghanbarpour, J. Jaguemont, M.A. Sokkeh, F. H.Gandoman, M. Berecibar, J. Van Mierlo, *A new concept of thermal management system in Li ion battery using air cooling and heat pipe for electric vehicles,* Appl. Therm. Eng. 174 (2020),115280.

[6] R. Ren, Y. Zhao, Y. Diao, L. Liang, H. Jing, *Active air-cooling thermal management system based on U-shaped micro heat pipe array for lithium-ion battery*, J. Power Sources 507 (2021),230314.

[7] A. Ajgar, A. Londhe, A. Dabade, P. Mule, D. Kashid, S. Jadhav, *Thermal Analysis of Battery Module:* Proceedings of National Conference on Relevance of Engineering and Science for Environment and Society, AIJR Proceedings (2021).

[8] A.G. Olabi, K. Obaideen, K. Elsaid, T. Wilberforce, E.T. Sayed, H.M. Maghrabie, M. A. Abdelkareem, *Assessment of the pre-combustion carbon capture contribution into sustainabledevelopment goals SDGs using novel indicators,* Renew. Sust. Energ. Rev. 153 (2022), 111710.

[9] Y. Cao, I.B. Mansir, A. Mouldi, et al., *Designing a system for battery thermal management:* Cooling LIBs by nano-encapsulated phase change material[J], Case Stud. Therm. Eng. 33 (2022) 101943.

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Vitamin Deficiency Detection Using Image Processing and Neural Network

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Abstract

Vitamins are an important part of our diets. So that our diets need to contain vitamins. A deficiency will develop if the right number of vitamins aren't consumed. In this study, this project introduces an artificial intelligence (AI) system for early vitamin insufficiency diagnosis. It is a free desktop application that uses the user's images of their eyes, lips, tongue, and nails to identify vitamin deficiencies instead of blood samples. The application will give users a report on any vitamin deficiencies they may have along with recommendations for the right foods to increase their vitamin intake and fend off deficiencies. The software is trained to differentiate between images of healthy people's eyes, lips, tongue, and nails and those of those who are vitamin deficient. Early identification of vitamin deficiencies can stop serious problems like anemia, infectious illness deaths, maternal or perinatal deaths, cognitive and physical development problems. Key Words: Deficiency, NLP, Fuzzy Membership Function, Vitamins, AI, Desktop Application, and Defuzzification. Extensive trials on a real-world dataset show that the suggested method is more successful and efficient than previous methods.

Keywords- *Artificial Intelligence, Deep Learning, Intelligent System.*

1. INTRODUCTION

Over two billion individuals worldwide suffer from vitamin insufficiency, an issue. According to the WHO, one in three kids do not get enough vitamins. Over two billion people worldwide suffer from vitamin insufficiency, which is a widespread issue. According to the WHO, one in three youngsters do not receive vitamins. A deficiency in vitamin A affects 33% of young children under the age of five. Low immunity and night blindness are symptoms of this condition. All ages are susceptible to vitamin deficits, which frequently coexist with mineral (zinc, iron, and iodine) shortages. Due to their demands for these substances and susceptibilities to their absence, children and pregnant women are the groups most at risk for vitamin deficiencies. Most common deficiencies relate to vitamin A, vitamin B, folate, and vitamin D. Supplementation programs have made diseases like scurvy and pellagra rare [1].

Numerous health difficulties that we face on a daily basis are highlighted by vitamin deficiencies. Many of these issues result from our inability to obtain the essential range of essential minerals and nutrition. It is challenging to effectively measure our nutritional requirements, particularly if people lack knowledge of the specific type of shortage they might be experiencing without medical advice. Vitamin inadequacies affect more than 2 billion people globally. More than 1.2 billion people worldwide suffer from zinc deficiency, and 500,000 of them pass away every year. Comparatively speaking, anemia brought on by iron deficiency kills over 100,000 individuals annually. Locally, a wide range of vitamin deficiencies affect more than 90% of the UAE's population. Even while there is no widespread famine crisis, statistics collected on American soil reveal that more than 92% of the

population has at least one mineral or vitamin deficit. Nutrient-rich foods have shifted from being the norm for daily food intake to more of a sign of luxury due to the widespread availability of inexpensive, easily accessible manufactured junk foods.

Micronutrient deficiencies in the soil have been discovered by researchers. Researchers from Canada discovered in 2003 that the mineral content of vegetables such as tomatoes, lettuce, spinach, and cabbage had decreased from

400 milligram's to less than 50 milligrams, demonstrating a regressive pattern of one nutrient's natural availability. Even if there were a perfect diet available for consumption, it's likely that something would still be missing [2]. Magnesium, vitamin A, and vitamin C deficiencies affect 50% of Americans, whereas vitamin D deficiency affects 90% of Americans of color and 70% of older Americans. When asked whether they were aware of their vitamin deficit earlier this year, 67 precent of a sample of 100 university students responded "no." Although the sample size of this small study is insufficient to accurately represent the population [3], it may provide an estimate of the level of social awareness that exists in reality.

2. RELETED WORK

Archana Ajith, Vrinda Goel - This paper proposes a skin disease detection method based on image processing techniques. This method is mobile based and hence very accessible even in remote areas and it is completely noninvasive to patient's skin. The patient provides an image of the infected area of the skin as an input to the prototype.

Kyamelia Roy, SheliSinha Chaudhuri - The outer integument of the human body is skin. The skin pigmentation of human beings varies from person to person and human skin type can be dry, oily, or combination. Such a variety in the human skin provides a diversified habitat for bacteria and other microorganisms. Melanocytes in the human skin, produces melanin which can absorb harmful ultraviolet radiation from sunlight which can damage the skin and result in skin cancer.

Anutosh Maitra, Rambhau Eknath Rote, Nataraj Kuntagod- In this paper that malnutrition management requires an integrated digital approach - that not only looks at making data available, but also establishing relationships between various program indicators, overlaying that with socio-economic conditions of the region and family demographics.

Sri Winiarti, Sri Kusumadewi, Izzati Muhimmah, Herman Yuliansyah - The result of the decision will give 3 clusters on nutritional status is good nutrition, malnutrition and better nutrition. Mobile apps are used as a reminder of the nutritional value or ingredients contained in the packaging of food products while consuming food. The result of system testing for application of FCM algorithm in this mobile application obtained validation of 80%.

Shih-Hsiung Lee, Chu-Sing Yang- This paper proposes an image preprocessing method, trying to segment different parts of nail. lunula and nail plate. In the data of poor image quality, the lunula may not be presented clearly. In order to maintain the nail image quality, this paper uses microscope to capture nail image. Besides lunula and nail plate, the nail details, such as free edge, cross striation and longitudinal striation, can be seen clearly in the image captured by microscope.

Cynthia Hayat, Barens Abian- This research consisted of 2 phases, which were training phase in which it generated ANN weight by using feed-forward of activation function, and testing phase in which the result of the previous stage was tested to obtain output.

Bambang Lareno, Liliana Swastina, Husnul Maad Junaidi - This paper focus to find a model of IT application that can be used for mapping the potential of malnutrition problems and the rate of utilization of posyandu. The result, the cross- platform information model developed is a web-based core system, with a mobile application-based support system.

Sambit BAKHSHI - In this paper, author propose an automated facial skin disease method using a pre-trained deep convolutional neural network (CNN). In the beginning, the images are regenerated using some pre-processing image techniques in order to augment the size of our database, collected from different sources and resized to fit the network. These images are then used for training and validation purposes.

Tanzina Afroz Rimi - This paper is a sandwich between picture handling strategies and machine learning. Where picture preparation has produced the picture which is being utilized by CNN to arrange the classes. The preparation information comprises five classes of the skin gives that have been talked about above. This project has 73% precision by actualizing our framework on the dermnet dataset of 500 pictures of various diseases. This

will end up being an incredible achievement if the further enhancements are finished utilizing a bigger measure of the dataset.

Laura Safira, Budhilrawan, Casi Setianingsih - The dataset in this study is taken from Google and also some of the paper that discusses the nail abnormalities. Nail pictures obtained are different from any source. Therefore, the image should be cut just one finger. Because when detecting terry's nail, the disorder usually occurs in all the nails. So, I can use one finger. The photos of a nail that has been doing the extraction characteristics using GLCM then will be done using KNN classification. In this case the class will be divided into two classes, healthy and Terry's.

Hongfeng Li a, Yini Pan b, Jie Zhao c, Li Zhang d- In this paper, author present a review on deep learning methods and their applications in skin disease diagnosis. I am first present a brief introduction to skin diseases and image acquisition methods in dermatology, and list several publicly available skin datasets. Then, I have introduced the conception of deep learning, and review popular deep learning architectures and popular frameworks facilitating the implementation of deep learning algorithms.

2.1 Proposed System

By eating a balanced diet that includes a variety of foods, as well as food fortification and supplementation, when necessary, many deficiencies can be avoided. A blood test, such as a venous blood test or finger-prick blood test, can detect the majority of vitamin and mineral deficiencies [4]. In a finger-prick blood test using a lancet, you can pick your own finger and collect a blood sample, while in a venous blood test, a trained expert will use a needle to pierce a vein, typically in your arm, to collect a blood sample. In hospitals, these blood tests can be done or I can also order home vitamin and mineral test kits online and do it ourselves. The cost of venous blood tests and finger-prick blood in India is an average of Rs 1000 and Rs.800 respectively home vitamin and mineral test kits cost around Rs 8000. I have proposed a cost-free desktop application that can give instant results using users' images of body parts only and there is no need of blood samples for test.

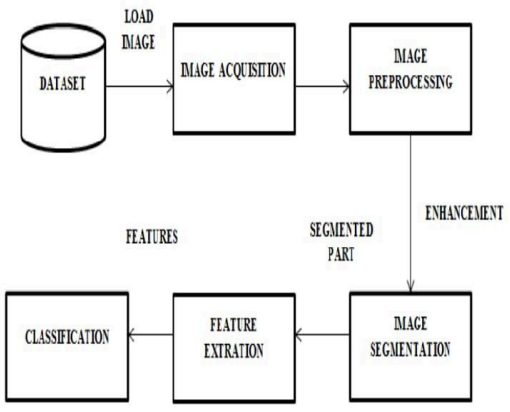

Figure 1. Module of Vitamin Deficiency

[5] The modules in vitamin deficiency detection are image acquisition, image pre- processing, image segmentation, feature extraction, and classification.

Image Acquisition: Image acquisition is the step where the vitamin deficiency images are taken as input.

Image Pre-processing: The aim of pre-processing is an improvement of the image data that suppresses unwanted distortions or enhance some image features are important for further processing

Image Segmentation: Image segmentation is the process of partitioning a digital image into multiple segments. Partitioning is done by k means clustering Steps for K mean clustering:

- Randomly select 'c' cluster centers.
- Calculate the distance between each data point and cluster centers.
- Assign the data point to the cluster center whose distance from the cluster center is the minimum of all the cluster centers.
- Recalculate the new cluster center.
- Recalculate the distance between each data point and new obtained cluster centers [6]

Feature Extraction: The aim of feature extraction is to find out and extract features that can be used to determine the meaning of a given sample.

Classification: In this phase to detect and classify the vitamin deficiency, I am using the classifier that is a support vector machine.

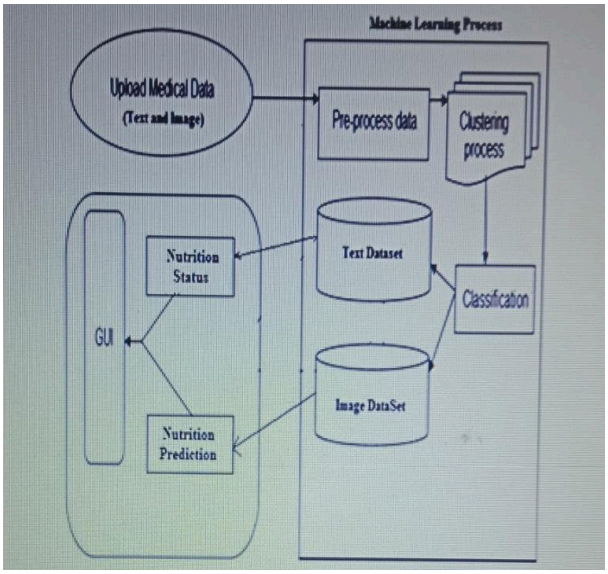

Figure 2. Block diagram of Vitamin Deficiency

2.2 Proposed Methodology

An analysis: A diet lacking in nutrients could cause some varied symptoms. These symptoms are the body's manner of human action potential victuals and mineral deficiencies. Recognizing them will facilitate regulating diet consequently. The symptoms of a biological process deficiency depend upon that nutrient the body lacks.

Neural Network Training and Android Application: A simple Android Application is often designed to prompt the user to capture photos of the mentioned organs. An intelligent application is often built to accumulate, process, analyze and extract the features of interest from these photos. to make a platform capable of this task, Machine Learning algorithms were wont to train a Neural Network for symptom detection.

AI and NLP: [7] Natural language processing (NLP) may be a part of AI where we apply computational techniques to the analysis and synthesis of tongue and speech.

Fuzzy Membership Function and Defuzzification: As multiple iterations of the Convolution Neural Network (CNN) are done using numerous photos containing the targeted attributes within the study mentioned earlier, the arrogance level of every extracted feature is fetched and fed during a Mamdani- based symbolic logic Membership Function built using PYTHON.

2.3 Algorithm

Convolution Neural Network (CNN)
[8] The structure of CNN includes two layers one is feature extraction layer, the input of each neuron is connected to the local ready fields of the previous layer, and extracts the local feature. Once the local features are extracted, the positional relationship between it and other features also will be displayed. The other is featuring map layer; each computing layer of the network is collected of an advantage of feature map. Every feature map is a plane, the weight of the neurons in the plane are same. The structure of feature plan uses the sigmoid function as activation function of the convolution network, which makes the feature map have shift in difference. Besides, since the neurons in the same mapping plane share weight, the number of free parameters of the network is decreased. Each convolution layer in the convolution neural network is come after by a computing layer which is used to find the local average and the second extract, this unique two feature extraction structure decreases the resolution.

Convolution Layer
Convolution is the first layer to extract features from an input image (leaf image).Convolution preserves the relationship between pixels by learning image features using small squares of input data. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters i.e. identity filter, edge detection, sharpen, box blur and Gaussian blur filter.

Fully Connected Layer
In this layer Feature map matrix will be converted as vector (x1, x2, x3, ...) With the fully connected layers, then combine these features together to create a model.

Pooling Layer
[9] Pooling layers would reduce the number of parameters when the images are too large. Spatial pooling also called subsampling or down sampling which reduces the dimensionality of each map but retains important information

Softmax Classifier
Finally, I have an activation function such as softmax or sigmoid to classify the outputs i.e. classify data.

2.4 Algorithm Working

1. AI and NLP
[10] Natural language processing (NLP) may be part of Al where we apply computational techniques to the analysis and synthesis of tongue and speech. within the medical field, patient records usually contain plenty of important data that professionals need to extract.

2. Neural Network Training and Android Application
A simple android application is often designed to prompt the user to capture photos of the mentioned organs. An intelligent application is often built to accumulate, process, analyze and extract the features of interest from these photos.

3. Fuzzy Membership Function and Defuzzification
[11] As multiple iterations of the Convolution Neural Network (CNN) are done using numerous photos containing the targeted attributes within the study mentioned earlier, the arrogance level of every extracted feature is fetched and fed during a Mamdani-based symbolic logic Membership Function built using PYTHON

3. RESULT AND DISSCUSSION

A nutrient-deficient diet may result in a variety of symptoms. These signs and symptoms are the body's way of signaling nutrient and mineral shortages. Understanding them will make it easier to control diet accordingly. Depending on the nutrient that the body lacks, a biological process shortage manifests as different symptom. There are some universals, though. They will consist of: broken nails mouth sores or fissures in the mouth's corners Having trouble seeing at night, having white growths on the eyes, and having red eyes sleek Tongue. The symptom often denotes anemia if the nails are yellow.

According to a separate survey, about 28% of mouth ulcer patients had vitamin B1 (B1 vitamin), B complex (B2 vitamin), and vitamin B6 deficiencies (B6 vitamin). You might be able to detect any B6 deficiency in your mouth. The edges of your lips might be damaged and covered with scaly skin. Perhaps your tongue would enlarge. Your age has a major impact on how much vitamin B6 you need each day Babies from 7 to 12 months desire nothing. daily dose of 3 milligrams. As you get older, you want more. If you are over fifty, you need at least five times as much; one 7 milligrams for males and one 5 milligrams for women per day Most of all, pregnant women want 1.9 milligrams each day. Excessive secretion or dehydration will result in angular inflammation, a disorder that causes the corners of the mouth to crack, break, or bleed. But, it may also be brought on by a combined diet of too little iron and B vitamins, particularly B complex. For instance, insufficient intakes of fat-soluble vitamin are generally associated to a disorder called moon blindness, that impairs people's ability to ascertain in low lightweight or darkness. This is due to the fact that fat- soluble vitamins are essential for supplying visual purple, a pigment located in the retinas of the eyes that aids with night vision. The papillae, or little lumps on your tongue, start to disappear.

4. CONCLUSION

A Desktop application capable of providing a diagnosis of selected vitamin deficiency spectrum from photos of the user's tongue, lips, eyes, and nails using Artificial Intelligence has been implemented. The application used a combination of Machine Learning to achieve the extraction of certain features and attributes from the images and a Fuzzy Logic decision-making algorithm to specify the type of deficiency. After specifying the visual symptoms associated with each deficiency through pathological research, a Tensor Flow classifier was trained using a considerable number of labelled images of segmented symptoms for each organ individually with a minimum resolution of 439 x 335 pixels each. The classifier was installed into a simple GUI to provide offline functionality. The Defuzzification Rules of the Fuzzy Membership Functions have been adjusted in accordance with the commonality and the probability of the symptoms and can be updated by admins to improve the accuracy of the detection. Another layer of the decision-making algorithm displays a list of nutrients as well as compensational medications and supplementary products. The approach was verified by associate professors in oral medicine, and oral and maxillofacial surgery to be valid and acceptable. The test has shown the correct diagnosis corresponding to the symptoms. However, due to the limited access to images and profiles of cases with vitamin deficiencies, the application was not directly tested on patients. The application is a new approach that allows self- diagnosis in a short time without the need for a blood sample. The accuracy of the diagnosis can be exponentially improved by including more data with direct contributions from medical practitioners, researchers, and experts through exclusive access to the database. The proposed solution's capabilities are not limited to vitamin deficiencies, but they can be extended to include early detection of other health problems using more resources besides the camera. The application named Vita-Cam is not a replacement for medical consultation, but it is a tool designed to boost the community's awareness of their missing nutritional needs and help them obtain a suitable diet, thus preventing further health complications caused by untreated vitamin deficiencies.

6. REFERENCES

[1]. Cynthia Hayat, BarensAbian, "The Modeling of Artificial Neural Network of Early Diagnosis for Malnutrition with Backpropagation Method", 2018.

[2]. BambangLareno, LilianaSwastina, HusnulMaadJunaidi, "IT Application to Mapping The Potential of Malnutrition Problems, 2018.

[3]. AnutoshMaitra, RambhauEknath Rote, NatarajKuntagod, "Managing Child Malnutrition via Digital Enablement: Insights from a Field Trial", 2017

[4]. Sri Winiarti, Sri Kusumadewi, Izzati Muhimmah, Herman Yuliansyah, "Determining The Nutrition of Patient Based on Food Packaging Product Using Fuzzy C Means Algorithm", 2017

[5]. Archana Ajith, VrindaGoel, "Digital Dermatology Skin Disease Detection. Model using Image Processing". 2017.

[6]. Kyamelia Roy, SheliSinhaChaudhuri, "Skin Disease detection based on different Segmentation Techniques", 2019

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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LIVE HUMAN DETECTING ROBOT

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Abstract

Natural destructions that we cannot stop.But humans are becoming increasingly aware in the concept of intelligent rescues operations in such calamities cannot be stopped.Still there are lots of disasters that occur all of a sudden and Eartquake is one such things.Earthquakes produce a devastating effects and they see no difference between human and material.Hence a lot of times humans are buried among the debries and it became impossible to detect them.

In the past ,when victims were trapped under earthquake rubble, there was a little chances that they would found .This was due the fact that rescue techniques such as optical devices, acoustic devices or robotic systems wre found limited applications for the detection buried victims.If victim was unconscious and was unable to shout for help then the existing rescue system found to be failed.

A life detection system based on microwave frequency detects the human body vibration by Doppler shift effect.

Introduction

There is many different kind of catastrophe in natural and man-made disaster :Earthquake ,flooding ,hurricane and they cause different disaster area like collapsed building landslide or crater during these emergency situations and specially in urban disaster many different people are deployed (policeman fire fighters and medical assistance). They need to cooperate to save lives protect structural infrastructure and evacuate victims to safety.

In these situations human rescuers must make quick decisions under stress and try to get victimsto safety often at own risk.they must gather determine the location and status of victims and the stability of the structures as quickly as possible so that medics and firefighters can enter he disaster area and save victims.

All of these tasks are performed mostly by human and trained dogs often in very dangerous and risky situations. This is why since some years mobile robots have been proposed to help project we will focused only on robot which will work in a disaster environment of man made structure like collapsed buildings.

The national science foundation to investigate the use of semi-autonomous robots for urban search and rescue. These robots will assist firemen police and disaster agencies with reconnaissance site evaluation and human detection. The goal of this research is to develop

mobile robot hardware (sensors) and software systems (user interfaces and navigation planning and coordination module) to support these tasks. Compare to the other projects these robots should have sufficient autonomy to maximize limited capabilities and attention of the human operator.

OBJECTIVES

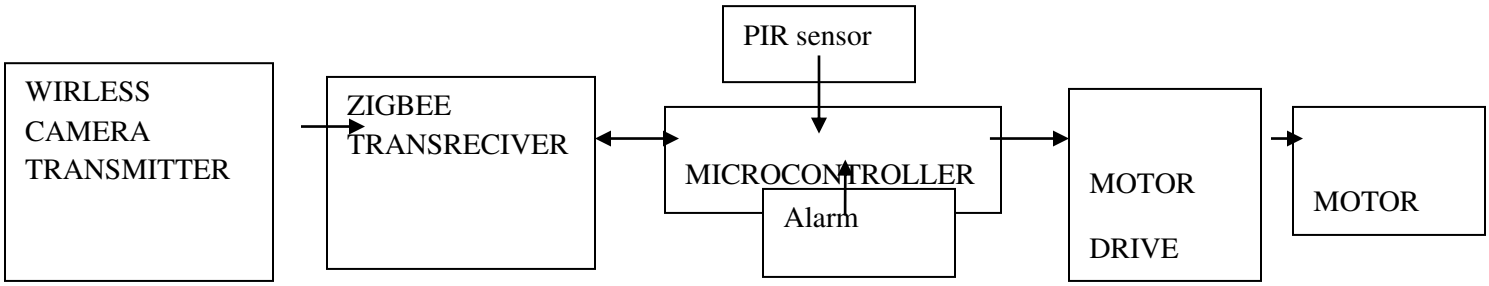
- To help in identifying the alive people & rescue operation
- To propose a wireless robot that is controlled form distance
- Less time required for rescue operation
- Quick help is possible

LITERATURE REVIEW

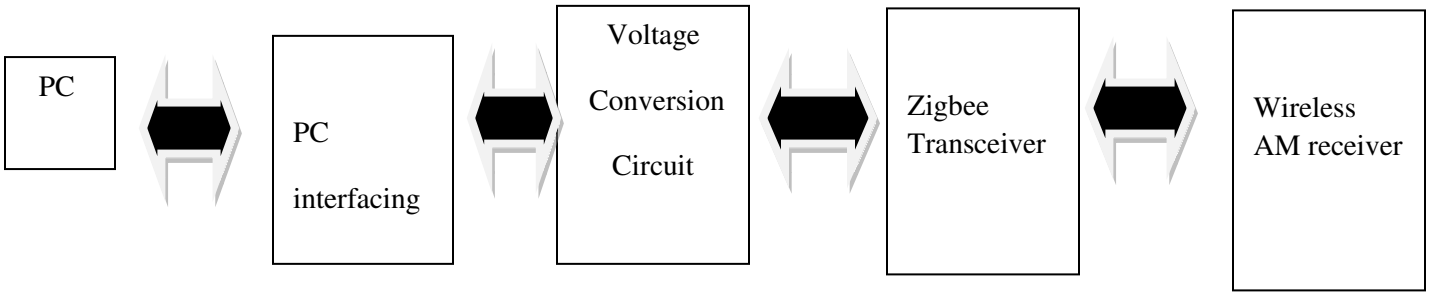
The paperwork "Design features and characteristics of a rescue robot" by Amon Tunwannarux and SupanuntHirunyaphisuthikul is about to design and implementation of rescue robot for a Thailand search and rescue robot such as the robot pattern ,type of sensor they use ,the robot controlling unit and the operator monitoring unit.

THEORY

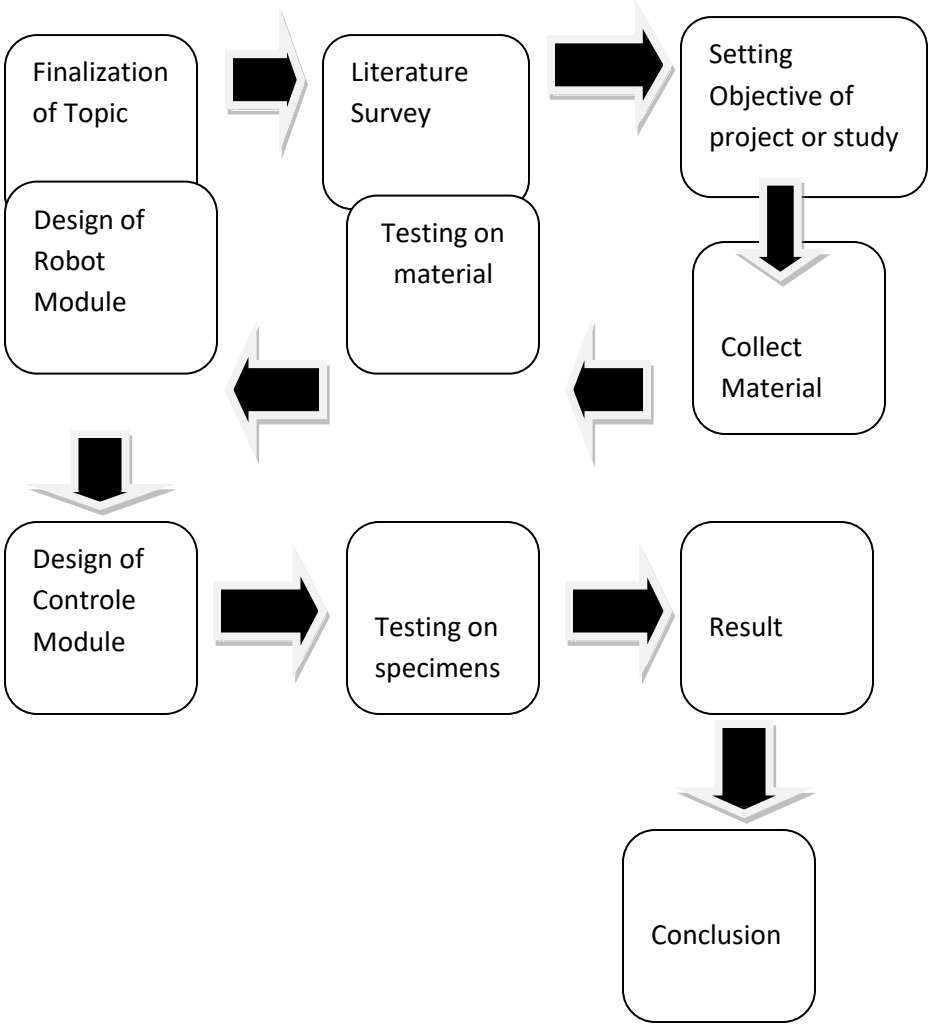
ROBOT MODULE



CONTROLE MODULE



Methology



References

[1] Detecting Direction of Movement Using Pyroelectric Infrared Sensors byJaeseok Yun, Member, IEEE, and Min-Hwan Song.

[2] Zia Uddin, Mojaharul Islam, "Search and Rescue System for Alive Human Detection by Semiautonomous Mobile Rescue Robot" International Conference on innovations in science engineering and technology, 2016.

[3] RufaidaShamroukh and FahedAwad.(2009). "Detection of surviving humans in destructed environments using a simulated autonomous robot"in IEEE Transaction proc. International symposi

[4] Sandeep Bhatia, Ajay Mudgil, and AmitaSoni prepare and issue a paper on the topic "Alive Human Detection Using an Autonomous Mobile Rescue Robot", Department of Electrical and Electronics, PEC University of Technology, Chandigarh, India Vol. 02, July [2010].

[5] Sandeep Bhatia, Ajay Mudgil, and AmitaSoni prepare and issue a paper on the topic "Alive Human Detection Using an Autonomous Mobile Rescue Robot", Department of Electrical and Electronics, PEC University of Technology, Chandigarh, India Vol. 02, July [2010].

[6] Kenneth G. Eskildsen, Great Neak, "Method and apparatus for large signal detection in PIR applications", u.s.7176469b2, abbrev. Feb, 13.2007.

[7] Reiner quad, Taunusstein, Karlheinz Stock, Loach, "Infrared detector with direction identification capability", u.s.4914298a, abberev. appr, 3.1990.

[8] Murulidhara T C, Kanagasabapthi,Siva S Yellampalli, "Unmanned vehicle to detect alive human during calamity" International Conference on Electrical, Electronics, Communication, Computer and Optimization Techniques, 2017.

[9] Rahu Krishna K, Merra A, Nikhil Mathew, "Wireless Human Detection Robot" International Journal for Research in Applied Science & Engineering Technology, 2017. Indoor Environment" IEEE Transactions on Consumer Electronics, Vol. 63, No. 3, August 2017. IEEE 2017.

[10]M.Brem Kumar, D.Manikandan, M.Gowdem, D.Balasubramanian, "Mobile Phone Controlled Alive Human Detection Using Robotics" International Journal of Advanced Research in Computer Engineering & Technology (IJARCET), 2015.

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Amazon's Fake Review Detection using Support Vector Machine

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Abstract:-— Online user data is crucial to the marketing process since it affects consumers' daily lives. False product reviews have a negative impact on the enterprise's capacity to analyze data and make decisions with confidence. Some users have a propensity to disseminate unconfirmed fake news on internet sites. Today, it iscrucial to be able to recognize fake reviews. Many websites provide things for sale to consumers online. Purchasing decisions can be made based on product reviews and market demand. On the basis of reviews, consumers determine whether a product is acceptable for use or not. There will be hundreds of comments about the product, some of which may be false. We provide a mechanism to identify fake reviews of items and indicate whether they are reliable or not in order to distinguish between them. This approach for identifying false reviews describes the use of supervised machine learning. This methodology was devisedin response to gaps because traditional fake review detection methods classified reviews as authentic or falseusing either sentiment polarity scores or categorical datasets. By taking into account both polarity ratingsand classifiers for false review identification, our method contributes to closing this gap. A survey of already published articles was conducted as part of our effort. Support Vector Machine[2], a machine learning technique, used in our system produced accuracy of 80%.

Keywords—Amazon, Fake review detection, supervised machine learning, support vectormachine(SVM)

INTRODUCTION:-

Nowadays, internet shopping is one of the most significant components of our everyday life. A lot of regular people rely on online reviews to decide which product to purchase. Customer reviews area key factor in determining a company's income on e-commerce platforms. In this day and age, it is simple to deceive and manipulate a consumer by posting a false review of a certain product. According to the UK's Competition and Markets Authority (CMA), fake or false reviews may annually affect £23 billion in consumer purchasing in the country. On Amazon, 61% of the reviews on devices are fake. One in seven reviews on TripAdvisor can be false Numerous false reviews on online review sites like TripAdvisor, Yelp, etc. either increase or decrease the popularity of a hotel or product. Many website visitors are unable to quickly recognize fake reviews. As a result, the buyer is duped and their perception of real items is manipulated. We thus decided to develop a user- friendly fake review detection system to stop people from being duped by fake reviews in order to overcome this discrepancy between fake and factual reviews.

Literature Survey: -

Fake feature framework is used in [1] whichcharacterization and organization features of fake reviews are done and is composed of 2 types- review. Techniques applied on amazon electronic product reviews for analyzing user centric features resulted in F-score of 82% accuracy using Random Forest or Ada boost classifiers. The system [2] centered around Opinion-Mining which is a fake review detection using Sentiment Analysis .They had developed a working model that annotates individual reviews were gathered in the dataset. Itwas also found that Sentiment Analysis is a Method of Implementation in which Vader found out if a piece of text is favorable, negative, or neutral is the process of sentiment analysis. Most techniques used for sentiment analysis fall into one of two categories:polarity-based (where texts are categorized as either

positive or negative) or valence-based (where thestrength of the sentiment is taken into account). For instance, in a polarity-based approach, the terms "good" and "great" would be considered equally, but "excellent" would be treated as more positive than "good" in a valence-based approach. In another research[3], Two main

Categories of fake reviews were identified as textual (depends on the content of the reviews) and behavioral (depends totally on reviewers writing style, emotional expressions and frequent number of times he writes them. Several types of machine learning models were used to distinguish between fake and real reviews.

Identification was done by taking into account 'key features of review' along with 'behavior of the reviewer'. Without behavioral features-Logistic Regression gave 87.87% accuracy in bi-gram, KNN and LR gave 87.82% accuracy in tri-gram and with behavioral features SVM gave 86.9% accuracy in bi-gram. A system developed for detecting fake reviews of hotels on yelp[4], TripAdvisor and many more websites. The system design includes a web crawler which gathers all the data of the reviews and stores it into MySQL database. The false reviews were identified using four different methods, viz. Text mining-based categorization, spell checking, reviewer behavior checking, and hotel environment checking. The ultimate chance of false reviews for a particular hotel is calculated using a grading method using the individual probabilities after all components have been assessed. The usual pre- processing suggestions were followed whenimplementing the text mining-based false detection method. About 14% of the reviews were classified as fraudulent. This data source has previously been utilized and validated by prior research for assessing the genuinity of the hotels. One of the studies focused on Sentiment analysis [5] and Machine Learning approach in finding the Fake reviews. This system used ML Algorithms Naïve Bayes, KNN, SVM, Decision Tree (j48). SVM (81.75%)[5] outperforms other algorithms in both w/ and w/o stop word approaches. The assumption was made that classification of Fake reviews is either True or False [6]. When recognizing fake reviews, it is important to consider the reviewer's credibility, the dependability of the product, and the reviewer's honesty. As a result, Naive Bayes delivered 98% accuracy whereas Random Forest produced 99% accuracy. Another research [7] centered on the methods used for classifying fake reviews which are Content based method which considers POS tag frequency count asa feature and Behavior Feature based method which considers unfair rating as a feature. The unsupervised machine learning algorithm used for this purpose is Expectation Maximization which gave accuracy of 81.34% and supervised machine learning algorithm used is SVM and Naive Bayes which gave accuracy

of 86.32%.One of the studies [8] suggestedCombination of classification algorithms with LDA which yielded higher accuracy results. The traditional SVM, Logistic regression and Multi-layer perceptron model gave accuracy of 65.7%, 80.5% and 80.3% respectively. When combined with LDA the SVM, Logistic Regression and Multi-layer perceptron model gave accuracy of 67.9% and 81.3% respectively. Three techniques are used in the system

[9] to classify false reviews. The first one is Review Centric Approach which considers content of review, use of capital letters, and numerical. The second approach is Reviewer Centric approach which considers profile image, URL length, IP address, etc and the third approach is Product Centric Approach which considers rank of product, price of product as feature. The algorithms used to detect the fake reviews were supervised, unsupervised and semi- supervised. One of the systems we studied focuses on annotating the sentiments of a review [10] using VADER. The gathered reviews are cleaned and opinion mined, after which the sentiment analysis steptakes place. The results of the sentiment analysis are then appended to the dataset and classified using vector calculation. Research [11] primarily focused on reviews that were produced with the intention of seeming authentically misleading. Sentimentalanalysis was performed in the system[12] on the dataset.Two classification models were described which were 2 way classification which classifies reviews into positive or negative and 3 way classification which classifies data into positive,negative or neutral which was followed by sentiment analysis . Further experimental works were carried out using R which is an open source statistical programming language and software environment. It is mostly useful for data manipulation, data analysis, calculations and visualization of results in graphical format. Using reviewer history and behavior

analysis is another way to detect fake reviews discussed in [13]. The research mainly discusses howa user can be identified as a bot using Jaccard similarity. The reviews of a product can be considered manipulated if they are excessively positive or negative and having similar structuring.

1. Methodology:

From the research we conducted and seeing how previous systems worked, our proposed methodologyis as follows. First step will be scraping the reviews from the link provided by the user on the website. The web scraping is performed using selenium. After the reviews are stored in Json format, the required details will be extracted, i.e pulling out only the required text from the review, whether the review is positive or negative, etc. The ML model model will be ready at this point and the extracted data will be fed to it. The algorithm will then predict if the reviews are fake or real according to the trained dataset. This output will be visualized to the website so the user will be able to identify how genuine the reviews are. The figure 1.1 describes the block diagram of the proposed methodology.

The steps summarized are as follows-

1. Scraping of the reviews from yelp
2. Extraction of the required details
3. Transferring the data as input to models.
4. Fitting algorithms to training set
5. Predicting the test results.
6. Visualising the test set result.

PROPOSED SYSTEM

This section explains the proposed in detail and it is carried out in four major phases so that we can find out the best model that will be used to get the maximum accuracy and fastest in terms of speed.

Using **web scraping**, data will be collected fromthe online websites.

Pre-processing- A very important step of machine learning since the data present on different sites is not clean and of no use.A series of steps will be followed to remove the unwanted things from the statements on the yelp dataset that was created so that it can be further used for computational purpose.

1) Tokenization: This is the initial phase or the very common step before applying any otherpreprocessing techniques. The text is divided into individual words called tokens. For example, if we have a sentence ("sudha is a very beautiful girl"), this process will divide it into tokens such as ("sudha" , "is" , "a" , "very", "beautiful", "girl") .

2) Stop Words Cleaning: words used most but hold no value or less valued are known as stop words. (a,an,this,the) are the most common examples. In thispaper, stop words are removed from the data before further processing in fake review detection

. Fig 1.2 Product need to be given by user

4) Lemmatization: Lemmatization method is used to convert a word to a singular one from the plural form of it.It aims to return the base form of the word from the dictionary. Forexample: converting the word ("Studied") to ("study").

Sentiment analysis- it is applied on the dataset and gives polarity scores between +1,-1 or 0 that is positive, negative or neutral.

Feature extraction/Engineering- it mainly involves reduction of the number of resources so that a large dataset can be described. Selection of theappropriate features for predicting the results.

Model selection-Selection of the appropriate model for the classification of real and fake review will be done to get the required result.

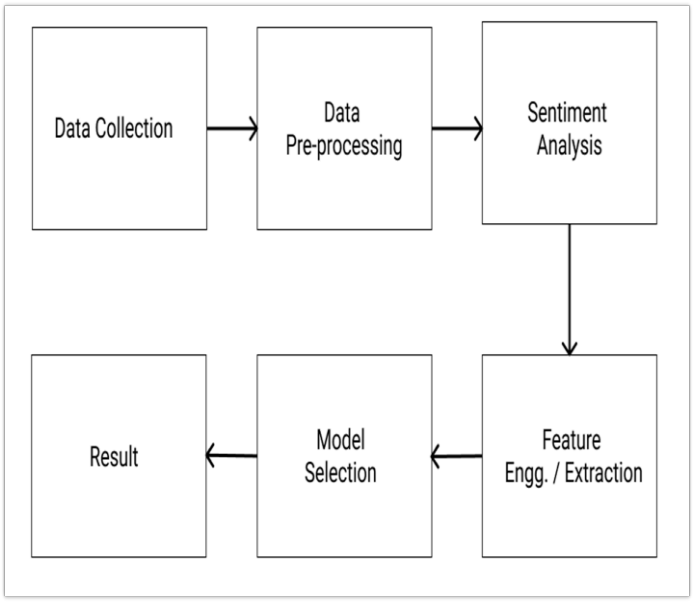
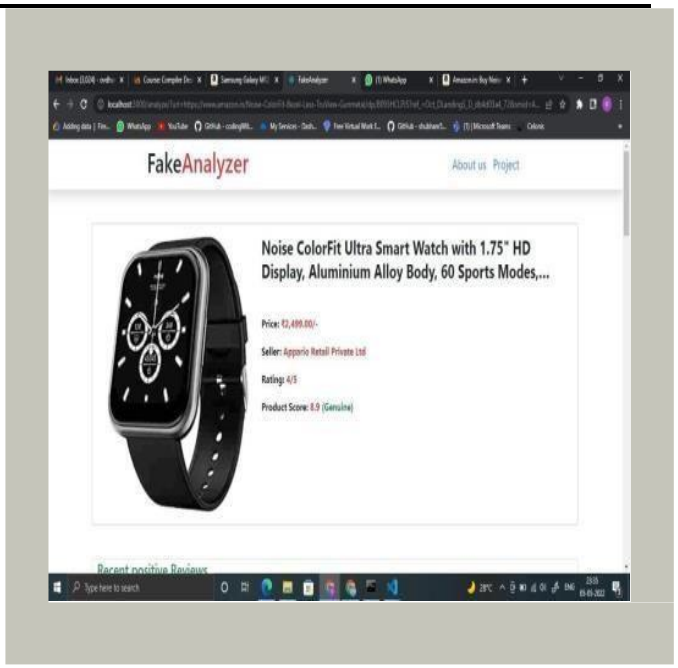
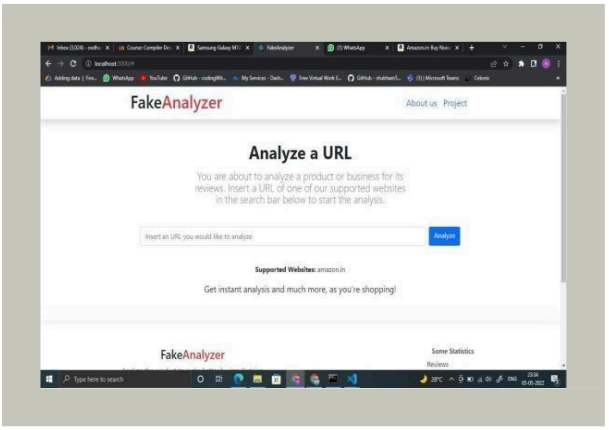


Fig1.1Proposedsystem





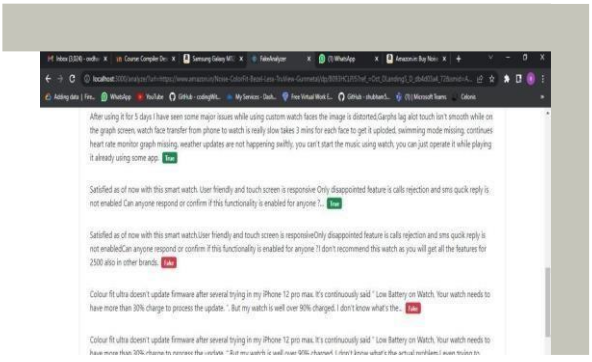


Fig 1.4 Reviews will be displayed along with thelabels as true or fake guiding the customers in purchase of the product Accuracy obtained is about 80% using the supportvector machine algorithm.

CONCLUSION:

Algorithms for supervised machine learning were used to distinguish between fraudulent and legitimate reviews.Since the business will receive honest consumer reviews of the goods, both the client and the firm will profit. Based on the classification of fraudulent reviews, customers willbe able to purchase the best goods. In the future, we'll concentrate on websites like Yelp and Flipkart and work to distinguish between fraudulent and authentic reviews so that users may simply pursue their daily interests.

REFERENCES:

1. Rodrigo Barbado, Oscar Araque, Carlos A. Iglesias, "A framework for fake review detection in online consumer electronics retailers",Volume 56, Issue 4,July 2020, Pages 1234-1244,ISSN0306- 4573,https://doi.org/10.1016/j.ipm.20 20.03.002
2. N. Kousika, D. S, D. C, D. B M and A. J, "A System for Fake News Detection by using Supervised Learning Model
3. for Social Media Contents," 2021 5thInternational Conference on Intelligent Computing and Control Systems (ICICCS),2021,pp.1042-1047,doi:10.1109/ICICCS51141.20 21.9432096.
4. Ammar Mohammed, Atef Ibrahim ,UsmanTariq, Ahmed Mohamed Elmogy "Fake Reviews Detection using Supervised MachineLearning" ,January 2021 International Journal of Advanced Computer Science andApplications 12(1),DOI:10.14569/IJACSA.2021.0120169 .öhring M., Keller B., Schmidt R., GutmannM., Dacko
5. S. HOTFRED: "A Flexible Hotel Fake Review Detection System". In: Wörndl W., Koo C., Steinmetz J.L. (eds) Information and Communication Technologies in Tourism Springer,Cham.https://doi.org/10.1007/978-3-030-65785-7_29.
6. Elmurngi and A. Gherbi, "An empirical studyon detecting fake reviews using machine learning techniques," Seventh International Conference on Innovative Computing Technology(INTECH),pp.107- 114,doi:10.1109/INTECH.20 17.8102442.
7. Neha S.,Anala A. ,"Fake Review Detectionusing Classification",une,InternationalJournal of Computer Applications180(50):16- 21,DOI:10.5120/ijca2018917316
8. R. Hassan and M. R. Islam, "Detection of fake online reviews using semi-supervised and supervised learning,"International Conferenceon Electrical, Computer and Communication Engineering (ECCE), pp. 1-5, doi: 10.1109/ECACE.2019.8679186.
9. S. Jia, X. Zhang, X. Wang and Y. Liu, "Fake reviews detection based on LDA," 4th International Conference on Information Management (ICIM), 2018, pp. 280-283, doi:10.1109/INFOMAN.2018.8392850.
10. N. A. Patel and R. Patel, "A Survey on Fake Review Detection using Machine Learning Techniques," 4th International Conference on Computing Communication and Automation (ICCCA), 2018, pp. 1-6, doi: 10.1109/CCAA.2018.8777594.
11. Dhairya Patel1, Aishwerya Kapoor2,Sameet Sonawane3 ,"Fake Review Detection using Opinion Mining",https://www.irjet.net/archives/V5/i12/IRJET-V5I12154.pdf

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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Study of Data Logger

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Abstract— This paper describes a detail explanation about data logger system. A data logger is an electronic device that combines analog and digital measurements with programming methodology to sense temperature, relative humidity and other parameters such as voltage and pulse. The data loggers take input from the thermocouple temperature and humidity and other sensors. Knowledge of temperature and relative humidity course during a certain time is needed in scientific, medical and industrial applications.

Keywords— Introduction, History of Data logger system, Operation of Data logger, Characteristics of Data logger and its advantage, future scope, References.

I. Introduction

In today's world there are many systems whose data is needed to be continuously collected. This data should be in form of log by which time, occurrence and other specifications can be collected at one place. All of this information is collected manually on field which consumes both time and workforce. In some situation it is not possible to retrieve this data because of extreme environment or remote location. Data logger is a different than typical data acquisition. It has ability to log data automatically on a 24-hour basis. Once it deployed and left unattended to measure and record information for the duration of monitoring period A complete data logging application generally requires most of the elements or components illustrated below.

1) Sensors: The inputs from various sources are given to the data logger through various
sensors to measure various parameters such as temperature, humidity where electrical

signals are converted to temperature and humidity values.

2) User Interface: The interface for interaction with the software and sensors is provided
and using implemented algorithm analysis is done for storage of data.

3) Software: It displays the information stored from sensors for and also maintains data for
long time storage.

Fig.1: Data Logging System

II. History of Data Logger

Chart recorders are electromagnetic devices that monitor and record conditions using built-in pens that chart the data on paper. The most famous example of these devices is the polygraph machine which was used in real life and could sometimes be seen in a TV show or movie.

*The first data loggers: Data loggers have greatly improved on the capabilities of the chart recorder. The main upgrades include their small size, their ability to run constantly on battery power, and the improved accuracy of the sensors. The biggest upgrade though is that data loggers can gather data and process it into
a digital format. This eliminates the need for the pens and paper used by chart recorders and the physical storage space needed to save all the data from these earlier devices run constantly on battery power, and the improved accuracy of the sensors. The biggest upgrade though is that data loggers.

*Today's digital data loggers: Data loggers have continued to get smaller and provide more capabilities as the 21st century moves along Early data loggers included a display on the device itself or users had to plug into the device to download the data. This is no longer necessary. Many modern data loggers are Bluetooth-connected or are directly connected to the internet.

III. Operation of Data logger

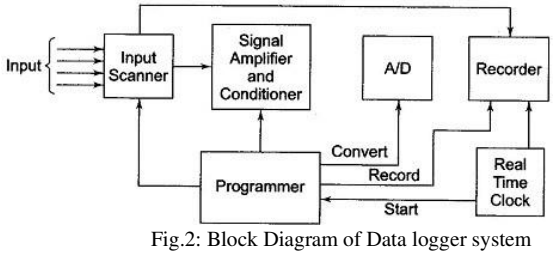


Fig.2: Block Diagram of Data logger system

3.1 Input Scanner: The various input signals fed to the input scanner are temperature, pressure, vibrations, ON/OFF signals etc. The input scanner
is an automatic switch that can select only one input signal at a time. In modem scanners the rate of scanning is up to 150 inputs.

3.2 Signal Amplifier and Conditioner: The input signal selected by scanner is a low-level signal. Hence a signal amplifier is used to amplify the low-level signal so that the input signal is maintained at 5 V level. The signal amplifier should possess certain characteristics like precise and stable D.C gain, high signal to noise ratio, good linearity, high impedance etc. The signal conditioner is placed between scanner and analogy to digital converter. It is a linearising circuit i.e., if a signal varies nonlinearly with respect to the measured parameter, then linearization of signal is done by the signal conditioner.

3.3 Analog to Digital Converter: The data loggers handle the data only in digital form and hence the analogy signal, if any, must be converted into digital form by employing analogy to digital converter The digital technique is used because it measures very small signals without loss of accuracy. The analogy signals that are converted to digital form are suitable to drive the digital recorders.

3.4 Recorder: The data logger drives the output recorder which prints the signals obtained from the analogy to digital converters. The recorder may consist of either typewriter or a punched tape. The typewriter provides a conventional log sheet with results in tabular form. Punched paper tape is used when the recorded data must be analysed further in a digital computer.

3.5 Programmer: It controls the sequence of operation of all other units of data logger. It takes information from input scanner, analogy to digital converter and recorder. The programmer performs various functions like starting analogy to digital conversion, selecting input signal by scanner, recording, and displaying reading, resetting logger etc.

3.6 Clock: The logging sequence is started automatically by a clock. The clock is used to automate the entire data logging system. When the clock signal is generated the scanning operation is started then the data logger advances ahead by time. The clock gives command to the programmer to start logging sequences at the intervals selected by the user.

IV. Characteristics of Data Logger

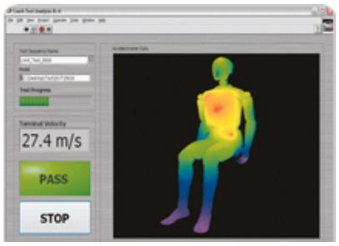
1) Modularity: Data loggers can be expanded simply and efficiently whenever required,
   without any interruption to the working system.
2) Reliability and Ruggedness: They are designed to operate continuously without interruption even in the worst industrial environments.
3) Accuracy: The specified accuracy is maintained throughout the period of use. Management Tool: They provide simple data acquisition and present the results in
   handy form.
4) Easy to use: These communicate with operators in a logical manner, are simple in concept, and therefore easy to understand, operate and expand.

V. Advantages

1.InlineAnalysis:

Data analysis with a traditional stand-alone data logger is typically performed offline only after the data has been transferred to the PC. Using a Paused data logger, you can take advantage of multicore processors and increasingly available RAM in the PC to perform signal processing and analysis on

your data as you acquire it. LabVIEW includes many common math and signal processing functions that use configuration wizards and make it easy to add analysis to your measurements.

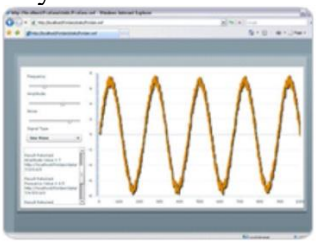


2.User Defined Functionality:

With a traditional stand-alone data logger, you are generally limited to hardware and software functionality defined by the vendor. These functions are good for accomplishing general-purpose tasks, but they may not help you meet your unique application requirements. For example, you may want to log data only under certain conditions or generate custom alarms that aren't built into the data logger. PC-based data loggers are software defined instruments. This means the functionality of the device is defined by the software, and you can customize the software to meet your specific application needs. Using LabVIEW, you can easily build functionality for custom alarms, logging conditions, report generation, and signal analysis. You can log data to virtually any file format for importing into other tools and sharing data with others.

3.TerabytesofDataStorage:

Data storage is an important component of a data logger. You can log only as much data as you can store in your data logger. Traditional stand-alone data loggers are limited by the amount of memory built into the device. Because the PC is a part of a PC-based data logger, you are limited only by the amount of hard drive space on the PC. Today, it's not uncommon to find a PC hard drive with terabyte capacity that provides ample space for your current measurements as well as permanent storage space.



4.NetworkConnectivity:

For applications that require long-term monitoring over days or weeks, you may have difficulty continually checking results. Remote monitoring is useful because you can see

results from a remote location. Using a PC-based data logger, you can take advantage of the PC's network connectivity to transmit results over a network for remote viewing. With LabVIEW, you can create custom alarm conditions that send e-mails or even design a Web service that you can visualize over a Web-based application.

V. Future Scope

Using data logging, scientists and engineers can evaluate a variety of phenomenon, from weather patterns to factory performance. PC-based data logging systems provide most flexibility, customization, and integration. To define a data logging system, we must evaluate
all the requirements for acquisition, analysis, logging, display, and report generation. Based on these requirements, we can customize data logging software and hardware to meet any needs.

VI. References

[1] Suman Saha, Md. Tofiqul Islam and M Zakir Hossain, "Design of a Low Cost Multi Channel Data Logger," Bangladesh University of Engineering and Technology, ARPN. Journal of Engineering and Applied Science, Vol.1, June 2006.
[2]Dogan Ibrahim, "Data Logger for Teaching Data Capturing and Analysis to Engineering Students," Department of Computer Engineering, Near East University, Nicosia, Cyprus, Wiley Inter Service DOI 10.1002/cae.20281
[3] Peter Roberson, "Using data loggers", science teachers' workshop, 2004, north Sydney.
[4] http/www.loggingtutorial/dr.saulgreenburg/htm.
[5] DNA technology, "Data logger controller", http://www.dnatechindia.com
[6] http://www.hanwell.com/index.html
[7] http ://en.wikipedia.org/wiki/chart-recorder
[8] www.ni.com/datalogger
[9]S. J. Perez, M. A. Calva, R. Castaneda, "A microcontroller-based data logging System" Instrumentation and Development Vol. 3 Nr. 8, copyright 1997, Journal of the Mexican Society of Instrumentation.

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Design and Fabrication of Bucket Elevator For Cattle Feed Industry

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Abstract— In a rural Area there is increasing demand of cattle feeds. Whereas there is animal husbandry is the main resource of money. Animals in India have limited access to cultivated green fodder and grasses. Most of the macro and micro nutrients to meet animal's requirement are provided by compound feed, especially on crop residue-based diets. Now days for completing this demand of cattle feed product various manufacturer are work on it to produce maximum amount of feed within the less time. But the problem occurring is, there is more interference of human being while operating which tends to require more time and more manpower at time of production on actually at workplace. This is increasing costing and also time requiring for product. To install Bucket elevator for machine for reducing product cycle time, our aim of project is to be reducing human interference and also production within less time. We are working on bucket elevator to lifting the raw material from ground level to hoper of cattle feed machine. Bucket elevator is the media of transportation of material from one location to another in a commercial space. Belt conveyor has huge load carrying capacity, large covering area simplified design, easy maintenance and high reliability of operation. Belt Conveyor system is also used in material transport in foundry shop like supply and distribution of moulding sand, mould sand removal of waste.

Keywords: Belts, Belt Conveyor, Drive Units, Conveyor, Frame, Bulk Material Roller, etc.

I. INTRODUCTION

In a rural Area there is increasing demand of cattle feeds. For completing this demand various manufacture are work on production of maximum amount of feed within the less time. Animals in India have limited access to cultivated green fodder and grasses. Most of the macro and micro nutrients to meet animal's requirement are provided by compound feed, especially on crop residue-based diets. It is possible to formulate balanced rations for growing and lactating animals only if the feed used conforms to the laid downspecifications, for energy, protein, minerals, vitamins etc.

- Snehal Patel, Sumant Patel, Jigar Patel, A Review on Design and Analysis of Bucket Elevator, International Journal of Engineering Research and Applications This paper deals with the design and analysis of different parts of elevator for conveying different types of materials. This study also shows that the negative influences of support of the shaft reflected through the increase in the stress concentration and occurrence of the initial crack are the main International Journal of Engineering Science and Computing, July 2016 8350 http://ijesc.org/[1]
- N. Yashawini, Raju. B and A. Purushottham, design and optimization of bucket elevator through finite element analysis, International Journal of Mechanical Engineering Authors have designed a bucket elevator and analyzed it for conveying granular materials to the height of 15m at the rate of 10 tones/hour output. This paper gives basic design calculations for the development of the bucket elevator. Static and vibration analysis carried out on the bucket elevator in order to need the required output from 10 tones/hr-20 tones/hr. This paper also gives the dynamic behavior of the bucket and gear shaft assembly. The results obtained from the analysis study critically examine the modification of design parameters. [2].

- Hemlata H. Mulik, Bhaskar D. Gaikwad, Design of Sugar Bucket Elevator and Roller Conveyor Chain for 20 Tones-per Hour Capacity, International Journal of Engineering Trends and Technology. In this paper the different components of roller conveyor chains are designed for sugar bucket elevator used in sugar industries for 20 tons per hour capacity and the loading conditions are described. The advantages of chain drive as compared with other drives are discussed. The chain wear mechanisms found in literature are listed. Abrasive and adhesive wear between pin, bushing, and roller are also discussed. [3].
- F.J. C. Rademacher, Non-Spill Discharge Characteristics of Bucket Elevators, Elsevier Sequoia S.A., Lausanne. One of the well-known disadvantages of a simple type bucket elevator is still the backflow or spill. The accordingly lower capacity and in-creased power consumption are not always the worst consequences, provided that the boot does not become too full. With the considerable heights of modem bucket elevators, up to 225 ft and over, serious damaging of the conveyed material, an intensified noise level and increased wear can be far more inconvenient. The discharge of the buckets has been recognized as an extremely complicated phenomenon which strictly speaking cannot be analyzed theoretically. This holds even more for free-flowing materials.[4]
- Suhas M. Shinde and R.B. Patil (2012): The major objective of this paper is to tell us that Over the years a lot of work has done and is still continuing with great effort to save weight and cost of applications. The current trend is to provide weight/cost effective products which meet the stringent requirements. The aim of this paper is to study existing conveyor system and optimize the critical parts like roller, shafts, C-channels for chassis and support, to minimize the overall weight of assembly and material saving [5].

II. PROBLEM SATEMENT

In an industry actually total wok is carried manually. Raw material which is want to fed in to the hoper of the machine which is at the 5 feet from the ground level now it is carried with a hand. But the problem occurring is it require more time and more manpower which increasing costing of product. Our aim of project is to be reducing manpower and also product within less time.

After study of processes in company it is noted that actual production process is too lengthy because it needs to lift the material from ground to hoper. Which affect the production process and increase time and also costing of product. After taken account all those things we decided to install the bucket elevator which helps to lift the material from ground to hoper and makes process much simpler.

III. METHODOLOGY

Bucket elevators operate by using an endless belt or chain on which rectangular buckets are mounted. The belt or chain revolves between a top and bottom pulley and the buckets move with it. At the bottom the buckets pick up product fed into the elevator boot and at the top the product is discharged as the bucket turns downward over the head pulley

3.1 Material Handling Equipment

Expressed in simple language, Material handling equipment is relating to the movement, storage, control and protection of materials, goods and products throughout the process of manufacturing, distribution, consumption and disposal. One of the definitions given by the American Material Handling Society is: Materials handling is the art and science of moving, packaging and storing of substance in any form. To do it safely and economically and efficiently, different types of tackles, gadgets and equipment are used, when the materials handling is referred to as mechanical handling of materials.

3.2 Bucket Elevator

Bucket elevators are the simplest and most dependable units for making vertical lifts. They are available in a wide range of capacities and may operate entirely in the open or be totally enclosed. Main variations in quality are in casing thickness, bucket thickness, belt or chain quality, and drive equipment. The main purposes of bucket elevators are used to lift bulk materials from one height to another.

For stable work and application widely bucket elevator are used. By using this one should get high Productivity. This bucket elevator is normally designed and made for metallurgy, chemical industry, building materials, mine, pulp and paper industries, ports and terminal, grain and vegetable oil, food, fodder, plastic and medicine related application. Bucket elevator systems are used for the following industrial field

Different major important system in bucket elevator

3.2.1. Drive Head and Bottom Head:

Drive head section made with high thickness steel sheets heavily stiffened. Steel split upper cover easily removable for inspection and maintenance of drive pulley or wheels. Dust or relief vent on top and inspection panel located at some height of the outlet. Bottom head is made with high thickness steel sheets is equipped with a removable bolted door for inspection and cleaning.

3.2.2 Inlet and Outlet:

Openings prearranged for the connection with other machines; chutes lined with wear resistant material when required.

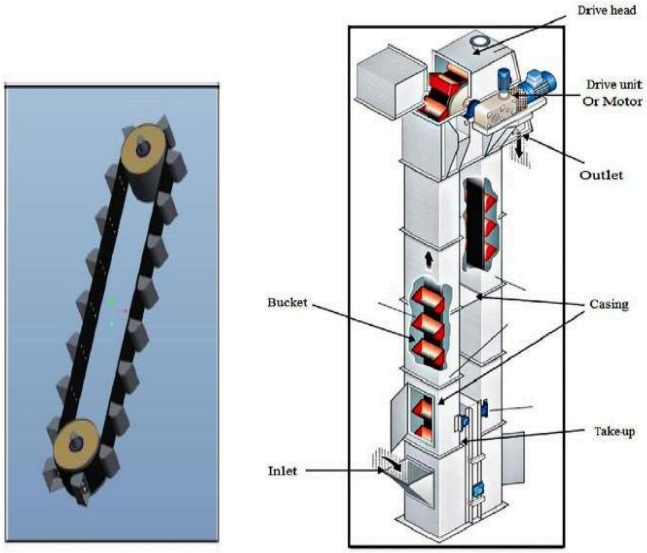

Fig. 1 Bucket Elevator

3.2.3 Buckets:

On the basis of the conveyed material characteristics the buckets are generally made of:

- Carbon steel
- Wear resistant steel
- Stainless steel
- Plastic material

Buckets are made with bent and welded steel plates, properly reinforced with welded plates in wear resistant material for heavy duty application, drawn or pressed for light materials.

Fig. 2 Bucket

3.2.4 Casing:

It is the cover part of elevators which is made of welded and bolted sections, designed to obtain a self-supporting structure of the machine for the vertical loads. The assembling sections are done by bolted flanges, with seals between each section. There is a bolted door for easy bucket inspection and mounting.

Fig. 3 Cover Shell

3.2.5 Drive Unit:

This configuration may vary depending on the application. The typical drive unit for installed power of 22kW or more includes an electric motor, hydraulic coupling and right-angle gearbox with backstop and torque arm directly mounted on the drive shaft. Additional electric motor for creeping can be installed, upon request, on the gearbox. As an alternative, drive units can be equipped with a belt drive between electric motor and gear unit.

3.2.6 Take-Up:

The gravity take-up system of the bucket elevators is equipped with additional dust-tight seals between the casing and the guide of the idle shaft belt bucket elevators

Realized for heavy duty application are equipped with a self-aligning system which en-sure the safe parallel guidance of the pulley.

project is based on the handling of bulk material and its packaging process. It is a combination of bucket elevator and belt conveyor

After surveying on various industries, we cleared our concept and designed our machine with proper dimension.

3.3 Design

During design of bucket elevator a few factors are consider for design and based on this for input data whole design calculations were carried out. The following factors are considered during design.

Material for lifting Wheat, Rice, Maize

Average bulk density 720-768 Kg/m3

Specific requirements

It should have excellent chemical resistance and it should have higher transmission capacity.

CALCULATION:

Within 1 hr 90 bag fill. (1 bag = 50kg) =90 50 =4500 kg/hr

5 Tonne/hour

5.00 m, 0.768 Tonne/m3

3.3.1 Characteristics

A belt elevator with widely spaced deep buckets and belt speed = 2m/s is suitable for the transmission purpose. We select a four-ply belt; then the diameter of the drive pulley is given by DP = 300 mm = 0.30 m and its radius Rp = 0.15 m.

The rotational speed of the pulley at = 2 m/s is given by, N=60.00 (D p) = (60 2) (0:30) = 127:32rpm 127:00rpm

The pole distance hp is found by the formula,

3.3.2 Linear Gravity Force

The linear mass of the belt with four-ply of material like rubber ground is given by, mrb = 2.40 m/s then,

qrb = g mrb

=9.81 2:40

= 23:54N=m 24:00N=m

The mass of standard deep bucket of Bucket width (B) =250mm; is given by mb = 3:38Kgthan;

q0=qrb + g (mb) (t b)

=24.00 +9.81 (0:5) (0:32) = 40N=m

The useful load is given by, q1 = gQ 3:60

= (9:81 5) (3:60 2) = 6:810N=m

Then the total linear gravity force acting on the carrying runs is given by, q=q0 + q1 =40+6.81 =46.81N/m 50N=m

3.3.3 Pull Calculation

We can make only a rough calculation, since we do not know the tension in the belt section running off the drive pulley as required to ensuring the rated pull. We assume that T1 = T0. The tension at point 2 is found by considering the resistance on take-up pulley and the scooping resistance by formula for heavy-duty operation =

1.08 and Ksc = 2.0

T2 = T1 + Wsc

= T1 + Ksc q 1

=1.08 T0 + 2* 6.81 =1.08 T0 + 13.62

T3 = Ton = T2 + q H

= 1.08 T0 + 13.62 + 50 *5 = 1.08 T0 + 263.62

Calculation against the direction of belt motion gives,

T4 = Tof f = T1 + H q0

= T0+40 5

= T0 + 200

According to theory of frictional drives we have,

= sin 1 (Dp - dp) 2C

Now angle of contact/arc of contact/angle of lap is given by

= + 20 = rad , Ton T of f e
Or for the case considered T 3T 4 e
For a mild steel pulley and high humidity (the elevator operates outdoor), the friction
Coefficient = 0.35, so that at = rad:
Therefore e = 3:00: Hence; T 3 3:00 T 4 or for the case considered 1.08 T 0 + 263.62 3:00(T 0 200)
Solution of this equation gives T0 270:51N: To ensure the certain margin; we take T 0 = 0 N and then,
T4 = Tof f = T0 + 200
= 200.0 N
T3 = Ton = 3.00 T4 = 3.00* 200 = 600.00 N
600:00= 1:08kW
Hearse, we take finally a drive motor of a power P = 1.08 kW We select for our application 2HP motor

3.3.4 BELT CALCULATION

Length of belt is given by,
Belt Tension,
T = T3 T4 (D p) 2 = (600*200) (0:50 2) = 60Nm
Permissible Tension in belt per mm width (f), f= T3 B b
=600 200 , 3N=m
Application of belt for bucket elevator is lightweight and need to transmit the lower torque. So, we select belt for power transmission either chain drive. Also belt drive has less NVH. (Noise, Vibration, Harshness)

3.3.5 BEARING

By using series: 60
Inner diameter: d = 83 mm Outside diameter: D = 130 mm Width of bearing: b = 23 mm Static load: Co = 42 KN Dynamic load: C = 49 KN
Permissible rpm for grease = 5187.5 rpm and For oil = 6536.25 rpm

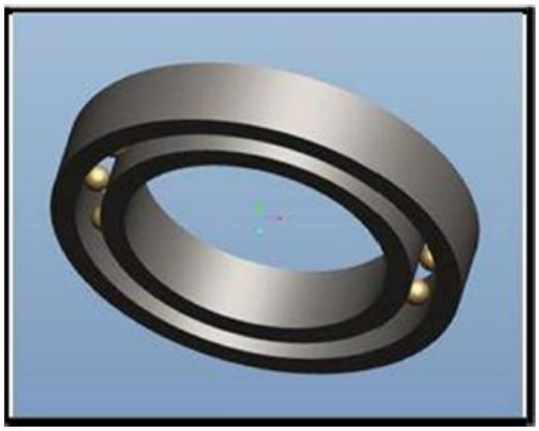

Fig. 4 Bearing

3.3.6 BUCKET CALCULATION

By using Table
Width of bucket = 160.00 mm Depth of bucket, h1= 105.00 mm Projection of Bucket, b= 105.00 mm
Now, assume =18

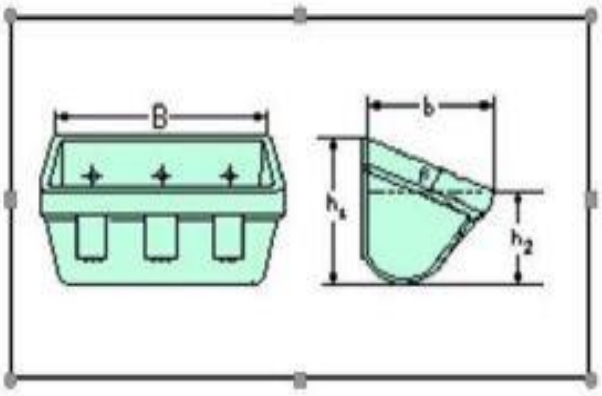

Fig. 5 Bucket Dimentions

Width of bucket = 160.00 mm Depth of bucket, h1= 105.00 mm Projection of Bucket, b= 105.00 mm
Now, assume =18
h1 h2 = b tan 18 = 105 0.325 = 34.11 mm h2 = h1 (h1 h2) = 105.00 34.11 = 70.88 mm
Therefore, Number of buckets = Belt length Bucket pitch = 10:94 0:40 = 28
It is used to conveying the material in the bucket elevator.
Specification = Material = Plastic
Bucket selected from standard table sized Width of bucket =160mm Depth of bucket=105mm Projection of
Bucket = 105mm Distance between two holes= 90mm

Fig.6 Belt Bucket Conveyor

Lower Basement:
It provides the supporting structure and protection for elevator system.
Specification = Material = Mild steel ,
Height = 1250 mm (4 feet 1.2 inch)

Fig.7 Lower Basement

Therefore, the method of bucket unloading is determined by the ratio between the pole distance and pulley radius. Now by using Formula at = 0.75 we have,
i0 b = Q 3:60
= 5:00 (3:60 2 0:760 0:75)
= 1:22m 1 =2m 1
Now by referring Table 1, we chose for i0/ tb = 2.0 deep type buckets with Bucket width (B) = 160 mm, Belt width (Bb) = 200 mm, Bucket pitch (tb) = 320 mm and also i0 = 0.6

IV OBSERVATION & CONCLUSION

Actual rotational speed of bucket elevator = 127 rpm
1 bucket capacity = 0.5kg so, for 28 bucket capacity = 14 kg
The current development of automatic bucket conveyer unit is used to avoid more human interference and maintain constant discharge of equipment which in turn reduces the downtime of equipment, reduces manual work of operators, improve efficiency and productivity of equipment and reduce the cost of operation. This project will be base for future development on the tensioned unit in the bucket elevator and other similar kind of equipment.

REFERENCES

[1] Snehal Patel, Sumant Patel, Jigar Patel Review on Design and Analysis of Bucket Elevator, International Journal of Engineering Research and Applications July 2016 8350 http://ijesc.org/

[2] Arora, R.P. and Raghunath, B.K. (2012), Production technology, Tech-Max Publication. First Edition

[3] "Positive Discharge Bucket Elevator Archives - Mechanical Engineering." Mechanical Engineering RSS. N.p., n.d. Web. http://www.mechanicalengineeringblog.com/tag/positive-discharge-bucket-elevator/.

[4] Yardley, E. D., and L. R. Stace. Belt Conveying of Minerals. Cambridge: Woodhead and Maney on Behalf of The Institute of Materials, Minerals and Mining, 2008.

[5] Shamlou, P. A. Handling of Bulk Solids: Theory and Practice. London: Butterworths, 1988

[6] McGuire, Patrick M. Conveyors: Application, Selection, and Integration. Boca Raton: CRC, 2010.

[7] Colijn, Hendrik. Mechanical Conveyors for Bulk Solids. Amsterdam: Elsevier, 1985ISO 5048 (SN 26 3102) Continuous mechanical handling equipment, Belt conveyors with carrying idlers, Calculation of operating power and tensile forces.

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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Voice Chat Bot in Healthcare System

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Abstract
The economic activity that is created by technology companies to fulfil consumer demand via the immediate provisioning of goods and services is called On-Demand Architecture. Our On-Demand Service Delivery models ensure that customer get the benefit from the quick availability of Services and when you need them. Healthcare payers, providers, including medical assistants, are also beginning to leverage these AI-enabled tools to simplify patient care and cut unnecessary costs. Whenever a patient strikes up a conversation with a medical representative who may sound human but underneath is an intelligent conversational machine. Normally Users are not aware about all the treatment or symptoms regarding the particular disease. For small problem user have to go personally to the hospital for check-up which is more time consuming. Such a problem can be solved by using medical Chat Bot by giving proper guidance regarding healthy living. The idea to create the voice chat bot using AI and ML is to diagnose the disease and provide the basic details about the disease before consulting a doctor. The chat bot basically stores the data in the database to identify the sentence keywords and to make a decision and answer the question regarding to details given by the user. This paper describes a healthcare voice chatbot using the machine learning algorithm which predicts the accuracy of disease. There are many machine learning algorithms that can be used to predict the disease. Support Vector Machine learning technique is primarily used to achieve precise prediction and boost the efficiency of the model. The system uses Natural Language Processing to achieve the style of chatting. Using this approach people can reduce spending time in hospitals and receive low cost or cost-free services.

The Current artificial intelligence has developed to a point where programs can learn by the humans and effectively simplistic human conversations which is essential. One of the best-known examples of chat bots in recent history is Siri the AI assistant that is part of Apple's standard software for its products. Siri took chat bot mainstream in 2011. Chat bots are coming into the healthcare industry and can help to solve health problems. Health and fitness chat bots have begun to gain popularity in the market. Previous year Facebook has started allowing healthcare industries to create Messenger chat bots which would then communicate with users. A great example is Health Tap the first company to release a health bot on the Messenger app. It allows users to ask their medical-related queries and receive answers. This system is created to reduce the healthcare cost and time of the user, as it is not possible for the user to visit the doctors when immediately needed. It can be mostly used in rural area where there is unavailability of the doctor. The system will take the input

of symptoms from the user then according to that it will diagnosis the symptoms and give particular result according to the input given. The interfaces are standalone built using java programming languages. The interfaces are so much attractive that it will lead to user to use it. Also, the interfaces are user friendly and simple. Basically, anyone can use it. Users have many options to choose from the disease from which they are suffering making users to use it more.

Literature Survey

1] Chatbot for Healthcare System Using Artificial IntelligenceLekha Athota and Vinod Kumar Shukla: June 2021 .

In this paper, the chatbot stores the data in the database to identify the sentence keywords and to make a query decision and answer the questions. Ranking and sentence similarity calculation is performed using N-gram, TFIDF and cosine similarity. The score will be obtained for each sentence from the given input sentence and more similar sentences will be obtained for the query given.

2] A Medical Chatbot: June 2018.

In this paper, Mrs. Rashmi Dharwadkar and Dr.Mrs. Neeta A. Deshpande have described the medical chat bot. How the medical chat bot actually works, how it gives response to the queries by the user/ patient and how it classifies the words to give the best accuracy/ result

3] Automatized Medical Chatbot (Medibot): Feb 2020.

In this paper, Prakhar Shrivastav and Nishant have described automatized medical chatbots are conversationally build with technology in mind wit

Existing System

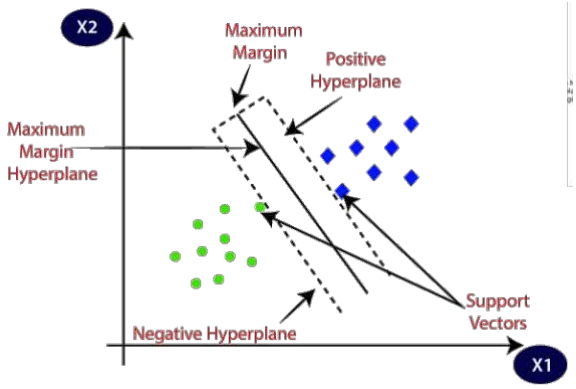
The chatbots were able to do communication. But there were some issues that led to develop more robust chatbot that can communicate with users more friendly. Previously the chatbots were not able to the communication properly. They were trained on only limited data. So, they were not able to understand the lengthy questions.

Methods And Technique

In this work, there are many machine learning algorithms tried to train the model such as KNN, Support Vector Machine, etc. The algorithm that has given the best result is Support Vector Machine. So, this algorithm has been selected as best fit.

1] SVM

Support vector machines (SVMs) are a type of supervised machine learning algorithm that can be used for classification and regression tasks. They are based on the idea of finding the hyperplane in a high- dimensional space that maximally separates different classes. In a classification task, an SVM algorithm will take a set of labelled training data and learn a model that can predict the class label of new, unseen data. The model is represented as a hyperplane in a
high-dimensional space, and the goal is to find the hyperplane that maximally separates the different classes. The distance between the hyperplane and the nearest data points is called the margin, and the goal is to maximize the margin in order to make the model more robust and generalize better to new data.



In SVM, there are different terms used in our model. They are:

[1]Support Vectors:

SVM chooses the extreme points/vectors that help in creating the hyperplane. These extreme cases are called as support vectors, and hence algorithm is termed as Support Vector Machine

[2]Hyperplane:

The goal of the SVM algorithm is to create the best line or decision boundary that can segregate ndimensional space into classes so that we can easily put the new data point in the correct category in the future. This best decision boundary is called a hyperplane.

[3]Margin Hyperplane:

The one that maximizes the distance to the closest data points from both classes. We say it is the hyperplane with maximum margin.

How SVM works?

SVM uses hyperplane to classify newly data point in correct group. The main aim of SVM is to maximize the margin from the data points in different classes from hyperplane.

Hyperplane is the straight line that best classifies the data point. We can write the equation of a hyperplane as:

$$y = mx + c \qquad \text{------[1]}$$

From this equation, we can derive two types of hyperplanes:

[1]Positive Hyperplane:

The point that is present above the hyperplane makes the model to draw the plane whose value is negative. The equation can be:

$$wx1 + c = -k \qquad \text{-----[2] where k can be any negative value.}$$

[2]Negative Hyperplane:

The point that is present below the hyperplane makes the model to draw the plane whose value is positive.

The equation can be: $wx2 + c = k$ where k can be any positive value.

The main of SVM is to maximize the margin difference so as to best separate the point into classes. So, we can take advantage of the above two equations.

We get equation:

$$w(x1-x2) = 2k \quad \text{----[3]}$$

We can convert this into vector by dividing it by magnitude of w:

$$W(x1-x2)/\|w\| = 2k/\|w\|$$

Now maximize this margin difference given constraints such that:

$$yi*(wxi+b) >= 1$$

Cost Function:
So, from above, we can write cost function as:

Cost Function:

$$\min_w \frac{1}{2}\sum_{i=1}^{n} w_i^2 + C\sum_{j=1}^{m} max(0, 1 - t_j \cdot y_j)$$

This is the overall process of Support Vector Machine Classifier. This algorithm works same as described above. For non-linear data points, SVM uses kernel functions such as rbf, polynomial, etc.

Proposed System

The chatbots are conversational virtual assistants which automate interactions with the users. Chatbots are powered by artificial intelligence using machine learning techniques to understand natural language. The main motive of the paper is to help the users regarding minor health information. The bot first asks the user to enter the information such as his name, age, etc. After that the bot starts to do the process, such as predicting the disease, suggesting the precautions, home remedies, etc. Here the bot is the trained model using machine learning algorithm that specifically gives the answers to the user queries that it is trained for.

Conclusion

The main purpose of this proposed chatbot is to help people by providing them not just text-based but also voice-based counselor service. Not every people can easily access mental healthcare services. By using this chatbot, people can get accompany for a 24/7 whole day and also not spending any cost. In this project, although the proposed chatbot is developed it is regrettable to say that this chatbot still considers apart from giving the diverse response every time. The accuracy of the model prediction can be further improved by training with larger datasets. Besides, the flow of the conversation for the chatbot is considered hard to design. Apart from the reason that lack of psychology knowledge and experience, it is not guaranteed that the user will follow the instruction given. Although the chatbot still considers able to give a related response even it is out of the range of the conversation flow, but this makes the chatbot unable to perform all the functions completely and reduces the quality of the mental

healthcare service. However, there is some efforts had been done to improve user experience such as adding some emojis in the conversations.

Furthermore, to simulate the human typing behavior, the typing indicator was also had been added. Since the color can indicate the basic mood, tone, concept, and connotation for a product, cold colors such as blue or green had been applied to the chatbot UI to let the user feel a sense of quietness and trust. In short, the proposed chatbot now cannot be considered as a perfect chatbot that able to give 100 .

References

1] Marcos Baez, Fabio Casati “Chatbots as conversational healthcare services”2020 DOI 10.1109/MIC.2020.303711, IEEE Internet Computing

2]Prathamesh Kandpal, Kapil Jasnai, Ritesh Raut “Contextual Chatbot for Healthcare Purposes (using Deep Learning)” Auckland University of Technology 2020

3]Mrs. Rashmi Dharwadkar1, Dr.Mrs. Neeta A. Deshpande, “A Medical Chatbot” International Journal of Computer Trends and Technology (IJCTT) – Volume 60 Issue 1- June 2018

4]Lekha Athota, Vinod Kumar Shukla, Nitin Pandey, “Chatbot for Healthcare System Using Artificial Intelligence” 2020 8th International Conference on Reliability, Infocom Technologies and Optimization (Trends and Future Directions) (ICRITO) Amity University, Noida, India. June 4-5, 2020

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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PARALLEL INDEXING ENGINE AND SPAM FILTERING FOR SEARCH ENGINES

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Abstract-
The growing reliance on online information and the potential financial benefits associated with it. Search engines serve as gateways to the vast amount of information available on the World Wide Web, and as a result, some individuals or organizations attempt to deceive search engines to achieve higher rankings in search results, aiming to attract user attention. This practice has become increasingly common in recent years.
Many websites now receive a significant portion of their traffic from search engine referrals. The main objective of a search engine is to provide high-quality search results by accurately identifying web pages that are most suitable for a specific query and presenting them to the user. Relevance is typically assessed based on the textual similarity between the query and a web page. Pages are assigned a query-specific numeric relevance score, where a higher score indicates greater relevance to the query.

I. INTRODUCTION:-

Web spamming refers to intentional actions taken to deceive search engines in order to obtain higher rankings for certain web pages. This practice has become increasingly prevalent and has led to a degradation of search results. Web spam can be found in various information systems, including email, social media, blogs, and review platforms.

The concept of web spam was first introduced in 1996 and has since been recognized as a significant challenge for the search engine industry. Major search engine organizations have identified adversarial information retrieval as a top priority due to the negative effects caused by spam and the emergence of new challenges in this research area.

There are several negative effects of web spam. Firstly, it diminishes the quality of search results and deprives legitimate websites of the revenue they could earn in the absence of spam. Secondly, it undermines users' trust in search engine providers, which is particularly concerning given that users can easily, switch to alternative search providers. Thirdly, spam websites can serve as a means of spreading malware, adult content, and engaging in phishing attacks.

Web spam also imposes a significant burden on search engine companies in terms of computational and storage resources. Additionally, many website operators attempt to manipulate search engine rankings using unethical techniques known as gray-hat and black-hat SEO. These techniques include link stuffing, where extraneous pages are created to link to a target page, and keyword stuffing, where the content of pages is engineered to appear relevant to popular searches.

Crafting web pages solely for the purpose of increasing rankings, without improving the utility for users, is known as "web spam." These pages often contain important keywords but lack meaningful content for human viewers.

On a different topic, massive big graphs have become prevalent in various domains, such as web graphs, social networks, and bioinformatics. These graphs can consist of billions of nodes and trillions of edges. Graph-based processing is valuable for analyzing relationships between objects and enables applications like linkage analysis, community discovery, pattern matching, and machine learning factorization discovery, pattern matching, and machine learning factorization models.

II. TYPES SEARCH ENGINE SPAM:-

The perspective of SEOs is spammers since their actions are intentional to make better rankings of a page without actually humanizing the quality of that page.

Web spam is detrimental to search engines in two ways because it:

- Reduces the quality of search results.
- Increases the cost of each processed query due to the storage and retrieval of useless pages

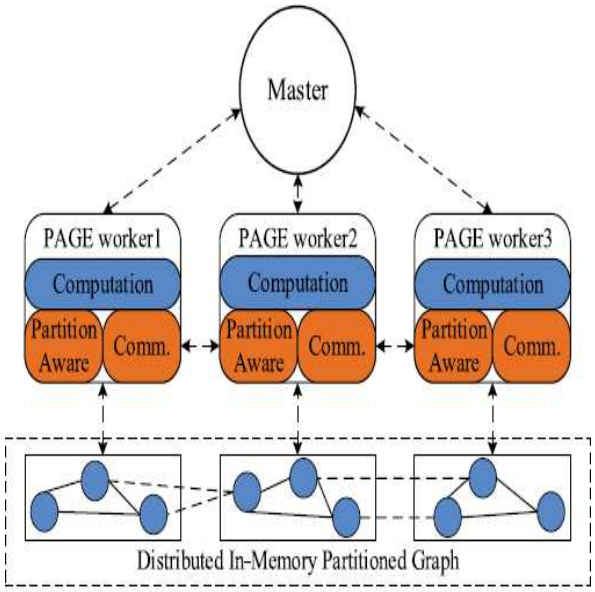
Mainly in search engines spams are categorized into following ways.

a. Term Spam
b. Content spam
c. Link spam
d. Cloaking and Redirections
e. Click spam

Term Spamming: Term spamming refers to the practice of search engine spamming. It is a form of SEO spamming. SEO is an abbreviation for Search Engine Optimization, which is the art of having your website optimized, or attractive, to the major search engines for optimal indexing. Term spamming is the practice of creating websites that will be dishonestly indexed with a high situation in the search engines. Sometimes, Term Spamming is used to try and manipulate a search engine’s understanding of a category. The

objective of a web designer is to create a web page that will find constructive rankings in the search engines, and they create their pages according the standards that they believe will help – unfortunately, some of them resort to spamdexing, unbeknown to the person who hired them.

Content Spamming: Once popular, but not particularly effective anymore, is hiding content using background and foreground colors that match. Hiding links is only slightly harder and can be achieved with 1×1 pixel images. CSS brought with it a few new tricks such as setting page elements to be not visible along with other tricks like negative indents.



(a) Architecture

Link Spamming: There are two major categories of link spam: outgoing link spam and incoming link spam.

- Outgoing link spam
- Incoming link spam

Click Spam: Since search engines use click stream data as an implicit feedback to tune ranking functions, spammers are eager to generate fraudulent clicks with the intention to bias those functions towards their websites. To achieve this goal spammers submit queries to a search engine and then click on links pointing to their target pages [92; 37]. To hide anomalous behavior they deploy click scripts on multiple machines or even in large bot nets [34; 88]. The other incentive of spammers to generate fraudulent clicks comes from online advertising. In this case, in reverse, spammers click on ads of competitors in order to decrease their budgets, make them zero, and place the ads on the same spot.

Cloaking and Redirection: Cloaking is the way to provide deferent versions of a page to crawlers and users based on information contained in a request. If used with good motivation, it can even help search engine companies because in this case they don't need to parse a page in order to separate the core content from a noisy one (advertisements, navigational elements, rich GUI elements). However, if exploited by spammers, cloaking takes an abusive form. In this case adversary site owners serve deferent copies of a page to a crawler and a user with the goal to deceive the former [28; 108; 110; 75]. For example, a surrogate page can be served to the crawler to manipulate ranking, while users are served with a user- oriented version of a page. To distinguish users from crawlers spammers analyze a user-agent field of HTTP request and keep track of IP addresses used by search engine crawlers. The other strategy is to redirect users to malicious pages by executing JavaScript activated by page on Load () event or timer. It is worth mentioning that JavaScript redirection spam is the most widespread and difficult to detect by crawlers, since mostly crawlers are script- agnostic.

I. CONCLUSION

In this paper we presented a variety of commonly web spamming and we have studied various aspects of search engine spam on the web. It is also possible to address the problem of spamming as a whole, despite the differences. Among individual spamming techniques. This paper aim identification of some common features of spam pages. For instance, the spam detection methods presented in [5] take advantage of the approximate isolation of reputable, non- spam pages: reputable web pages seldom point to spam. Thus, adequate link analysis algorithms can be used to separate reputable pages from any form of spam, without dealing with each spamming technique individually.

REFERENCES:

1. P. Metaxas and J. DeStefano. Web Spam, Propaganda and Trust. In 1st International Workshop on Adversarial Information Retrieval on the Web, May 2005.
2. Z. Gy¨ongyi, H. Garcia-Molina and
   J. Pedersen. Combating Web Spam with Trust Rank. In 30th International Conference on Very Large DataBases, Aug. 2004.

3. D. Fetterly, M. Manasse and M. Najork. Detecting Phrase-Level Duplication on the World Wide Web. In 28th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval, Aug. 2005.
4. D. Fogaras and B. Racz. Towards scaling fully personalized pagerank. In Proceedings of the 3rd Workshop on Algorithms and Models for the Web-Graph,

WAW'04, 2004.
5. Q. Gan and T. Suel. Improving web spam classifiers using link structure. In Proceedings of the 3rd International Workshop on Adversarial Information Retrieval on the Web, AIRWeb'07, Ban↵ , Alberta, 2007.
6. J. Piskorski, M. Sydow, and D. Weiss. Exploring linguistic features for web spam detection: a preliminary study. In Proceedings of the 4th International Workshop on Adversarial InformationRetrieval on the Web, AIRWeb'08,Beijing, China.
7. B. Poblete, C. Castillo, and A. Gionis. Dr. searcher and mr. browser: a unified hyperlink-click graph. In Proceedings of the 17th ACM conference on Information and knowledge management, CIKM'08, 2008.
8. G. Mishne, D. Carmel and R. Lempel. Blocking Blog Spam with Language Model Disagreement. In 1st International Workshop on Adversarial Information Retrieval on the Web, May 2005.
9. Dennis Fetterly, Mark Manasse, and Marc Najork. Spam, damn spam, and statistics. In Proceedings of the Seventh International Workshop on the Web and Databases (WebDB), 2004.

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Design Development & Analysis of Dual Mass Flywheel Spring

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Abstract

All engines have flywheels or weighted crankshafts that balance out compression and power strokes, maintain idle speed, aid starting and reduce parts wear. Dual mass flywheel is a multi-clutch device which is used to dampen vibration that occurs due to the slight twist in the crankshaft during the power stroke. The torsional frequency is defined as the rate at which the torsional vibration occurs. When the torsional frequency of the crankshaft is equal to the transaxles torsional frequency an effect known as the torsional resonance occurs. When the operating speed of the engine is low, vibration occurs due to the torsional resonance and this can be avoided using dual mass flywheel Spring. This work is carried out to study the effect of arc springs on the dual mass flywheel. The main aim is to increase durability of the arc spring and to elimination of gear rattle. First design steel and brass material springs as per our load. Then modelling in Creo 2.0 A three-dimensional model of a single arc spring are optimized by modal analysis and static structural deformation using ANSYS13.00. In experimentation manufacturing steel and brass springs. Also, to find natural frequency of both the springs with the help of FFT analyser for validation of result

Keywords— Flywheel, Dual Mass, torsional vibration, modelling, Creo 2.0, Ansys 13.00, FFT analyser, Validation of ANSYS and FFT results.

1. Introduction

Flywheel

A flywheel is an inertial energy storage device. It absorbs mechanical energy and serves as a reservoir, storing energy during the period when the supply of energy is more than the requirement and releases it during the period when the requirement of energy is more than the supply.

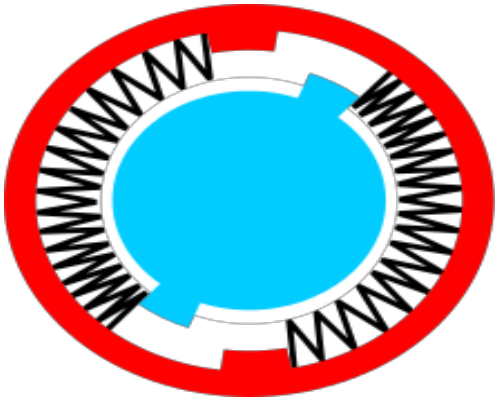

Fig. 1 Dual Mass Flywheel

Original purpose of the DMF A Dual mass flywheel or DMF is a rotating mechanical device that is used to provide continuous energy (rotational energy) in systems where the energy source is not continuous, the same way as a conventional flywheel acts, but damping any violent variation of torque or revolutions that could cause an unwanted vibration. The vibration reduction is achieved by accumulating stored energy in the two flywheel half masses over a period of time but damped by a

series of strong springs, doing that at a rate that is compatible with the energy source, and then releasing that energy at a much higher rate over a relatively short time. The compact dual-mass flywheel also includes the whole clutch Piston engines do not generate a constant torque but a time-varying engine torque (t). The shape ouches torque f1Jnction depends mainly on the engine speed aping and the number of cylinders. In the engine torque i plotted over the crankshaft angle using two different levels of engine speed.

Problem Statement

Dual mass flywheel is a multiclutch device which is used to dampen Torsional vibration that occurs due to the slight twist in the crankshaft during the power stroke when the operating speed of the engine is low, vibration occurs due to the torsional resonance and this can be avoided using dual mass flywheel with arc springs. This work is carried out to study the effect of materials on the dual mass flywheel arc springs. The main aim is to decrease the torsional vibration of crank shaft and to elimination of gear rattle by changing material of the arc springs which is used in Dual mass flywheel. The effectiveness is examined Brass material spring over Steel material spring by checking natural frequency of both materials with the help of modal analysis using ANSYS 13 &FFT analyser. A three-dimensional model of a single arc spring, are optimized by modal analysis and fatigue analysis using ANSYS 13.00.

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OBJECTIVES

Development of new material springs or modification of existing material is the real challenge for most of the materials engineers. The spring will also be analysed using ANSYS software for its mechanical properties and the result will be compared with the experimental results the resulting properties would help to identify the suitable applications for this material spring. Moreover, this technique can describe a structure in terms of its natural characteristics which are the natural frequency, damping and mode shapes. Following are the objectives of the project,

1. To design Steel material spring analytically.
2. To design Brass material spring analytically.
3. To modelling of Steel spring with help of Creo 2.0
4. To modelling of Brass spring with help of Creo 2.0
5. To carry out FEA analysis of newly modelling Steel springs for finding natural frequencies and mode shapes by using ANSYS 13.00.
6. To carry out FEA analysis of newly modelling Brass springs for finding natural frequencies and mode shapes by using ANSYS 13.00.
7. To carry out FEA analysis of newly modelling Steel springs for finding deformation of at various load by using ANSYS 13.00.
8. To carry out FEA analysis of newly modelling Steel springs for finding deformation of at various load by using ANSYS 13.00.
9. To Manufacture Steel material spring at Asiatic Steel Spring Manufacture A/ p Hadapsar MIDC, Pune
10. To Manufacture Brass material spring at Asiatic Steel Spring Manufacture A/ p Hadapsar MIDC, Pune
11. To carry out Experimental analysis (FFT Analysis) of newly manufacture Steel spring for finding natural frequencies at Trinity College of Engg. A/ p Bopdev Ghat, Yewlewadi, Pisoli,Pune.
12. To carry out Experimental analysis (FFT Analysis) of newly manufacture Brass spring for finding natural frequencies at Trinity College of Engg. A/ p Bopdev Ghat, Yewlewadi, Pisoli, Pune

Methodology

In this paper following different methods are adopted.

A) Analytical Method- In analytical method design of both material springs

1. Design Steel material spring.

2. Design Brass material spring.

B) Numerical Method – In numerical method modelling and analysis of both materials springs

1. Modeling of Steel material spring with help of Creo 2.0
2. Modeling of Brass material spring with help of Creo 2.0
3. FEA analysis of newly modelling Steel springs for finding natural frequencies and mode shapes by using ANSYS 13.00.
4. FEA analysis of newly modelling Brass springs for finding natural frequencies and mode shapes by using ANSYS 13.00
5. FEA analysis of newly modelling Steel springs for finding deformation of at various load by using ANSYS 13.00.
6. To carry out FEA analysis of newly modelling Steel springs for finding deformation of at various load by using ANSYS 13.00.

C) Experimental Method- In this method manufacturing and FFT analysis of springs

1. Manufacture Steel material spring at Asiatic Steel Spring Manufacture A/ p Hadapsar MIDC, Pune
2. Manufacture Brass material spring at Asiatic Steel Spring Manufacture A/ p Hadapsar MIDC, Pune
3. To carry out Experimental analysis (FFT Analysis) of newly manufacture Steel spring for finding natural frequencies at Trinity College of Engg. A/ p Bopdev Ghat, Yewlewadi, Pisoli, Pune.
4. To carry out Experimental analysis (FFT Analysis) of newly manufacture Brass spring for finding natural frequencies at Trinity College of Engg. A/ p Bopdev Ghat, Yewlewadi, Pisoli, Pune

Literature Survey

Dr. K. Annamalai & A. Govinda (2014) studied the theoretical and experimental dynamic behaviour of different materials for dual mass flywheel spring Dual mass flywheel is a multi-clutch device which is used to dampen vibration that occurs due to the slight twist in the crankshaft during the power stroke. The torsional frequency is defined as the rate at which the torsional vibration occurs. When the torsional frequency of the crankshaft is equal to the transaxles torsional frequency an effect known as the torsional resonance occurs. When the operating speed of the engine is low, vibration occurs due to the torsional resonance and this can be avoided using dual mass flywheel. This work is carried out to study the effect of arc springs on the dual mass flywheel. The main aim is to increase durability of the arc spring and to elimination of gear rattle. A three-dimensional model of a single arc spring, hard-soft spring combination and single mass with arc springs are optimized by modal analysis and fatigue analysis using ANSYS. The torsional frequency is defined as the rate at which the torsional vibration occurs. When the torsional frequency of the crankshaft is equal to the transaxles torsional frequency an effect known as the torsional resonance occurs. The vibration caused by the torsional resonance when the operating speed of the engine is low can be avoided using dual mass flywheel. This work is carried out to study the effect of arc springs on the dual mass flywheel, a three-dimensional model of a single arc spring, two arc springs with different stiffness and single mass with arc springs are optimized using ANSYS. The simulation of fatigue analysis is also performed using ANSYS.

D. G. Dighole, Prof. R.S. Shelke, Prof. Dr. S.N. Shelke (2015) studied about the rapid developments of vehicle technology over the last few decades, flywheels have been used to achieve smooth operation of machines. The early models where purely mechanical consisting of only a stone wheel attached to an axle. Nowadays, flywheels are complex constructions where energy is stored mechanically and transferred to an integrated motor/generator. The stone wheel has been replaced by a steel or composite rotor and magnetic bearings have been introduced. Today flywheels are used as supplementary UPS storage at several industries world over. Flywheels serve as kinetic energy storage and retrieval devices with the ability to deliver high output power at high rotational speeds as being one of the emerging energy storage technologies available today in various stages of development, especially in advanced technological areas, that is spacecrafts. Today, most of the

research efforts are being spent on improving energy storage capability of flywheels to deliver high power transfer, lasting longer than conventional battery powered technologies. This study solely focuses on exploring the effects of dual mass flywheel geometry for improving energy storage capability to deliver high power transfer per unit mass, as compared to conventional flywheel. Dual mass flywheel also reduces the weight of the flywheel using composite materials. In this study using the two spring two mass system to produce useful vibrations which will be employed to increase the inertia of the system and thereby enable to reduce the weight of existing flywheel or increase power output using existing weight of flywheel. They concluded that there is approximately 7 to 8 % increase in power output by using the Dual mass flywheel and also observed that the Dual mass flywheel is 5 to 6 % efficient than the conventional flywheel which will also result in increasing fuel economy of the engine.

By Park, Dong hon Suwon- si, Kyunggi do (2000) [6] invented about a dual mass flywheel for a vehicle includes us a primary flywheel connected to a crank shaft of an engine a dumper housing integrally formed in a circumfertially direction of the primary flywheel. A secondary flywheel connected to an input shaft of a transmission and rotating mounted on a hub of primary flywheel. Driven fingers integrally formed the second flywheel and insert the vertically in to the dumper housing to be forced by the dumper spring. The dumper springs compresses two spring sets symmetrically disposed within the dumper housing .one end of each dumper springs being driven by the stoppers which are integrally formed on primary flywheel. While the other end of springs drives the driven finger of the secondary fly wheel. The primary and secondary flywheels are integrally provided which projections for preventing the dumper spring from excessively compressed & damaged. The dumper spring compressed a plurality of springs. Each having difference springs coefficients and the dumper springs are supported by a plurality of a sliding guide or blocks in that way torsional vibrations of cranck shaft get reduced with the help of Dual Mass Flywheel

Ulf Shaper, Oliver Sawodny, Tobias Mahl and UtiBlessing (2009) [5] that research about -The Dual Mass Flywheel (DMF) is primarily used for dampening of oscillations in automotive power trains and to prevent gearbox rattling. TWs paper explains the DMF mechanics along with its application and components. Afterwards a detailed abs-initio model of the DMF dynamics is presented. This mainly includes a model for the two arc springs in the DMF and their friction behaviour. Both centrifugal effects and redirection forces act racially on the arc spring which induces friction. A numerical simulation of the DMF model is compared to measurements for model validation. Finally, the observe ability of the engine torque using the DMF is discussed. For this purpose, a linear torque observer is proposed and evaluated. In today's world power train control sits acclimates torque information to perform various tasks. These tasks include for example the clutch acnl3tion in automated manual transmissions and dual-clutch transmissions as well as the control of electric motors in hybrid power trains. Indirect torque estimation is needed because the direct measurement of the transmuted torque using strain gages cannot be done in volume production cars for economic reasons. One source for power train torque estimation is the engine itself. However, the torque estimation provided by the internal combustion engine is based on complex thermodynamic models. These engine models tend not to be reliable in all situations. Critical a picture indeed the accuracy of the lobo charger models and the influence of exhaust gas recirculation on combustion calculation.

By Rudolf Glassner (2013) [6] studied about Dual Mass flywheel of driver train of vehicle includes a primary flywheel mass, Secondary flywheel mass & coupling device. The coupling device include at least two pivot levers associated with secondary flywheel mass with inter act with a control profile formed on primary flywheel mass. The pivot levers are pre tensional against control profile in a radial direction by the elastic element. a control segment of elastic element is disposed radially inside control profile. An object of the present invention is to provide a dual mass flywheel having coupling device which has fewer speed dependent coupling characteristics .In the Dual mass flywheel

in accordance with the invention the centrifugal force acting on elastic elements in operation is minimized in that elastic elements are more closely to axis of rotation of dual mass flywheel than previously usual If the flywheel is too light the motorcycle requires more effort to start, idles badly, and is prone to stalling. Weight is not the important factor here, but inertia. Inertia is stored energy, and is not directly proportional to flywheel weight. It's possible to have a light flywheel with much more. Any power the motor develops must accelerate the flywheels before leaving the sprocket shaft, and any used in bringing the flywheel up to speed is not available at the rear wheel

Li Quan Song, Li Ping Zeng, Shu Ping Zhang, Jian Dong Zhou Hong En Niu (2014) was develops new structure of new structure of dual mass flywheel (DMF) with continuously variable stiffness is proposed based on compensation principle in order to release the impact produced by the step changes of stiffness. By theoretical calculation and experiments, the proposed structure and design theory involved are proved to be feasible for reducing the torsional vibration of the power transmission system for automobiles with large-power and high-torque engines. The natural characteristics of the vehicle power transmission system carrying the DMF are analysed to investigate the influence of torsional stiffness on the first-order and the second-order resonance speeds. The results show that this new DMF can lower the idle speed of the engine, realize high counter torque at a large torsional angle, and avoid the impact due to the abrupt changes of stiffness. An inertia balance mechanism is proposed to eliminate the inertia forces produced by moving parts of the compensation device, which can successfully put the torque compensation theory into engineering practice. By adding a compensation device, a new DMF with continuously variable stiffness is presented to release the impact produced by the step changes of stiffness. This new DMF can avoid impact and noise more effectively. By adding a compensation device, a new DMF with continuously variable stiffness is presented to release the impact produced by the step changes of stiffness.

Sagar N Khurd, Prasad P Kulkarni, Samir D Katekar (2015) study represents new approach to design helical coil spring by using workbench. Response surface modelling and analysis of helical spring by considering Translational invariance have been carried out. In previous paper we had considered longitudinal invariance. Design parameters are wire diameter, coil diameter, height, number of turns elastic modulus in X and Y direction, force. Simple equation is proposed which gives value of compressive stress of helical coil spring by carrying out regression analysis done by M S excels, it is observed that force and material property are significant parameters which affect compressive stress because their P value is 1. Relationship among design parameters and compressive stress has been obtained. In this analysis it is observed that coil diameter increases stress on the spring decreases. It is observed that force and material property are significant parameters which affect compressive stress.

C. Madan Mohan Reddy, D. Ravindra Naik, Dr. M. Lakshmi Kantha Reddy (2014) studied about present work is carried out on modeling, analysis and testing of suspension spring is to replace the existed steel helical spring used in popular two-wheeler vehicle. The stress and deflections of the helical spring is going to be reduced by using the new material. The comparative study is carried out between existed spring and new material spring. Static analysis determines the stress and deflections of the helical compression spring in finite element analysis. The testing proto type is used to test the spring under different loading conditions. Finite element analysis methods (FEA) are the methods of finding approximate solutions to a physical problem defined in a finite region or domain. FEA is a mathematical tool for solving engineering problems. In these the finite element analysis values are compared to the experimental values. A typical two-wheeler suspension spring is chosen for study. The modeling of spring is developed on pro/E 5.0 analysis is carried out on Ansys 14. They conclude that the comparative study has been carried out in between the theoretical values to the experimental values and the and the analytical values. The maximum shear stress of chrome vanadium steel spring has 13-17% less with compare to hard drawn steel spring.

` **Prince Jerome Christopher J, Pavendhan R. (2010)** studied about vehicles problem happens while driving on bumping road condition. The objective of this project is to design and analyse the performance of Shock absorber by varying the wire diameter of the coil spring. The Shock absorber which is one of the Suspension systems is designed mechanically to handle shock impulse and dissipate kinetic energy. It reduces the amplitude of disturbances leading to increase in comfort and improved ride quality. The spring is compressed quickly when the wheel strikes the bump. The compressed spring rebound to its normal dimension or normal loaded length which causes the body to be lifted. The spring goes down below its normal height when the weight of the vehicle pushes the spring down. This, in turn, causes the spring to rebound again. The spring bouncing process occurs over and over every less each time, until the up-and-down movement finally stops. The vehicle handling becomes very difficult and leads to uncomfortable ride when bouncing is allowed uncontrolled. Hence, the designing of spring in a suspension system is very crucial. The analysis is done by considering bike mass, loads, and no of persons seated on bike. Comparison is done by varying the wire diameter of the coil spring to verify the best dimension for the spring in shock absorber. Modeling and Analysis is done using Pro/ENGINEER and ANSYS respectively. They have designed a Shock Absorber used in 160 cc bike and we have modelled it using 3D parametric software called Pro/Engineer. The shock absorber design is modified by reducing the diameter and stress analysis is performed. The stress value is lesser in our designed spring than in original which adds an advantage to our design. By comparing the results in the table, we could analyse that our modified spring has reduced in weight and it is safe.

Mehdi Bakhshesh, and Majid Bakhshesh (2012) both studied about springs that can reserve high level of potential energy, have undeniable role in industries. Helical spring is the most common element that has been used in car suspension system. In this research, steel helical spring related to light vehicle suspension system under the effect of a uniform loading has been studied and finite element analysis has been compared with analytical solution. Afterwards, steel spring has been replaced by three different composite helical springs including E-glass/Epoxy, Carbon/Epoxy and Kevlar/Epoxy. Spring weight, maximum stress and deflection have been compared with steel helical spring and factors of safety under the effect of applied loads have been calculated. It has been shown that spring optimization by material spring changing causes reduction of spring weight and maximum stress considerably. In any case, with changing fibre angle relative to spring axial, composite spring properties have been investigated & concluded that a helical steel spring has been replaced by three different composite helical springs. Numerical results have been compared with theoretical results and found to be in good agreement. Compared to steel spring, the composite helical spring has been found to have lesser stress and has the most value when fibre position has been considered to be in direction of loading. Weight of spring has been reduced and has been shown that changing percentage of fibre, especially at Carbon/Epoxy composite, does not affect spring weight. Longitudinal displacement in composite helical spring is more than that of steel helical spring and has the least value when fibre position has been considered to be in direction of loading. The most safety factor is related to case that fibre position has been considered to be perpendicular to loading and it is for Carbon/Epoxy composite helical spring.

Pavan Kumar AV, Vinayaka N, Dr P B Shetty, Dr. Kiran Aithal S, Gowtham V studied about that the Helical Compression spring has been designed in such a way that when the vehicle travels over the spring, the spring takes the maximum load of 200 kg and the rest is taken by the ground. For this purpose, the spring is analysed for the fatigue loads and has been optimized for the selection of material, wire diameter, carbon percentage and other governing parameters & concluded that as the diameter of spring increases, Ultimate Tensile Strength increases. As the carbon percentage increases, the Ultimate Tensile Strength increases, but flexibility decreases. As the diameter increases, factor of safety increases. As the carbon percentage increases, the factor of safety graph shifts up with respect to the previous grades. As the carbon spring is oil hardened, the strength increases and the factor of safety curve shifts up.

N. N. Suryawanshi1, Prof. D. P. Bhaskar (2015) studied about Dual Mass Flywheel (DMF) is primarily used for dampening of oscillations in automotive power trains and to prevent gearbox rattling. We explained detailed initial model of the DMF dynamics is presented. This mainly includes the two arc springs and two masses in the DMF and their behaviour. An experimental the DMF model is compared to convention flywheel. Finally, the observation of the engine torque using the DMF is discussed. For this purpose, the DMF is manufactured and done experiment or testing to see the results. And then results are comparing with the conventional flywheel &both concluded that there is approximately 10 % increase in power output by using the Dual mass flywheel.

Saurabh Singh (2012) studied about demonstrates the feasibility of adopting composite material for design of helical coil suspension system. In this paper the combination of steel and composite material is used in place of conventional steel only. The composite material used in this analysis is Glass Fiber/Epoxy. The cause of implementing combination of steel and composite material was because of the low stiffness of single composite spring, which limits its application to light weight vehicle only. And conclude that that combination of conventional steel and composite material can increase the stiffness; which is the major requirement however the ever-demanding need of weight reduction of vehicles will be satisfied by employing this method. The weight reduction in this combination of material

Demin Chena, Yueyin Ma, Wei Sun, Xiaolin Guo, Xaofei Shi (2011) studied about in order to reduce torsion vibration of automotive powertrain, angular stiffness formula of arc helix spring was built according to the performance parameter of a C-grade car. Based on the expression, a method of optimization design about arc helix spring is proposed with the variable radian. A new Dual Mass Flywheel (DMF) with 6 arc helix springs is designed. The torsion vibration simulation model of automotive power train is established by MSc. Easy and the system is analysed. Further, the experiment is made and proves that the design of DMF can satisfy the use of the car & they concluded that angular stiffness formula of arch helix spring is calculated; a new design optimization method of DMF is proposed with radian as the main variables. The DMF of six arch helix springs is designed. The torsion vibration model of a C-Class car is built by Msc.Easy5, and the vibration reduction effect of DMF designed is simulated. Finally, the experiment on the DMF is carried out and results show that it meets design requirements. This method given in the paper can be used to select the appropriate arc helix springs for DMF to avoid resonance between the transmission and engine. It makes the DMF better match with the vehicle's transmission system and access to the best effect of reducing vibration and noise. Therefore, it is quite important to improve vehicle comfort, the transmission efficiency and prolong the transmission life.

By Alaster John Young (2000) [6]explained about a twin flywheel comprising first and second co axially arranged flywheel masses which are mounted for limited angular rotation relative to the each other .The flywheel masses are inter connected at least one linkage arrangement comprising a multi-link linkage having two or more circumfertially spaced main links pivotally mounted on second flywheel masses with the circumfertially adjust pair of main links inter connected by extending connected linkage and anchor link which connect to the multi linkage with first flywheel mass .Relative rotation of flywheel mass causes multi-link linkage which connect to the second flywheel mass by anchor link , so that when twin mass is rotating ,relative rotation of flywheel masses resisted by centrifugal forces acting on linkage . Any particular link may in the form of unitary link in the form of parallel pair's plates. Associated with one or more links or pivots acting between flywheel masses there may be controlling means to control the relative rotation of flywheel masses

2. METHDOLOGIES

1)Analytical Method- In that method Steel & Brass material springs design as per our parameters

Design of Steel Material spring-

Design helical spring for steel material as per following parameters

a) Load (W) = 250N

b) No. of Coils(n) = 15
c) Assume dia. of wire =6.40mm (Standard value from R. S. Khurmi)
d) Modulus of Rigidity of steel =80 X 10^3 MPA
e) Assume deflection of spring =30mm

Table No.1 Parameters of Steel Spring

Parameter	Value
D	51.25 mm
Ls	96 mm
Lf	130.15 mm
δ	30mm
C	8.0078
K	8.33
P	8.67mm
τ	0.58 Mpa

Design of Brass Material spring-

Design helical spring for steel material as per following parameters

a) Load (W) = 250N
b) No. of Coils(n) = 15
c) Assume dia. of wire =6.40mm (Standard value from R. S. Khurmi)
d) Modulus of Rigidity of steel =80 X 10^3 MPA
e) Take coil dia. of spring as above =51.25 mm

Table No. 2 Parameters of Brass Spring

Parameter	Value
D	**51.25mm**
δ	67.10 mm
Ls	96 mm
Lf	196.5 mm
C	8.0078
K	3.72
P	13.1 mm
τ	0.58 mpa

In Steel spring and In Brass spring induced shear stress is same so there is no matter about material change our main aim is increase the deflection that is achieved by above design

2) Numerical Analysis – In numerical analysis take modeling of steel spring and brass spring with Creo 2.0 then take analysis of both springs with ANSYS 13.00

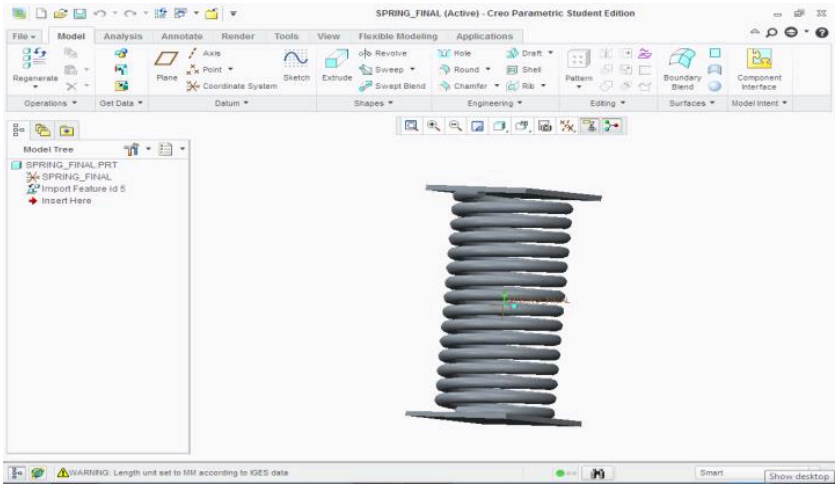

Fig. 2 Model of Steel spring With Creo 2.0

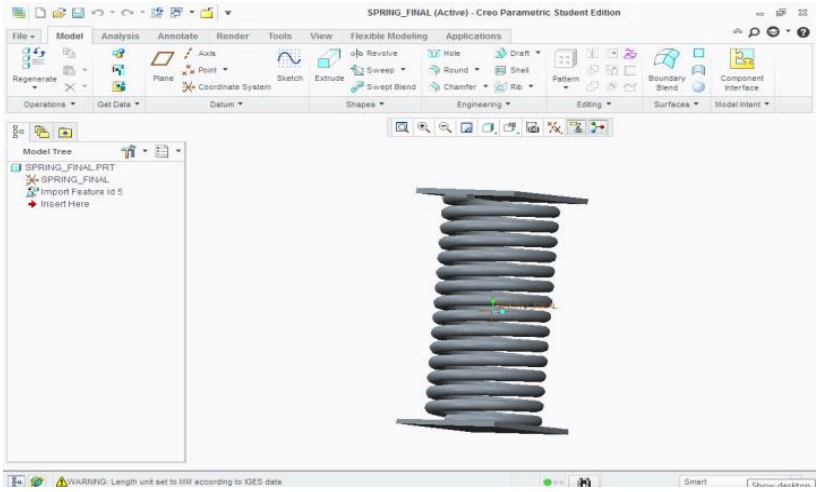

Fig.3 Model of Brass spring With Creo 2.0

Analysis of springs by ANSYS 13.00

Mode shapes for Steel spring

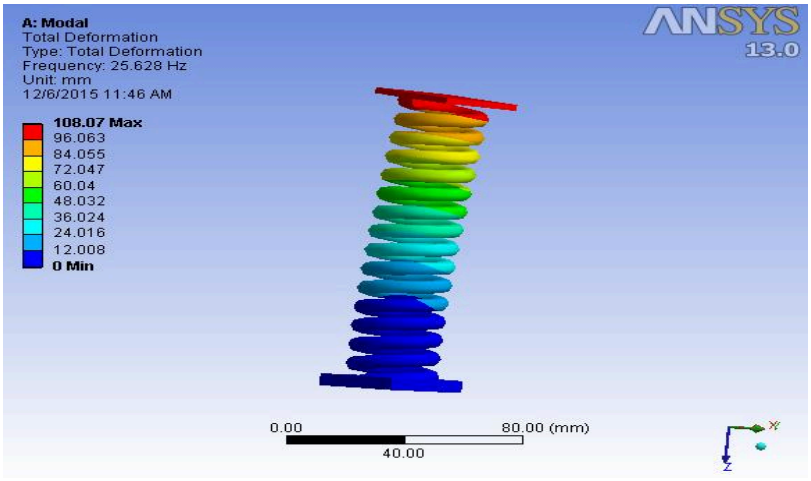

Fig.4 Mode shapes for Steel spring

Table No. 3 Natural frequencies for Steel Spring

Mode No.	Natural frequency (Hz)
1	25.628
2	115.17
3	126.27
4	145.91
5	146.6
6	343.63
7	360.59
8	381.21

Mode shapes for Brass spring

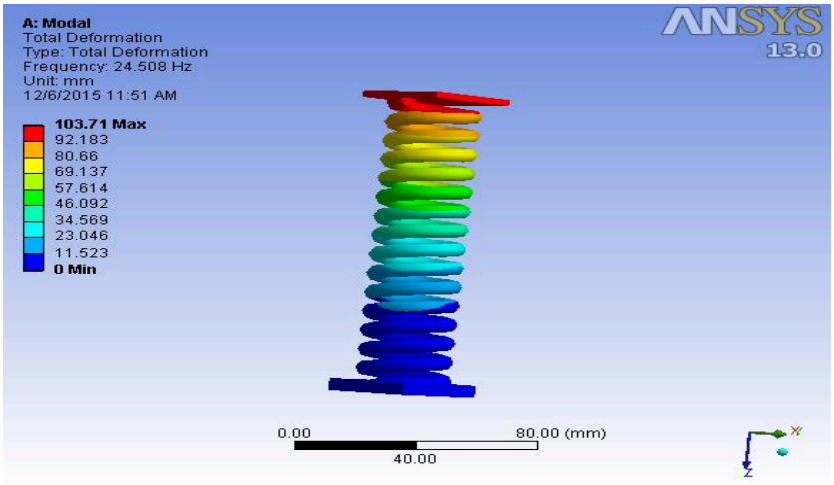

Fig.5 Natural frequencies for Brass Spring

Table No. 4 Natural frequencies for Brass Spring

Mode No.	Natural frequencies (Hz)
1	24.501
2	110.75
3	121.42
4	140.97
5	330.42
6	346.73
7	350.59
8	366.56

The result for modal analysis of springs by ANSYS gives above eight natural frequencies which are further compared to each other in result and discussion

Experimental analysis –

In Experimental analysis first manufacture steel spring and brass spring at Asiatic Steel Spring manufacturer in Hadapsar M I D C, Pune then take FFT analysis for finding natural frequency of both materials at Trinity College of Engg. A / p Pisoli Bopdev Ghat, Pune

Fig. 6 Final Springs

Process sheet for manufacturing Steel spring and Brass Spring

Experimental Modal analysis

Modal analysis is the study of the dynamic properties of structures under vibration excitation. Modal analysis is the field of measuring and analysing the dynamic response of structures and or fluids during excitation. Examples would include measuring the vibration of a car's body when it is attached to an electromagnetic shaker, or the noise pattern in a room when excited by a loudspeaker. Modern day modal analysis systems are composed

Experimental setup

Experimental setup was prepared to carry out modal analysis. Experimental setup requires VA4Pro FFT analyser, accelerometer, impact hammer, connection cables, fixed support, nut and bolts etc.

Experimental setup for Steel spring

Fig. 7 Experimental setup for Steel spring

Table No. 5 Natural frequencies for Steel Spring

Mode No.	Natural frequency (Hz)
1	23
2	92
3	104
4	191
5	251
6	327
7	329
8	466

Experimental setup for Brass spring

Fig. 8 Experimental setup for Brass spring

Table No. 6 Natural frequencies for Brass spring

Mode No.	Natural frequencies (Hz)
1	15
2	60
3	112
4	163
5	213
6	256
7	302
8	376

With respect to above readings Compares of natural frequency of steel spring and brass spring we will discuss in result and discussion chapter.

Result & Discussion

In this paper the results obtained in the ANSYS and in FFT analyser are compared to each other. The comparison is made between the Steel Spring and Brass spring. Also, the comparison in results of Steel spring and Brass spring is carried out in the sense of natural frequencies, mode shapes and deformation.

2.1.1 Comparison based on ANSYS results

Here the results obtained in ANSYS 13.0 for Steel Spring and Brass spring are compared in the sense of natural frequencies, mode shapes and deformations of mode shape. Graphs are also plotted to compare the Steel Spring and Brass spring. in respect to various aspect as natural frequency and deformation of mode shapes.

2.1.2 Comparison of natural frequency

The following Table No. 6 gives the comparison in the sense of natural frequencies at first eight modes of vibration for Steel Spring and Brass spring. It also gives decrease in frequencies and percent decrease in frequencies for Steel Spring and Brass spring at first eight modes.

Validation of ANSYS and FFT results for Steel Spring

Here comparison of ANSYS and FFT results are compared for Steel spring. Following Table 6.4 shows the ANSYS and FFT results for first eight mode numbers. Table 4.4 also shows the error and percentage error in the ANSYS and FFT results for first eight mode numbers of steel spring

Table No. 6 Comparison of FEA and Experimental results for Steel Spring

Mode No	ANSYS results	FFT results	Error (Hz)	% error
1	25.628	23	2.628	11.42609
2	115.17	92	23.17	25.18478
3	126.27	104	22.27	21.41346
4	145.91	191	-45.09	-23.6073
5	146.6	251	-104.4	-41.5936
6	343.63	327	16.63	5.085627
7	360.59	329	31.59	9.601824
8	381.21	466	-84.79	-18.1953

From the Table 6 it can see that for mode 1, 6, 7, 8 ANSYS and FFT results are vary. The percentage error in ANSYS and FFT result is varies between 6 to 18.19percent. The percentage error is below 20 % and hence it validates the results obtained for Brass Spring

Table No. 7 Comparison of ANSYS and FFT results for Brass spring

Mode No	ANSYS results	FFT results	Error (Hz)	% error
1	24.508	15	9.508	63.38667
2	110.75	60	50.75	84.58333
3	121.42	112	9.42	8.410714
4	140.97	163	-22.03	-13.5153
5	330.42	213	117.42	55.12676
6	346.73	256	90.73	35.44141
7	350.59	302	48.59	16.0894
8	366.56	376	-9.44	-2.51064

From the Table 7 it can see that for mode 3, 4, 7, 8 ANSYS and FFT results are vary. The percentage error in ANSYS and FFT result is varies between 3 to 16.08percent. The percentage error is below 30 % and hence it validates the results obtained for Brass Spring

Conclusion

With respect to above all work following conclusion are drawn:

- **Natural Frequency** – When taking reading with numerically and experimentally it was observed that the natural frequencies of Brass spring are decreases by 1 Hz to 10 Hz of Steel spring fromfirst to eighth natural frequency. Hence there is 1- 23 % decrease in natural frequencies of Brass spring than steel spring that is effect on the shock absorbing of spring. Due to this deflection increases and more shock absorbed
- **Deformation of spring** - When conducting static structural analysis in Ansys 13.00.it is observed that the deformations of Brass spring areincreases by 10% of Steel spring fromfirst to seventh natural frequency. If deformation increases of spring then automatically shock absorbing capacity also be increased of the dual mass flywheel spring.
- **Ultimate Tensile Strength**– When comparing steel and brass we observed that of Steel spring is 450 N/mm^2 and that of Brass spring 525 N/mm^2. Ultimate Tensile Strength of Brass Spring is increased by 75 N/mm^2 than the Steel Spring. It is very beneficial to life of the spring
- **Corrosion resistant -** When comparing steel springand brass spring then it observed that brass spring is corrosion resistant material then life of spring increases and also maintenance cost decreases.
- **Weight**- Weight of flywheel is most important factor in flywheel which much affected on vehicle performance there is correlation between natural frequencies inversely proportional

to the mass. Decrease in natural frequency indicates there is relative increase in weight. It is beneficial to flywheel

Reference Papers

[1] Dr. K. Annamalai & A. Govinda," Design & Analysis of dual mass flywheel spring", International Journal Engineering & Technology Research, Volume 2, Issue 1, January – February 2014, 35-41IASTER 2014, www. Iaster. Com, ISSN Online 2347-4904

[2] D. G. Dighole, Prof. R.S. Shelke, Prof. Dr. S.N. Shelke," Design and Development of Dual Mass Flywheel for Improving Energy Storage Capability" International Journal of Science, Engineering and Technology Research (IJSETR), Volume 4, Issue 7, July 2015

[3] Park Dong Hoon, "Dual mass flywheel for automobile vehicle" European patent published, on 16 feb 2000

[4] Ulf Schaper, Oliver Sawodny, Tobias Mahl and Uti Blessing, "Modeling and torque estimation of an automotive Dual Mass Flywheel" American Control Conference Hyatt Regency Riverfront, St. Louis, MO, USA June 10-12, 2009

[5] Mr. Rudolf Glassner", Design& Analysis of dual mass flywheel" United State Patent, Patent No. US 83932477B2, Date of patent; March 12, 2013

[6] Li Quan Song, Li Ping Zeng, Shu Ping Zhang, Jian Dong Zhou, Hong En Niu," Design and analysis of a dual mass flywheel with continuously variable stiffness based on compensation principle" Elsevier, Mechanism and Machine Theory 79 (2014) 124–140, 13 May 2014

[7] Sagar N Khurd, Prasad P Kulkarni, Samir D Katekar, "Probabilistic design of helical coil spring for Translational invariance by using Finite Element Method" International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056 Volume: 02 Issue: 06 | Sep-2015

[8] C. Madan Mohan Reddy D. Ravindra Naik Dr M. Lakshmi Kantha Reddy," Analysis and Testing of Two-Wheeler Suspension Helical Compression Spring", IOSR Journal of Engineering (IOSRJEN) www.iosrjen.org ISSN (e): 2250-3021, ISSN (p): 2278-8719 Vol. 04, Issue 06 (June. 2014),

[9] Prince Jerome Christopher J, Pavendhan R." Design and Analysis of Two-Wheeler Shock Absorber Coil Spring", *International* OPEN ACCESS *Journal of Modern Engineering Research (IJMER)11 may 2007.*

[10] Mehdi Bakhshesh, and Majid Bakhshesh," Optimization of Steel Helical Spring by Composite Spring", INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY SCIENCES AND ENGINEERING, VOL. 3, NO. 6, JUNE 2012

[11] Pavan Kumar AV, Vinayaka N, Dr P B Shetty, Dr Kiran Aithal S, Gowtham V, "Design and analysis of Helical compression spring", International Journal of Emerging Technology and Advanced Engineering Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 8, August 2014)

[12] N. N. Suryawanshi, Prof. D. P. Bhaskar," An Experimental Study of Dual Mass Flywheel on Conventional Flywheel on Two stroke petrol engine.", International Journal of Engineering Research and General Science Volume 3, Issue 2, Part 2, March-April, 2015

[13] Saurabh Singh," Optimization of Design of Helical Coil Suspension System by Combination of Conventional Steel and Composite Material", International Journal of Applied Engineering Research, ISSN 0973-4562 Vol.7 No.11 (2012)

[14] Demin Chena, Yueyin Ma, Wei Sun, Xiaolin Guo, Xaofei Shi," Research of Design and Vibration Reduction of Dual Mass Flywheel
with Arc Helix Spring", International Conference on Electronic & Mechanical Engineering and Information Technology,2011

[15] Mr. Alastair John Young, Design Spring of twin mass flywheel, United State Patent, Patent No. 6029539, Date of patent; Feb 29,2000

Reference Books

[16] User manual, Adash 4400 VA4Pro, Ver.2.27 - April 24, 2014

[17] Mechanical Vibrations, S. S. Rao, Fourth edition, 2006
[18] J. N. Reddy, "Introduction to Finite Element Method", Third edition., TATA mcgraw Hill Publishers
[19] Machine Design, R. S. Khurmi, J. K. Gupta S Chand Publication, 2010

Web Sites

[20] https://en.wikipedia.org
[21] https://sites.google.com/site/.../dual-mass flywheel
[22] www.luk.co.uk/content.
[23] spareshub.com/ sachs-dual-mass-flywheel

Proceedings of "National Conference on Emerging Trends in Science and Advances in Engineering"
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A NOTE ON PSEUDO SYMMETRIC IDEALS OF PARTIALLY ORDERED TERNARY SEMIGROUPS

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Abstract
In this article, we study some interesting properties of pseudo symmetric ideals and prime pseudo symmetric ideals in partially ordered ternary semigroup.

Keywords: Partially ordered ternary semigroup, pseudo symmetric ideal, prime pseudo symmetric ideals.

2020 Mathematics Subject Classification: 06F99, 20M12, 20N99.

Introduction

Lehmer D. H. [3] studied the triplexes algebraic systems for commutative ternary groups. The ideal theory of n-ary semigroups and ternary semigroup was introduced by Sioson F. M. [5] in 1965. Dixit V. N. and Dewan S. [7] studied the properties of quasi-ideals and bi-ideals in ternary semigroups. Iampan A. [1, 2] has developed the theory of ordered ternary semigroups along the line of the theory of ordered semigroups and ternary semigroups. Daddi V. R. and Pawar Y. S. [8] defined the notion of an ordered quasi-ideal and an ordered bi-ideal in an ordered ternary semigroup. In 2014, Siva Rami Reddy V. et al. [9, 10] have established the ideal theory of a partially ordered ternary semigroup. They also defined and studied the notions of complete prime ideals, prime ideals, complete semiprime ideals and semiprime ideals of partially ordered ternary semigroups. Jyothi V. et al. in [6] introduced the notion of semipseudo symmetric ideals and pseudo symmetric ideals of partially ordered ternary semigroups. The notions of prime, semiprime pseudo symmetric ideals and irreducible pseudo symmetric ideals of partially ordered ternary semigroups is defined by Shinde D. N. and Gophane M. T in [4].

Preliminaries

A non-empty set T with a ternary operation $[\ ]: T \times T \times T \to T$ is called a ternary semigroup [3] if $[\ ]$ satisfies the associative law, $[p\,q\,r\,s\,t\,] = [\,[\,p\,q\,r\,]\,s\,t\,] = [\,p\,[\,q\,r\,s\,]\,t\,] = [\,p\,q\,[\,r\,s\,t\,]\,]$, for all $p, q, r, s, t \in T$.
For non-empty subsets X, Y and Z of a ternary semigroup T, $[XYZ] = \{[xyz]: x \in X, y \in Y \text{ and } z \in Z\}$. For easiness, we write, $[XYZ]$ as XYZ, $[xyz] = xyz$ and $[XXX] = X^3$.
A ternary semigroup T is said to be a partially ordered ternary semigroup [1] if there exist a partially ordered relation $\leq$ on T such that, $a \leq b \Rightarrow xya \leq xyb, xay \leq xby, axy \leq$

bxy for all $a, b, x, y \in T$. In this article, we write T for a partially ordered ternary semigroup, unless otherwise specified.
A partially ordered ternary semigroup T is said to be commutative [2] if $xyz = zxy = yzx = yxz = zyx = xzy$, for all $x, y, z \in T$.
Let X be a non-empty subset of T. We denote, $\{t \in T : t \leq x, \text{for some } x \in X\}$ by $(X]$.
A non-empty subset I of T is said to be a left (respectively, right, lateral) ideal [8] of T if $TTI \subseteq I$ (respectively, $ITT \subseteq I, TIT \subseteq I$) and $(I] = I$. A non-empty subset I of T is said to be ideal [8] of T if it is a left ideal, a right ideal and a lateral ideal of T.
An ideal I of T is said to be a pseudo symmetric ideal [6] if $x, y, z \in T, xyz \in I$ implies $xsytz \in I \; \forall \; s, t \in T$. A pseudo symmetric ideal I of T is said to be proper pseudo symmetric ideal of T if it different from T.
A proper pseudo symmetric ideal I of T is said to be a prime pseudo symmetric ideal [4] of T if $I_1 I_2 I_3 \subseteq I \Rightarrow I_1 \subseteq I$ or $I_2 \subseteq I$ or $I_3 \subseteq I$ where I_1, I_2, I_3 are pseudo symmetric ideals of T.

Result: [8] Let A, B and C be non-empty subset of T then the following statements hold,
(1) $A \subseteq (A]$.
(2) $((A]] = (A]$.
(3) $(A](B](C] \subseteq (ABC]$.
(4) If $A \subseteq B$ then $(A] \subseteq (B]$.

Main Results:

Pseudo Symmetric Ideals

Theorem 1: If I_1 and I_2 are two pseudo symmetric ideal of T then $I_1 \cap I_2$ is also pseudo symmetric ideal of T, provided $I_1 \cap I_2 \neq \emptyset$.

Proof: Since I_1 and I_2 are ideal of T. So, $I_1 \cap I_2$ is ideal of T. Let $xyz \in I_1 \cap I_2 \; \forall \; x, y, z \in T \Rightarrow xyz \in I_1$ & $xyz \in I_2$. If $xyz \in I_1$ and I_1 is pseudo symmetric ideal of T then $xsytz \in I_1 \; \forall \; s, t \in T$. If $xyz \in I_2$ and I_2 is pseudo symmetric ideal of T then $xsytz \in I_2 \; \forall \; s, t \in T$. So, $xsytz \in I_1 \cap I_2$. Hence $I_1 \cap I_2$ is a pseudo symmetric ideal of T.

Theorem 2: Arbitrary intersection of pseudo symmetric ideal of T is a pseudo symmetric ideal of T, provided it is non-empty.

Proof: Let $\{I_i\}_{i \in \Delta}$ be a family of pseudo symmetric ideals of T. Let $I = \bigcap_{i \in \Delta} I_i \neq \emptyset$, be the intersection of this family of T. Here I is an ideal. Let $xyz \in I \; \forall \; x, y, z \in T \Rightarrow xyz \in I_i, i \in \Delta$ and I_i is pseudo symmetric ideal of T then $xsytz \in I_i, i \in \Delta \; \forall \; s, t \in T \Rightarrow xsytz \in \bigcap_{i \in \Delta} I_i \; , \; \forall \; s, t \in T \Rightarrow xsytz \in I \; \forall \; s, t \in T$. Hence I is a pseudo symmetric ideal of T.

Theorem 3: If I_1 and I_2 are two pseudo symmetric ideal of partially ordered ternary semigroup T then $I_1 \cup I_2$ is also pseudo symmetric ideal of T.

Proof: Since, I_1 and I_2 are ideal of T. So, $I_1 \cup I_2$ is ideal of T. Let $xyz \in I_1 \cup I_2 \; \forall \; x, y, z \in T \Rightarrow$ either $xyz \in I_1$ or $xyz \in I_2$. If $xyz \in I_1$ and I_1 is pseudo symmetric ideal of T then $xsytz \in I_1 \; \forall \; s, t \in T \Rightarrow xsytz \in I_1 \cup I_2$. If $xyz \in I_2$ and I_2 is pseudo symmetric ideal of T then $\in I_2 \; \forall \; s, t \in T \Rightarrow \quad xsytz \in I_1 \cup I_2$. Hence $I_1 \cup I_2$ is a pseudo symmetric ideal of T.

Theorem 4: Arbitrary union of pseudo symmetric ideal of T is a pseudo symmetric ideal of T.

Proof: Let $\{I_i\}_{i \in \Delta}$ be a family of pseudo symmetric ideals of T. Let $I = \bigcup_{i \in \Delta} I_i$ be the union of this family of pseudo symmetric ideal of T. Hence I is an ideal of T. Now, let $xyz \in I \; \forall \; x, y, z \in T \Rightarrow xyz \in I_i$ for some $i \in \Delta$ and I_i is pseudo symmetric ideal of T then $xsytz \in I_i$ for some $i \in \Delta \; \forall \; s, t \in T \Rightarrow xsytz \in \bigcup_{i \in \Delta} I_i \quad \forall \; s, t \in T \; xsytz \in I \; \forall \; s, t \in T$. Hence I is a pseudo symmetric ideal of T.

Theorem 5: The collection of all pseudo symmetric ideals of partially ordered ternary semigroup T forms a poset with respect to the partial ordering relation $\subseteq$.

Proof: Let $\mathcal{I} = \{I_i \; / \; i \in \Delta, \; \Delta \text{ is any indexing set}\}$ be a family of all pseudo symmetric ideals of partially ordered ternary semigroup T.
(1) Reflexive- For any $I_i \in \mathcal{I}, i \in \Delta, \; I_i \subseteq I_i \Longrightarrow \subseteq$ is reflexive.
(2) Antisymmetric- For any $I_i, I_j \in \mathcal{I}$ and $i, j \in \Delta$. If $I_i \subseteq I_j, I_j \subseteq I_i$ then $I_i = I_j \Longrightarrow \subseteq$ is antisymmetric.
(3) Transitive- For any $I_i, I_j, I_k \in \mathcal{I}$ and $i, j, k \in \Delta$. If $I_i \subseteq I_j, I_j \subseteq I_k$then $I_i \subseteq I_k \Longrightarrow \subseteq$ is transitive. Therefore $\mathcal{I}$ forms a poset.

Theorem 6: Let I be an ideal of commutative partially ordered ternary semigroup T, then I is a pseudo symmetric ideal.

Proof: Let T be the commutative partially ordered ternary semigroup and I be any ideal of T. Let $x, y, z \in T, \; xyz \in I$ and $s, t \in T$ then $xsytz = \; xystz = xyszt = xyzst = (xyz)st \in ITT \subseteq I \Longrightarrow xsytz \in I$. Hence I is a pseudo symmetric ideal of T.

Corollary 7: If I is an ideal of commutative partially ordered ternary semigroup T then $(I]$ is a pseudo symmetric ideal of T.

Note: In a commutative partially ordered ternary semigroup, a left, a right and a lateral ideal coincide.

Theorem 8: The intersection of a left, a right and a lateral ideal of commutative partially ordered ternary semigroup T is a pseudo symmetric ideal of T.

Proof: According to above note, a left, a right and a lateral ideal are coinciding and every ideal of commutative partially ordered ternary semigroup is pseudo symmetric ideal.

Theorem 8: If I is an ideal of T and P is a pseudo symmetric ideal of T, then $I \cap P$ is a pseudo symmetric ideal of I, providing I as a partially ordered ternary semigroup.

Proof: Since, I is an ideal of T and P is a pseudo symmetric ideal of T then $I \cap P$ is an ideal of I. Let $x, y, z \in I, xyz \in I \cap P \Longrightarrow xyz \in I$ and $xyz \in P$. If $xyz \in I$ and I is an ideal of T then, for all $s, t \in I$, consider $xsytz = (xsy)tz \in III \subseteq I$ (since I is an ideal of T) $\Longrightarrow xsytz \in I$. If $xyz \in P$ and P is a pseudo symmetric ideal of T then, for all $s, t \in I \subseteq T \Longrightarrow xsytz \in P \; \forall \; s, t \in T$. Therefore $xsytz \in I \cap P$. Hence $I \cap P$ is a pseudo symmetric ideal of I.

Theorem: Every pseudo symmetric ideal of T is a bi- ideal of T.

Proof: Let I be a pseudo symmetric ideal of T. Consider $ITITI = I(TIT)I \subseteq III \subseteq TTI \subseteq I$ (since I is a pseudo symmetric ideal of T) and $(I] \subseteq I$. Hence, I is a bi- ideal of T.

Theorem: Every pseudo symmetric ideal of T is a quasi- ideal of T.

Proof: Let I be a pseudo symmetric ideal of T. Consider $(TTI] \cap (TIT \cup TTITT] \cap (ITT] \subseteq (I] \cap (I] \cap (I] = (I] \subseteq I$. Therefore $(TTI] \cap (TIT \cup TTITT] \cap (ITT] \subseteq I$ and $(I] \subseteq I$ (since I is a pseudo symmetric ideal of T). Hence I is quasi- ideal of T.

Prime Pseudo Symmetric Ideals

Theorem: A proper pseudo symmetric ideal I of T is prime if and only if $I_1, I_2, I_3, \ldots \ldots, I_n$ are pseudo symmetric ideals of T, where n is an odd natural number, $I_1\, I_2\, I_3 \ldots \ldots I_n \subseteq I$ implies $I_i \subseteq I$ for some $i = 1, 2, 3, \ldots \ldots, n$.

Proof: Suppose I is a prime pseudo symmetric ideal of T. Let $I_1, I_2, I_3, \ldots \ldots, I_n$ be pseudo symmetric ideals of T such that $I_1 I_2 I_3 \ldots \ldots I_n \subseteq I$, where n is an odd natural number.
If $n = 1$ then $I_1 \subseteq I$.
If $n = 3$ then $I_1 I_2 I_3 \subseteq I \Rightarrow I_1 \subseteq I$ or $I_2 \subseteq I$ or $I_3 \subseteq I$ (since I is a prime pseudo symmetric ideal of T). Hence $I_i \subseteq I$ for some $i = 1, 2, 3$.
If $n = 5$ then $I_1 I_2 I_3 I_4 I_5 \subseteq I \Rightarrow I_1 I_2 I_3 \subseteq I$ or $I_4 \subseteq I$ or $I_5 \subseteq I \Rightarrow I_1 \subseteq I$ or $I_2 \subseteq I$ or $I_3 \subseteq I$ or $I_4 \subseteq I$ or $I_5 \subseteq I$ (since I is a prime pseudo symmetric ideal of T). Hence $I_i \subseteq I$ for some $i = 1, 2, 3, 4, 5$.
Therefore, by induction on n, $I_1 I_2 I_3 \ldots \ldots I_n \subseteq I \Rightarrow I_i \subseteq I$ for some $i = 1, 2, 3, \ldots \ldots, n$.
Conversely, let $I_1, I_2, I_3, \ldots \ldots, I_n$ be pseudo symmetric ideals of T, where n is an odd natural number such that $I_1 I_2 I_3 \ldots \ldots I_n \subseteq I \Rightarrow I_i \subseteq I$ for some $i = 1, 2, 3, \ldots \ldots, n$. By the definition of prime pseudo symmetric ideal, I is a prime pseudo symmetric ideal of T.

Definition: [4] A proper pseudo symmetric ideal I of T is said to be a maximal pseudo symmetric ideal of T if I is not properly contained in any proper pseudo symmetric ideal of T.

Theorem: If T is a partially ordered ternary semigroup such that $T^3 = T$ then every maximal pseudo symmetric ideal of T is a prime pseudo symmetric ideal of T.

Proof: Let I be a maximal pseudo symmetric ideal of T. Let I_1, I_2 and I_3 be pseudo symmetric ideals of T such that $I_1\, I_2\, I_3 \subseteq I$. Suppose that $I_1 \nsubseteq I$, $I_2 \nsubseteq I$, $I_3 \nsubseteq I$. If

$I_1 \nsubseteq I \Rightarrow I_1 \cup I$ is a pseudo symmetric ideal of T and $I \subset I_1 \cup I \subseteq T$. Since I is a maximal pseudo symmetric ideal of T, $I_1 \cup I = T$. Similarly, we can prove that $I_2 \cup I = T$ and $I_3 \cup I = T$. Now, $T = T^3 = TTT = (I_1 \cup I)(I_2 \cup I)(I_3 \cup I) \subseteq I \Rightarrow T \subseteq I$. Thus $I = T$. Which is contradiction. Therefore either $I_1 \subseteq I$ or $I_2 \subseteq I$ or $I_3 \subseteq I$. Hence I is a prime pseudo symmetric ideal of T.

Reference

[1] Iampan, A. (2009). Characterizing the minimality and maximality of ordered lateral ideals in ordered ternary semigroups, *J. Korean Math. Soc.*, 46, 775-784.

[2] Iampan, A. (2010). On ordered ideal extensions of ordered ternary semigroups, *Lobachevskii J. Math*., 31 (1), 13-17

[3] Lehmer, D. H. (1932). A ternary analogue of abelian groups, *Amer. J. Math.,* 54, 329-338.

[4] Shinde, D. N., and Gophane, M. T. (2022). On irreducible pseudo symmetric ideals of a partially ordered ternary semigroup, *Quasigroups and Related Systems*, 30 (1), 169-180.

[5] Sioson F. M. (1965). Ideal theory in ternary semigroups, *Math. Japan*, 10, 63-84.

[6] Jyothi, V., Sarala, Y., and Madhusudhana Rao, D. (2014). Semipseudo symmetric ideals in partially ordered ternary semigroups, *Inter. J. Innovative Research and Development*, 3 (4), 386-393.

[7] Dixit, V. N., and Dewan, S. (1995). A note on quasi and bi-ideals in ternary semigroups, *Int. J. Math. Math. Sci.,* 18 (3), 501-508.

[8] Daddi, V. R., and Pawar, Y. S. (2012). On ordered ternary semigroups, *Kyungpook Math. J.*, 52 (4), 375-381.

[9] Siva Rami Reddy, V., Sambasiva Rao, V., Anjaneyulu, A., and Gangadhara Rao, A. (2014). Ideals in partially ordered ternary semigroups, *Inter. J. Math. Sci., Technology and Humanities*, 110, 1177-1194.

[10] Siva Rami Reddy, V., Sambasiva Rao, V., Anjaneyulu, A., and Gangadhara Rao, A. (2014), Complete prime po ideals and prime po ideals in po ternary semigroups, *Inter. Research J. Pure Algebra*, 4 (3), 457-470.

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Forging Die Design for Camshaft

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Abstract
Forging is a fundamental manufacturing technique. It establishes the mechanical qualities of the part in the initial stage of manufacture because it is a primary metal forming process. The forging industry is essential in the automotive industry. Many forged parts are required in many sectors to preserve product quality, shorten development cycle times, and reduce forging part production costs. Another issue is the waste of forging material as a result of the quicker production rate and complex shape. Camshaft yield rate is currently 58.5%. Optimise the process design of the camshaft die and control the camshaft yield %. In addition, the input weight for camshaft forging is to be reduced by forging die design improvements, which will result in increased production rate and lower part cost. As a result, the entire cost of the process and camshaft will be reduced.ent, which will result in increasing the production rate and decrease in the cost of the part. This will lead to reduce overall cost of the process and camshaft.

Keywords— Die Forging, Camshaft, Yield.

1. Introduction

Nowadays, it is critical for manufacturing organisations to acquire the ability to create and produce a wide range of high-quality items in a short period of time. Quickly releasing a new product into the market ahead of competition is critical for capturing a larger percentage of the market share and increasing profit margins. Because of the consumer need for variety, batch production, producers must design flexible manufacturing processes to enable a quick turnaround in product development. The primary goal of forging is to shape metal while still maintaining product quality, reducing development cycle times, and lowering forging part production costs. Increase the rate of creation of complex shapes with

Faek Diko B eng *et al*. Illustrate the metal simulation flow. It also studied the die design methodology using the CAD software. As well as it describes a PC-based interactive CAD system for closed die forging design. This system includes the facilities for drawing the die geometry, simulation of the deformation process and dies analysis under forming conditions [1].

T. Altan *et al*. explain the procedure of impression die forging. The design of any forging process begins with the geometry of the finished part. Consideration is given to the shape of the part, the material to be forged, the type of forging equipment to be used, the number of parts to be forged, the application of the part, and the overall economy of the process being designed. The finisher die is then designed with allowances added for flash, draft, shrinkage, fillet and corner radii, and positioning of the parting line. When using multistage forging, shapes of the die performs are selected, the blocker dies are designed, and the initial billet geometry is determined. In making these selections, we consider the design parameters such as grain flow, parting line, flash dimensions, draft angles, fillet and corner radii for design purpose [2].

Nikolai Biba *et al*. studied the development of forging simulation software has initiated the problem of its cost effective implementation in a forging company. This paper presents an approach to this issue based on experience gained through the development of the software, and long term collaboration with the forging industry in everyday practical work. The effectiveness is based on advanced user friendliness of the simulation software and its application to wide range of problems. This include the precise control of material flow during forming, material savings, increasing tool life by means of optimisation of pre stressed dies and the development of profiled dies that compensate for the elastic deformation of the tooling set. Special attention is paid to prediction of forging defects and finding ways to eliminate them. Also in this paper different simulation advantage are highlighted [3].

A.Cherouat *et al*. studied the numerical methodology developed in order to improve the cold 3D forging process with respect to the ductile damage occurrence. In this paper methodology is based on advanced constitutive equations accounting for the “strong” coupling between the elastic plastic behavior, and also the mixed isotropic and kinematic hardening and the isotropic ductile damage. Studied the mechanical and numerical aspects related to the associated initial and boundary values problem are briefly outlined. Application is made to be the cold forging of a 3D part by studying the influence of the material ductility as well as the friction nature between the part and the die on the damage occurrence [4].

Aktakka *et al*. in this study analyse the warm forging process, this process is strongly affected by the process temperature. In hot forging process, a wide range of materials can be used and even complex geometries can be formed. However in cold forging, only low carbon steels as ferrous material with simple geometries can be forged and high capacity forging machinery is required. Also the warm forging compromise the advantages and disadvantages of hot and cold forging processes. In this paper warm forging process, a product having better tolerances can be produced compared to hot forging process and a large range of materials can be forged compared to cold forging process [5].

Camshaft is utilised in the automotive industry, the goal of our effort is likewise related to the automotive industry. The customer desires a high-quality product at a low cost. The goal is to improve the yield %, forging weight ratio, press load, manufacturing pace, and overall price of the component. Improvements to the aforementioned point by die design and switching from horizontal to vertical forging.

2. Problem definition

Camshaft yield percentage for the present die design is 58.5%. The process design of the camshaft die is optimised, and the camshaft yield percentage is controlled. Additionally, the forging die design should be improved to reduce the input weight for the forging of the camshaft, which will increase production and lower the part's cost. This will result in a decrease in the process' total cost and camshaft cost.

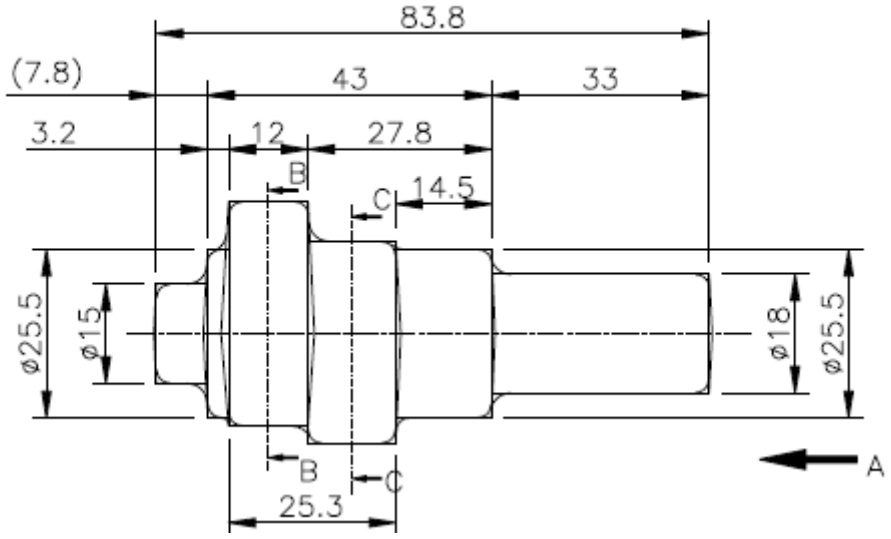

Figure 1: Horizontal Die Forging Process of Camshaft

2.1 Justification of problem selection

Table1. Horizontal Forging Process Parameters

Sr. No	Parameter	Ingot 1	Ingot 2	Ingot 3
1	Ingot Weight	0.400 kg	0.450 kg	0.500 kg
2	Ingot Diameter	38 mm	38 mm	38 mm
3	Ingot Area	1134.11 mm^2	1134.11 mm^2	1134.11 mm^2
4	Ingot Length	44.87 mm	50.48 mm	56.09 mm
5	Ingot Volume	50887.5 m^3	57249.87 m^3	63612.22 m^3
6	Ingot Temperature	700 – 750 ^0C	700 – 750 ^0C	700 – 750 ^0C
7	Press Load	250 ton	250 ton	250 ton
8	Die Contact	Under filling	Under filling	Filling

Different types of ingots simulated on SIMUFACT software then following results were obtained.

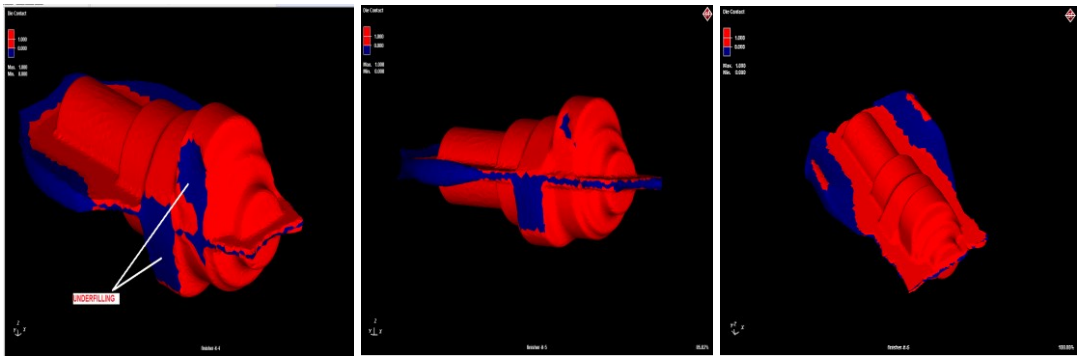

Figure 2: Simulation of Horizontal Die Forging Process for 0.400 kg, 0.450 kg, 0.500 kg Respectively

For ingot 0.400 kg

In existing forging process (horizontal forging process) yield % is the ratio of net weight to gross weight.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.31 kg

Gross weight = Cut weight × 1.06

= 0.4×1.06

=0.424 kg.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Yield % = 72 %

As per the simulation of the ingot 0.400 kg yield percentage is 72 %. But final result is under filling of the die cavity. We compare this result with other results thus this ingot is not suitable for this process.

For 0.450 kg Ingot

In existing forging process (horizontal forging process) yield % is the ratio of net weight to gross weight.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.31 kg

Gross weight = Cut weight × 1.06

= 0.45×1.06

=0.477 kg.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Yield % = 64.98 %

As per the simulation of the ingot 0.450 kg yield percentage is 64.98 %. But final result is under filling of the die cavity. We compare this result with other results thus this ingot is not suitable for this process.

For 0.500 kg Ingot

In existing forging process (horizontal forging process) yield % is the ratio of net weight to gross weight.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.31 kg

Gross weight = Cut weight × 1.06

= 0.5×1.06

=0.53 kg.

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

$$\text{Yield\%} = \frac{0.50}{0.53} \times 100$$

Yield % = 58.5 %

As per the simulation of the ingot 0.500 kg yield percentage is 58.5 %. But final result is filling of the die cavity. We compare this result with other results then thus ingot is suitable for this process.

3. Methodology

3.1 Die Set

Figure 3: Actual Die Tooling

In Figure 3: die is the specialised tool used in this research work. Die is a special tool used for shaping the material mostly using a press. In this research work die is given the desired shape of camshaft. In Figure 3: upper halves and lower halve of die are shown in respectively. Lower halve is fix on the press with the help of fixture and upper halve moves upward to downward and vice versa in the press.

3.2 Ingot

Figure 4: Actual Ingot

In Figure 4: this ingot is used in actual camshaft forging process. This ingot is shaped with the help of die and mechanical press. When applying pressure on die automatically pressure acts on the ingot and then ingot takes the desired shape of die. Following consideration is important at the time of ingot selection.

3.3 Mechanical Press

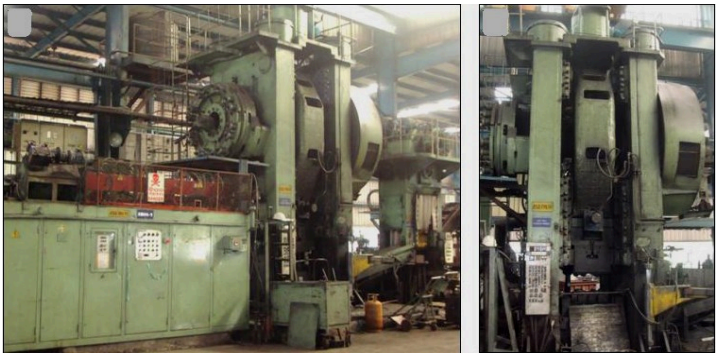

Figure 5: 600T Mechanical Press

The actual trial was taken at the forging division of M/s Siddeshwar Ind. Pvt. Ltd, Pune. Mechanical cranked press of capacity 600T was used for the forging operation. The Figure 5: shows the setup of 600T mechanical press. The inline induction heating arrangement was used for heating the ingot to required temperature.

3.4. Induction Heater

Figure 6: Inline Induction Heater

In Figure 6: The inline induction heating arrangement is used for heating the billet to required temperature. The billet heating temperature range is 700 – 750 ^{0}C which is related to warm forging process. Induction heating is a non contact method of heating a conductive body by utilising a strong magnetic field. Supply frequency 50 Hz - 60 Hz induction heaters incorporate a coil directly fed from the electric supply, typically for lower power industrial applications where lower surface temperatures are required.

3.5 SIMUFACT Software

SIMUFACT is internationally operating software, whose head quartered is located at Hamburg, Germany. Software is used for the design and optimization of manufacturing processes my means of process simulation. Use of the SIMUFACT software to compare the simulation results of horizontal die forging process and vertical die forging process. Such as yield percentage, input forging weight, gross weight and trimming press load.

4. Modelling of forging die

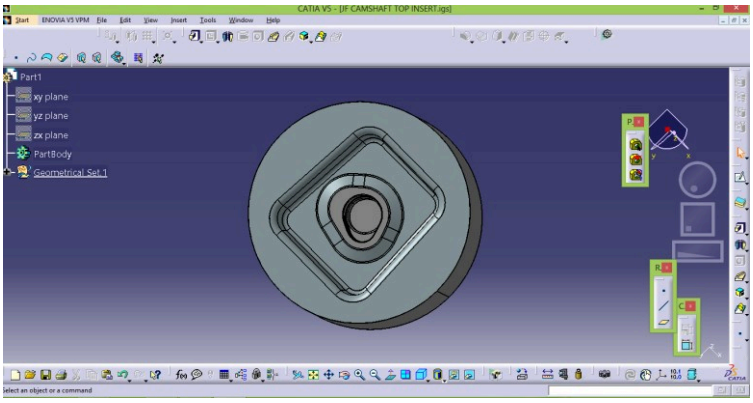

Figure 7: Modelling of Camshaft Forging Die Top Insert in CATIA V5 Software

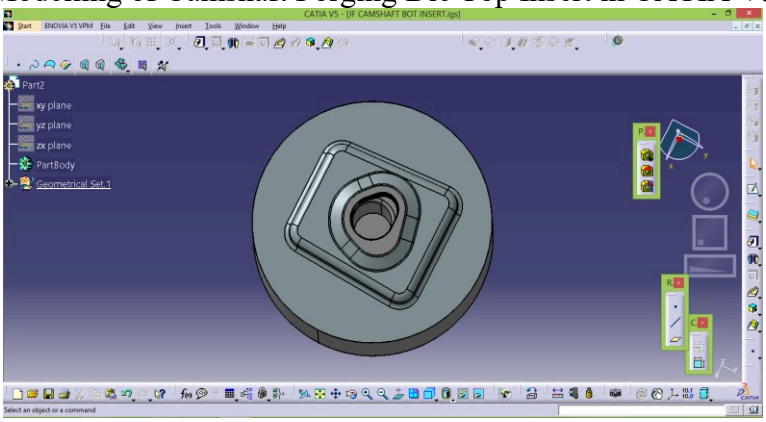

Figure 8: Modelling of Camshaft Forging Die Bottom Insert in CATIA V5 Software.

In Figure 7: and Figure 8: shows the modelling of camshaft forging die with top and bottom insert respectively. These models dimensions are as per the component dimensions in given above component drawing. Show the design of die model in CATIA V5 software in Figure 7: and Figure 8: respectively.

3. Results and Discussion

Vertical Forging Process

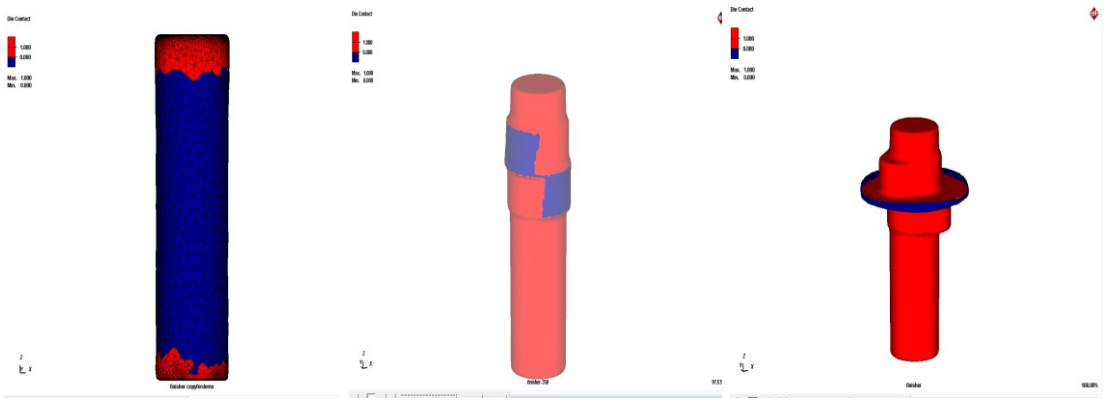

Figure 9: Simulation of Vertical Die Forging Process for 0.300 kg, 0.350 kg, 0.400 kg Respectively

For 0.300 kg Ingot

In improved forging process (vertical process) yield % is the ratio of net weight to gross weight

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.36 kg

Gross weight = Cut weight × 1.06 kg

= 0.3× 1.06

= 0.318 kg

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Yield % = 113.20 %

As per the simulation of the ingot 0.300 kg yield percentage is 113.20 %. But final result is under filling of the die cavity. We compare this result with other results then thus ingot is not suitable for this process.

For 0.350 kg Ingot

In improved forging process (vertical process) yield % is the ratio of net weight to gross weight

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.36 kg

Gross weight = Cut weight × 1.06 kg

= 0.35× 1.06

= 0.37 kg

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Yield % = 97.29%

As per the simulation of the ingot 0.350 kg yield percentage is 97.29%. But final result is under filling of the die cavity. We compare this result with other results then thus ingot is not suitable for this process.

For 0.400 kg Ingot

In improved forging process (vertical process) yield % is the ratio of net weight to gross weight

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Net weight = 0.36 kg

Gross weight = Cut weight × 1.06 kg

= 0.4× 1.06

= 0.43 kg

$$\text{Yield\%} = \frac{\text{Net Wt.}}{\text{Gross Wt.}} \times 100$$

Yield % = 83.72%

As per the simulation of the ingot 0.400 kg yield percentage is 83.72. But final result is filling of the die cavity. We compare this result with other results then thus ingot is suitable for this process.

5. Conclusion

Yield Increased by 25.2%, from 58.5% to 83.72%. Since the yield % is based on the ingot's ratio of net weight to gross weight. As a result, we optimise the ratio and raise the process' yield %. Reduce the weight of the input forging from 0.500 kg to 0.400 kg. Given the length requirement and the raw materials cross section of 38, the input gross weight for the horizontal process is 0.500 kg. Given the requirement for length and the raw materials cross section of 24, the input gross weight for the vertical forging process is 0.400 kg.

Acknowledgement

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References

[1] Faek Diko B eng, M Eng.(1992). Metal flow simulation and design of dies, *Scientific studies and research center Damascus Syria,* 237, pp. 1- 237.

[2] T. Altan, M. Shirgaokar. (2000). Process design in impression dies forging, *Technol*, 98, pp. 1-12.

[3] Nikolai Biba, Sergei Stebounov, Andrei Lishiny. (2001). Cost effective Implementation of forging simulation, *Material Processing Technology*113, pp. 34- 39.

[4] A. Cherouat, k. Saanouni, Y. Hammi. (2003). Improvement of forging process of a 3D complex part with respect to damage occurrence, *Material Processing Technology,* 142, pp. 307- 317.
[5] Gulgun Aktakka. (2006). Analysis of warm forging process, *Natural and applied sciences,* 99, pp. 1-99.

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Smart Alert System for Drowsy Driver Detection System using AI

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Abstract
Drowsy driving is a significant cause of road accidents worldwide, posing a serious threat to driver safety and public well-being. To address this issue, this paper introduces an AI-based smart alert system designed to detect drowsy drivers and provide timely warnings to prevent potential accidents. The proposed system utilizes advanced machine learning techniques to analyze driver behavior, facial expressions, and physiological signals to accurately identify signs of drowsiness. By leveraging real-time data processing and intelligent algorithms, the system can promptly detect drowsiness indicators and activate appropriate alerts, ensuring driver attentiveness and mitigating potential risks. Experimental results demonstrate the effectiveness and reliability of the proposed AI-based smart alert system in enhancing road safety and reducing the occurrence of accidents due to drowsy driving

Introduction
Drowsy driving is a prevalent problem that contributes to numerous road accidents worldwide. Fatigue, lack of sleep, and extended driving periods significantly impair a driver's ability to concentrate, react promptly, and make informed decisions, making drowsy driving a grave concern for road safety. Traditional approaches, such as relying solely on driver self-assessment or time-based rest recommendations, are often inadequate in preventing accidents caused by drowsiness. Therefore, the development of an AI-based smart alert system capable of accurately detecting drowsiness in real-time can provide an effective solution to mitigate this issue.

The primary objective of this research is to design and implement an AI-based smart alert system for drowsy driver detection. The system aims to:Analyze various driver parameters, including facial expressions, eye movements, and physiological signals, to accurately assess drowsiness levels.

Utilize advanced machine learning algorithms to classify drowsiness indicators and differentiate them from normal driving behavior. Provide timely and customized alerts to drivers when drowsiness is detected, effectively preventing accidents caused by drowsy driving. Enhance road safety and reduce the occurrence of accidents through proactive detection and intervention.

Data Collection to train and validate the AI-based smart alert system, a comprehensive dataset comprising various driver attributes and driving scenarios is collected. The dataset includes video recordings of drivers' facial expressions and eye movements, along with physiological signals such as heart rate and electroencephalogram (EEG) measurements. Data is collected during both simulated and real-world driving conditions to ensure the system's robustness and adaptability.

The collected data undergoes preprocessing and feature extraction to identify relevant attributes for drowsiness detection. Facial landmarks, eye closure patterns, gaze direction, and physiological signals are extracted using computer vision and signal processing

techniques. Statistical, frequency domain, and time-frequency analysis methods are employed to derive discriminative features that characterize drowsy and alert states.

Various machine learning algorithms, including deep neural networks, support vector machines, and decision trees, are explored to classify the extracted features and distinguish between drowsiness and wakefulness states. The algorithms are trained using labeled data and optimized through cross- validation to achieve high accuracy and reliability.

Literature Survey

1] Driver Drowsiness Detection System andTechniques: A Review [3]Drowsiness detection can be divided into three main categories1 Vehicle based2 Behavioural based 3 Physiological based.shows the three different approaches for drowsiness detection. Drowsiness detection is based on these three parameters. A detailed review on these measures will provide insight on the present systems, issues associated with them and the enhancements that need to be done to make a robust system.

[2]Drowsiness Detection of a Driver using Conventional Computer Vision Application In the proposed work, Smart Vehicle System (SVS) is implemented to detect the drowsiness and fatigue of a driver in real-time based on the image captured. The work is based on behavior analysis, high end camera installation and conventional algorithm to detect the possible coordinate to identify eyes and mouth. Existing state of art methods are computationally complex as compare to our proposed method.

[3]Real-Time Driver-Drowsiness Detection System Us-ing Facial Features WANGHUA DENG1 AND RUOXUE WU

[4]We propose a novel system for evaluating the driver's level of fatigue based on face tracking and facial key point detec- tion. We design a new algorithm and propose the MC-KCF algorithm to track the driver's face using CNN and MTCNN to im- prove the original KCF algorithm. We define the facial regions of detection based on facial key points. Moreover, we introduce a new evaluation method for drowsi- ness based on the states of the eyes and mouth.

[5]The proposed system in this analysis provides accurate detection of driver fatigue. The analysis and design of driver drowsiness detection system is presented. The proposed system is used to avoid various road accidents caused by drowsy drivingand it can also help drivers to stay awake when driving by giving a warning when the driver is sleepy. And also this system used for security purpose of a driver.

Advantages

1. Accurate Drowsiness Detection: The AI-based smart alert system employs machine learning algorithms that can accurately identify signs of drowsiness, such as eye closure, head nodding, and erratic driving behavior. It can distinguish between normal driving patterns and drowsy driving, ensuring reliable detection.
2. Real-Time Monitoring: The system continuously monitors the driver's behavior and physiological indicators in real time. This enables instant detection of drowsiness, allowing for immediate intervention to prevent accidents.
3. Customizable Alert Mechanisms: The system offers flexible alert mechanisms tailored to individual drivers. It can adapt to different sensitivity levels based on driver preferences, ensuring personalized and effective alerts.
4. Non-Intrusive Technology: The AI-based system utilizes non-intrusive sensors, such as infrared cameras, steering wheel sensors, and facial recognition, to gather data on driver behavior. This ensures driver comfort and eliminates the need for wearable devices or

invasive sensors.

5. Enhanced Safety Measures: By detecting drowsy driving in real time, the system can significantly enhance road safety. It provides proactive alerts, helping drivers remain alert and responsive, thereby reducing the risk of accidents caused by fatigue.

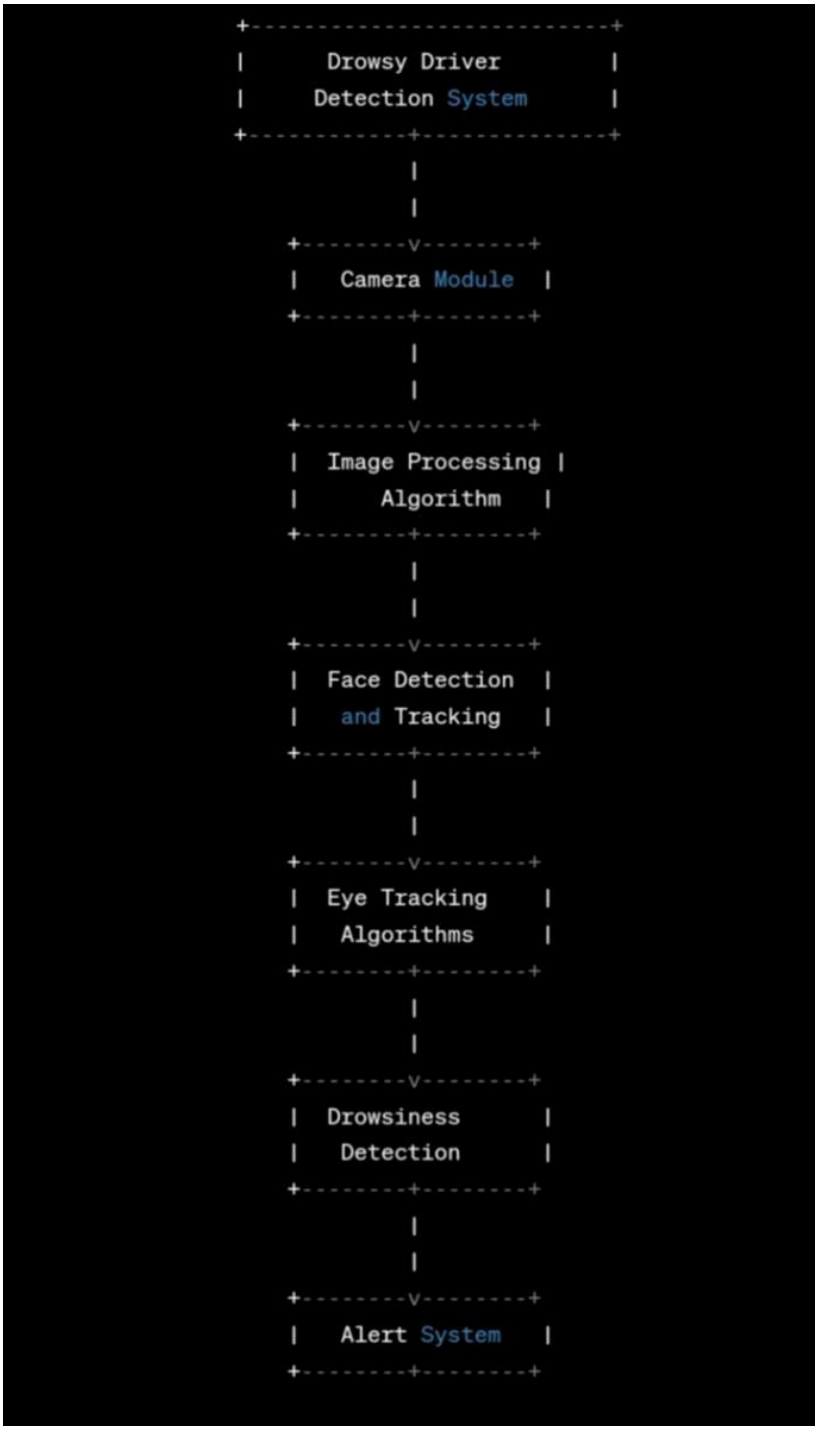

Figure 1: Block diagram of AI Base smart alert system for drowsy driver detection system.

Application

1. Automotive Industry: The AI-based smart alert system can be integrated into vehicles, offering an additional safety feature for both private and commercial vehicles. It can be deployed in cars, buses, trucks, and taxis, ensuring driver safety and preventing accidents due to drowsiness.
2. Fleet Management: Fleet management companies can benefit from the system by incorporating it into their vehicles. This helps ensure the safety of their drivers and minimizes the risk of accidents, improving overall fleet efficiency.
3. Transportation Networks: Public transportation systems, such as trains and buses, can implement the AI-based smart alert system to detect drowsy drivers among their staff. This ensures the safety of passengers and prevents incidents caused by driver fatigue.
4. Ride-Sharing Services: Ride-sharing platforms can integrate the system to monitor the alertness of their drivers. It helps maintain a high level of service quality and safety, ensuring a positive experience for passengers.
5. Heavy Machinery and Industrial Vehicles: Industries involving heavy machinery and vehicles, such as construction, mining, and logistics, can implement the smart alert system to detect drowsiness in equipment operators.This helps prevent accidents and ensures the safety of workers in hazardous environments.

Conclusion

The paper concludes by summarizing the advantages of AI- based smart alert systems for drowsy driver detection and their wide-ranging applications. It emphasizes the potential of these systems in improving road safety and reducing accidents caused by driver drowsiness. The importance of continued research and development in this field is highlighted.

References

[1] Perez, Claudio A. et al., (2001). “Face and Eye Tracking Algorithm Based on Digital Image Processing”, IEEE System, Man and Cybernetics 2001 Con-ference, vol. 2, pp1178-1188.

[2] S. Singh. and N. P. Fapanikolopaulas (1999), “Monitoring Driver Fatigue Using Facial Analysis Technologies”, IEEE International conference on theIntelligent Transportation Systems. pp.316-318.

[3] Perez, Claudio A. et al., (2001). “Face and Eye Tracking Algorithm Based on Digital Image Processing”, IEEE Systems, Man and Cybernetics 2001 Conference, vol. 2, ep 1178-1188

[4] M. Suzuki, N. Yamamoto, O. Yamamoto, T. Nakano, and S. Yamamoto (2006) “Measurement of Driver’s Consciousness by Image Processing Method for Pursuing Driver’s Drowsiness by Eye-Blinks coping with Individual Differences” IEEE International Conference on Systems, Man, and Cybernetics, Taipei, Taiwan. vol. 2, pp. 2891-2896.

[5] S. Singh. and N. P. Fapanikolopaulas (1999), “Monitoring Driver Fatigue Using Facial Analysis Technologies”, IEEE International conference on the Intelligent Transportation Systems. pp.316-318.

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FEA and Experimental Analysis of Crane Hook Considering Different Cross sections and Materials

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Abstract

Crane hook is significant component used for lifting the load with the help of chain or wire ropes. Crane hooks are highly liable components and are always subjected to bending stresses which leads to the failure of crane hook. Failure of a crane hook mainly depends on three major factors i.e., dimension, material, overload. To minimize the failure of crane hook, the stress occurred in it must be studied. Structural failure of the crane hook may happen as a crane hook is subjected to continuous loading and unloading. In this paper the design of the hook is done by analytical method for the different materials like aluminium, cast iron, high strength low alloy steel and Structural Steel. CATIA software is used for modelling the crane hook and ANSYS software used to find out the stresses induced in it. This result helps us for determining of stress in existing model. By predicting the stress concentration area, the hook working life increase and reduce the failure stress.

Keywords: **Crane hook, stress, ANSYS**,

I INTRODUCTION

The stress concentration factors are widely used in strength and durability evaluation of structures and ma-chine elements. A large number of research works have been performed in this field and recommendations for the engineers developed. However, the diversity of the loading cases, geometry and material characteristics to-gather with the new solution methods motivates to continue the research, as it is proved by a large number of notch problem related publications that appeared during the last decade. The review of these and earlier publications allow to conclude that the specific group of the structural members, the curved beams, need a more extensive investigation since a very few articles in this field have been published yet (perhaps, there is the one and the only publication directly related to the stress concentration factors in curved beams due to the additional discontinuity of the geometry, the circular holes, under bending load).
The present article continues the research work on the modeling of the wear damage and its influence to the stress concentration for the lifting hooks of trapezoid-dal cross-section. The article provides a set of cases of the lifting hooks of trapezoidal gross cross-section with shallow notches, where the circumferential stress concentration factors (*Kt*) were calculated employing finite element analysis (FEA). The FEA results were grouped and fitted to find the equations suitable for the fast engineering evaluation of the notch effect on the stress concentration.

Some preliminary investigation of the stress triaxiality factors is also presented. The design rules of the lifting hooks require using ductile materials to avoid brittle failure, however, the stress triaxiality reduces the ductility and the danger of brittle failure increases. In this respect, the strain based criteria for the failure prediction, accounting the stress triaxiality, appear to be more relevant.
Crane hooks are highly liable components and are always subjected to failure due to accumulation of large amount of stresses which can eventually lead to its failure. Crane hooks are the components which are generally used to elevate the heavy load in industries and constructional sites. A crane is a machine, equipped with a hoist, wire ropes or chains and sheaves used to lift and move heavy material. Cranes are mostly employed in transport, construction and manufacturing industry. Overhead crane, mobile crane, tower crane, telescopic crane, gantry crane, deck crane, jib crane, loader crane are some of the commonly used cranes. A crane hook is a device used for grabbing and lifting up the loads by means of a crane. It is basically a hoisting fixture designed to engage a ring or link of a lifting chain or the pin of a shackle or cable socket. Crane hooks with trapezoidal, circular, rectangular and triangular cross section are commonly used. So, it must be designed and manufactured to deliver maximum performance without failure. Thus the aim of this research is to study stress distribution pattern within a crane hook of various cross sections using analytical and experimental methods.

PROBLEM STATEMENT

The crane hooks are critical components and large amount of stresses are subjected to crane hook, which are ultimately leading to failure. Fatigue of the crane hook is happens due to continuous loading and unloading of crane. If the crack is detected in the crane hook, it can cause fracture of the hook. The crack may lead to accident due to failure and damage will be catastrophic to personals.

OBJECTIVES

- Design the crane hook for lifting application.
- Model the crane hook in the CAD software.
- Meshing and FEA analysis of the crane hook.
- Compare the various cross-section and materials of crane hook to find out the suitable one.
- Compare the result of crane hook with experimental analysis.

I LITERATURE SURVEY

Y.Torres,J.M.Gallardo,J.Domínguez,F.J.JiménezE (**2010**) [1] The objective of paper is to identify the causes that led to a failure of the crane hook in service. The study of the accident includes: (1) a summary and analysis of the peculiarities inherent to the standards that determine the manufacture and use of this type of device, (2) metallographic, chemical and fractographic analyses, (3) assessment of the steel mechanical behavior in terms of Vickers hardness profile, its tensile strength and fracture energy, and (4) simulation of the thermal history of the hook. The visual and

microstructural inspections reveal some evidences that a weld bed was deposited on the hook surface. Several cracks grew from that area into the material. Fracture surface shows features typical of brittle failures (trans granular cleavage fracture). The unalloyed, low-carbon steel contains a relatively low aluminium (<0.025%) and high non-combined nitrogen (>0.0075%) content. All the gathered evidences are in agreement with a strain-aging process triggering the embrittlement of the material, with the fracture starting from a crack generated at the heat affected zone of an uncontrolled welding of the hook.

M. Shaban et. al **(2013)**,[2] studied the stress pattern of crane hook in its loaded condition, a solid model of crane hook is prepared with the help of ABAQUS software. Real time pattern of stress concentration in 3D model of crane hook is obtained. The stress distribution pattern is verified for its correctness on an acrylic model of crane hook using shadow optical method (Caustic method) set up. By predicting the stress concentration area, the shape of the crane is modified to increase its working life and reduce the failure rates. The complete study is an initiative to establish a FEA procedure, by validating the results, for the measurement of stresses. For reducing the failures of hooks the estimation of stresses, their magnitudes and possible locations are very important. From the stress analysis, they have observed the cross section of max stress area. If the area on the inner side of the hook at the portion of max stress is widened then the stresses will get reduced. The caustic method is very powerful method to detect the stress distribution for complicated mechanical elements such as hooks. By drilling several distributed small holes on the hook, the caustic method can predict accurately the stress value at each hole position.

E. Narvydas et.al **(2012),**[3] investigated circumferential stress concentration factors with shallow notches of the lifting hooks of trapezoidal cross-section employing finite element analysis (FEA). The stress concentration factors were widely used in strength and durability evaluation of structures and machine elements. The FEA results were used and fitted with selected generic equation. This yields formulas for the fast-engineering evaluation of stress concentration factors without the usage of finite element models. The design rules of the lifting hooks require using ductile materials to avoid brittle failure; in this respect they investigated the strain based criteria for failure, accounting the stress triaxiality.

Rashmi Uddanwadiker **(2011)**,[4] studied stress analysis of crane hook using finite element method and validate results using Photo elasticity. Photo elasticity test is based on the property of birefringence. To study stress pattern in the hook in a loaded condition analysis was carried out in two steps firstly by FEM stress analysis of approximate model and results were validated against photo elastic experiment. Secondly, assuming hook as a curved beam and its verification using FEM of exact hook. The ANSYS results were compared with analytical calculations, the results were found in agreement with a small percentage error = 8.26%. Based on the stress concentration area, the shape modifications were introduced in order to increase strength of the hook.

Takuma Nishimura et. al **(2010),**[5] studied the damage estimation of crane-hooks. They estimated the load conditions which were assumed to be crucial to the crane-hook

damages. FEM model of the crane-hook referring to one of its actual designs was constructed. A database was prepared based on the FEM model; it was constructed as a collection of a number of various possible load conditions and the corresponding deformation values, obtained as the results of the FEM analysis. The database was used to identify the load conditions that were fatal to those damaged crane-hooks. Some of the feature points were selected on the crane-hook design; the deformation of a damaged crane-hook can be then obtained based on the feature points detected by means of the image processing.
The critical load condition of the damaged crane-hook was calculated by comparing the obtained actual deformation and the simulated deformation values in the database. On the basis of these calculated load conditions, the critical load condition for the crane-hook was estimated as a statistical distribution based on the Bayesian approach.

II WORKING PRINCIPLE

To minimize the failure of crane hook, the stress induced in it must be studied. Crane is subjected to continuous loading and unloading. This causes fatigue of the crane hook but the fatigue cycle is very low. If a crack is developed in the crane hook, it can cause fracture of the hook and lead to serious accident. In ductile fracture, the crack propagates continuously and is more easily detectible and hence preferred over brittle fracture. In brittle fracture, there is sudden propagation of the crack and hook fails suddenly. This type of fracture is very dangerous as it is difficult to detect. Strain aging embrittlement due to continuous loading and unloading changes the microstructure. Bending stress and tensile stress, weakening of hook due to wear, plastic deformation due to overloading, and excessive thermal stresses are some of the other reasons for failure. Hence continuous use of crane hooks may in-crease the magnitude of these stresses and ultimately results in failure of the hook.
During the lifting of a piece of machinery by means of an overhead travelling crane the hook fractured suddenly, resulting in serious injury to one of the workmen. The load was attached to the hook by means of fibre rope slings and rupture occurred in a plane which appeared to coincide with the sling loop nearest to the back of the hook. The rated capacity of the crane was 15 tons; at the time of the mishap it was being used to lift one end of a hydraulic cylinder with a total weight of about 27 tons, the exact weight lifted being unknown.

III FINITE ELEMEMENT ANALYSIS

3D CAD model of crane hook:-

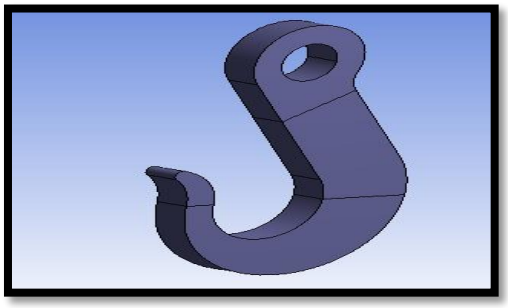


Fig. 1. 3D CAD model of crane hook

Static Structural analysis – Cross section comparison: -

Rectangular cross section:-

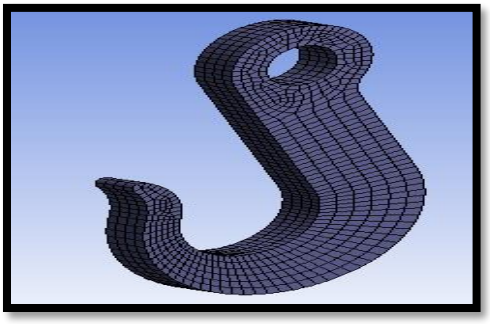
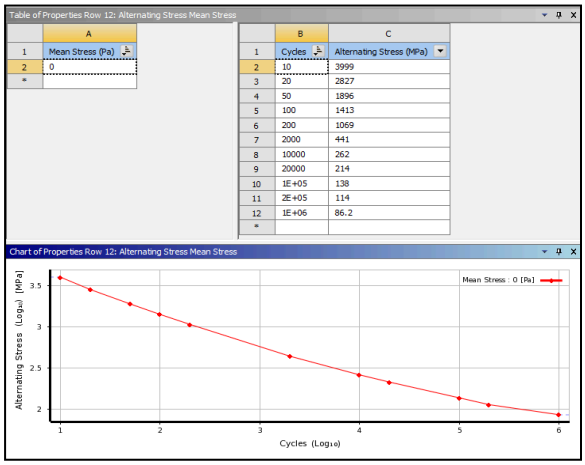


Fig. 2. Mesh

Statistics	
Nodes	12965
Elements	2420

SN CURVE



	A	B	C
1	Mean Stress (Pa)	Cycles	Alternating Stress (MPa)
2	0	10	3999
3		20	2827
4		50	1896
5		100	1413
6		200	1069
7		2000	441
8		10000	262
9		20000	214
10		1E+05	138
11		2E+05	114
12		1E+06	86.2
*			

Fig.3 SN curve

Fatigue Life settings

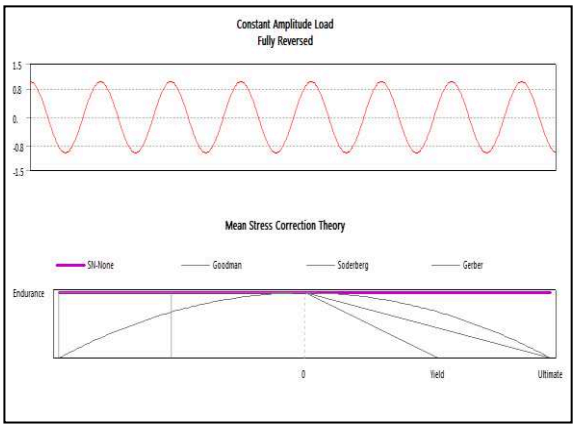


Fig. 4. Fatigue life setting

Boundary condition

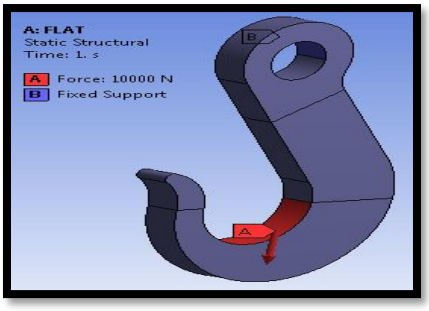


Fig. 5. Boundary conditions

Result of rectangular cross section

Equivalent stress

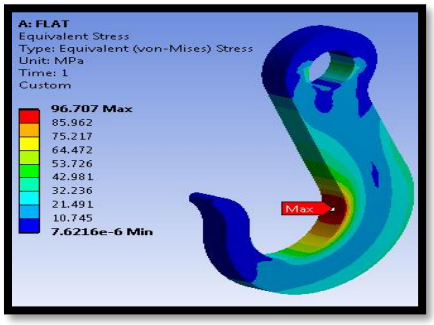


Fig.6. Equivalent stress

Total deformation

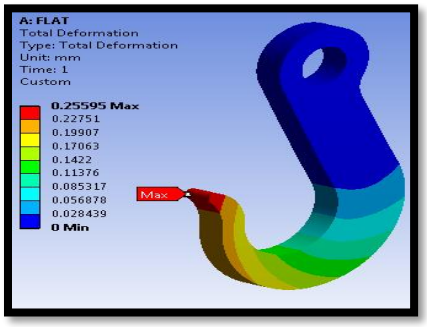


Fig.7.Total deformation

Fatigue Life

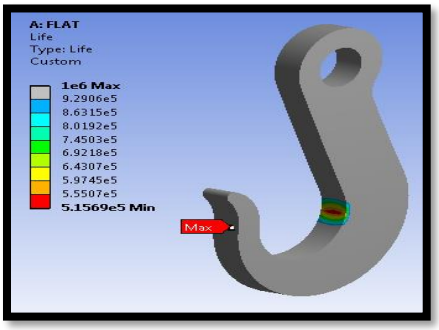


Fig.8. Fatigue life

Factor of safety

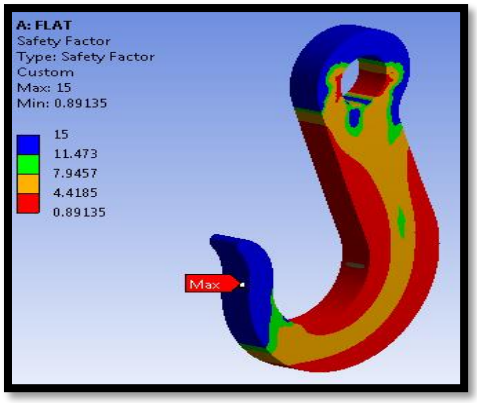


Fig.9. Factor of safety

Table 1: Results of FEA for different cross-sections

Cross-sections			
	Rectangular	**Trapezoid**	**circular**
Equivalent stress (MPa)	**96.707**	**122.25**	**170.83**
Total deformation (mm)	**0.25595**	**0.29404**	**2.0094**
Fatigue life	**5.1569e5**	**1.5521e5**	**45707**
Factor of safety	**0.89135**	**0.7051**	**0.50459**

Table 2: Results of FEA for rectangular cross-sections having different materials

Materials			
	Structural steel	**Aluminium alloy**	**Gray cast iron**
Equivalent stress (MPa)	**96.707**	**96.764**	**96.672**
Total deformation (mm)	**0.25595**	**0.721**	**0.4653**
Fatigue life	**5.1569e5**	**2.4457e7**	**brittle**
Factor of safety	**0.89135**	**0.85507**	**brittle**

IV EXPERIMENTAL ANALYSIS

Experimental analysis is done on universal testing machine (UTM). A universal testing machine (UTM), also known as a universal tester, materials testing machine or material test frame, is used to test the tensile strength and compression strength of material.

From the FEA results a rectangular cross section hook of structural steel which is made, then it is attached to fixture. The hook is then tested for compressive strength as shown in fig.10. From experimental testing it is clear that hook can sustain more than 10KN load. The graph of load v/s displacement is shown in fig.11, that validate the FEA results of rectangular hook.

Fig. 10. Experimental testing of hook on UTM

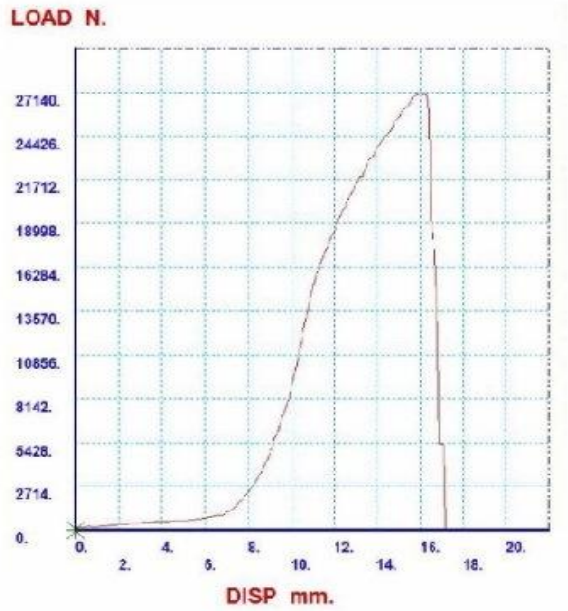


Fig.11.Graph of load v/s displacement on UTM

FUTURE SCOPE

The scope of the project is, it can be implemented on selection and manufacturing industries of crane hook.

CONCLUSION

- From comparative analysis of various materials of hook i.e. structural steel, cast iron & aluminium, it is clear that steel is most feasible for manufacturing.
- Finite element analysis also helps in defining grades of steels from stress outputs.
- From comparative analysis of stress & deformation of various cross sections, it is clear that rectangular cross section is most suitable for hook, as it is easy for manufacturing.
- Experimental analysis is done for checking load carrying capacity from that it is clear that designed hook can sustain more than 10KN load.

REFERENCE

(1) Y. Torres, J.M. Gallardo, J. Domínguez, F.J. Jiménez E, Brittle fracture of a crane hook (2008).

(2) M.Shaban, M.I.Mohamed, A.E.Abuelezz, T Khalifa, Determination of stress distribution in crane hook by caustic (may 2013).

(3) E.Narayndas ,N. PuodziUniene, Circumferential stress concentration factor t the symmetric shallow notches of lifting hook of trapezoidal cross section, ISSN 1392 - 1207. MECHANIKA. 2012 Volume 18(2): 152-157 (april,2012).

(4) Rashmiuddan Wadiker, Stress analysis of crane hook and validation by photo elasticity. (August 26, 2011)

(5) Takuma Nishimura ,Takamuro Maki , Kazu-yuki Hanahara, Yukio Tada, Shigeyuki Ku-roda and tadahisafukui, Damage factor estimation of crane hook, (Dec-2010).

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Performance of Evaporative cooler using Solar Energy

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Abstract— Evaporative coolers are required for cooling purpose in summer. Large amount of energy used for their operation. Solar operated evaporative cooler will save this electricity and also will be beneficial where there is shortage of electricity. The main objective is to compare operating cost for evaporative cooler operating on electricity and solar energy. Such coolers are extensively being used in hot and dry climate conditions in northern Maharashtra, MP, Gujarat, Rajasthan etc.

Keywords— *Evaporative cooler, solar energy, electricity, operating cost.*

I. INTRODUCTION

Solar Power is an economically and environmentally sound source of renewable energy. As a society, we are beginning to understand that it is important to open up to new concepts of energy production. Solar Power plants convert the sun's energy into solar electricity. The sun is the largest source of energy in the form of heat and light energy. Solar Power has a huge potential to make a major impact on the electricity requirement in homes and industries. That the sun supplies as much energy onto the earth in a single day that equals the annual energy requirement is enough to judge the amount of solar energy that goes untapped.

An evaporative cooler produces effective cooling by combining a natural process - water evaporation - with a simple, reliable air-moving system. Fresh outside air is pulled through moist pads where it is cooled by evaporation and circulated through a house or building by a large blower.

II. LITERATURE REVIEW

The new emerging evaporative cooling options is one a series of technical briefs being prepared by the Southwest Energy Efficiency Project (SWEEP) in support of the U.S. Department of Energy's Building America Program. There's a world of difference between old-style swamp coolers and modern evaporative cooling systems. The latter can provide years of trouble-free service and cool, clean, comfortable, fresh air at a lower energy cost than conventional air conditioners—and initial costs are competitive as well. In addition, the latest evaporative cooler designs are a lot easier on the grid than compressor-based cooling systems.[1]

Evaporative coolers perform best when the humidity is low. On days when the humidity is really high, the house can feel muggy inside. For those who have another type of air conditioning system, that will be the time to use it. For the drier days the evaporative cooler can do quite well. If you can, place the cooler in a window that is shaded. The sun baking on the metal surface can reduce the effectiveness. I actually don't have mine shaded, but you should do what I say and not what I do. Evaporative coolers draw air from the outside and as it passes through the pads it is cooled and blown into the house. It is best to close all the windows in the house except for one that is farthest from the cooler. [2]

A swamp cooler is a simple device that produces cool air by evaporative cooling. This is achieved by blowing warm, dry air through a permeable pad that is soaked with water. As the water evaporates it cools the pad and the air that passes through it. This principle works well in hot dry climates, and is less expensive to install and operate than conventional air-conditioning units. Swamp coolers run on regular 115-volt electricity, but they can be low-cost if they are solar powered. [3]

Evaporative cooling, also known as adiabatic saturation of air is a thermodynamic process. When hot and dry air passes over a wet surface, the water evaporates and air loses its sensible heat and gains equal amount of latent heat of water vapor, thereby reducing its temperature. More the amount of evaporation, greater is the cooling effect. Thus the system is more efficient in hot and dry climates i.e. when it is most needed.[4]

Performance of evaporative cooler with rectangular pads of materials like rigid cellulose, corrugated paper, high density polythene and aspen is theoretically analyzed. The variation of saturation efficiency and cooling capacity with air mass flow rate is shown. The saturation efficiency decreases and outlet temperature of air increases with mass flow rate of air for all the materials. [5]

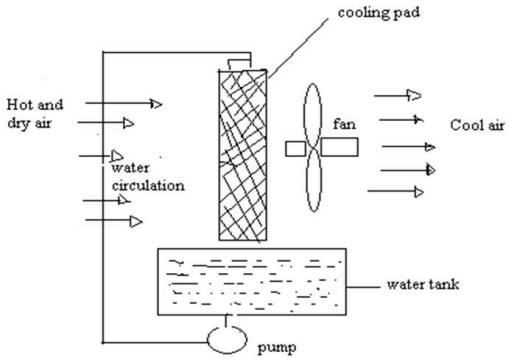
III. PROBLEM DEFINATION

Evaporative coolers are required for cooling purpose in summer. Large amount of energy used for their operation. Solar operated evaporative cooler will save this electricity and also will be beneficial where there is shortage of electricity.

IV. OBJECTIVE

The main objective is to compare operating cost for evaporative cooler operating on electricity and solar energy.

V. WORKING PRINCIPLE



The present evaporative coolers use a cooling media made wet by water flow. Hot and dry air is made to flow over this media with the help of a fan or blower. The water in the cooling media gets evaporated due to heat of air. Thus the temp of air reduces and water vapour formed, mixes with air. The relative humidity of air increases. Normally 5-10ºc reduction in the temp of air is possible.

VI. EXPERIMENTAL SET-UP

Cooler operated on solar system:-.

1. Solar panel is mounted on top floor of building for getting proper sunlight.
2. Battery is connected to solar panel for charging within 2 days battery get fully charged.
3. Battery is connected to inverter to convert DC to AC.
4. Inverter is connected to energy meter to measure energy consumption & outlet of energy meter is connected to evaporative cooler.
5. Duct is made on inlet & outlet side for the accurate measurement of velocity.
6. Thermocouples are placed at inlet & outlets side of cooler. Two at inlet & two at outlet side. Out of two, one for DBT measurement & one for WBT measurement.
7. For energy consumption measurement, energy meter is connected to the cooler.
8. Now cooler is running on first speed. At this time, velocity is measure at each side by using anemometer. On each side four readings are taken at four corners for reliability purpose.
9. Different temperature readings are taken at inlet & outlet directly by using temperature indicator.
10. For energy consumption measurement, time was measure for pulses of energy meter. Then by using energy meter constant energy consumption is calculated.
11. Similarly procedure is carry out for second & third speed.

VII. OBSERVATION TABLE FOR EVAPORATIVE COOLER RUNNING ON SOLAR SYSTEM

Time		Inlet		Outlet			Time (10p)
	Flow	DBT	Flow	DBT	Flow	DBT	
9 am	I	33.4	22.6	27.4	22.0	3.4523	75.76
	II	31.8	22.8	27.5	22.2	3.6850	80.71
	III	32.1	22.9	27.5	21.8	3.0350	92.96
12 pm	I	33.3	23.6	26.5	21.0	3.0925	74.19
	II	33.9	23.8	26.8	21.7	3.3900	83.43
	III	33.5	23.5	26.7	21.5	3.6650	96.44
3 pm	I	37.5	23.4	29.3	22.8	3.4650	72.14
	II	37.7	23.5	29.5	22.5	3.6246	80.50
	III	37.5	23.7	28.7	22.1	3.9430	100

VIII. RESULT TABLE FOR EVAPORATIVE COOLER RUNNING ON SOLAR SYSTEM

T		RH					
	FLOW	Inlet %	Outlet %	Sat. Eff. %	Ma Kg/hr	Cooling capacity KJ/hr	Energy consumption KW-hr
9 am	I	48	62	45.4	1199.97	4895.88	0.148
	II	48	64	47.7	1280.85	5617.83	0.139
	III	49	64	50.0	1402.10	6580.57	0.121
12 pm	I	45	62	70.1	1081.12	7498.67	0.151
	II	42	66	70.2	1178.31	8533.37	0.134
	III	44	65	68.0	1266.95	8787.57	0.116
3 pm	I	32	58	58.1	1197.5	10015.9	0.155
	II	31	58	57.7	1211.18	10130.3	0.139
	III	32	59	63.7	1370.56	12309.2	0.112

IX. PAYBACK PERIOD

Payback period in capital budgeting refers to the period of time required for the return on an investment to "repay" the sum of the original investment. The time value of money is not taken into account. Payback period intuitively measures how long something takes to "pay for itself." All else being equal, shorter payback periods are preferable to longer payback periods. Payback period is widely used because of its ease of use despite the recognized limitations described below.

The payback period is considered a method of analysis with serious limitations and qualifications for its use, because it

does not account for the time value of money, risk, financing or other important considerations, such as the opportunity cost. Whilst the time value of money can be rectified by applying a weighted average cost of capital discount, it is generally agreed that this tool for investment decisions should not be used in isolation. Alternative measures of "return" preferred by economists are net present value and internal rate of return. An implicit assumption in the use of payback period is that returns to the investment continue after the payback period. Payback period does not specify any required comparison to other investments or even to not making an investment.

X. COST BENEFIT ANALYASIS

1) Operating cost = C = 1000 * A *Cost/unit Rs/season
=184.4 * 5.53
= 1019.73 Rs/season
2) Cost of solar panel, Battery, Inverter = S = 15000 Rs
3) Payback period = S/C season
= 15000/1019.73
= 14.70season
= 15 Seasons = 15 Years

In such application the operation will be continuous and payback period may be calculated as
Assuming 18 h operation per day,
Units per day =0 .184 *18
= 3.312 kWh = 3.3 units
Cost per day = 3.3 *5
= 17 Rs per day
Pay back = 15000/17
= 882 days
= 2.5 years approx.

If power consumption is higher this may be further reduced.

XI. CONCLUSION

There are many regions in India as part of Rajasthan, part of Bihar, M.P., Vidarbha and north Maharashtra and some hot spots in north where evaporative cooling will produce a condition well within the summer comfort zone. There is increasing demand of evaporative coolers in these regions as they are quite inexpensive compared with refrigerated air conditioning system. So in this region solar energy available abundantly. This energy can be stored in battery by using solar panel. It can be used to run the evaporative coolers.

If we used evaporative coolers three month in year (season) i.e.1000 hr operation then payback period is 15 years. This payback is more. So by optimizing cost of solar panel, battery and inverter payback period can be reduced. After payback period we will get upto 10-15 year free of cost evaporative cooling.

REFERENCES

[1] Midwest Research Institute National Renewable Energy Laboratory Division, “New Evaporative Cooling Systems: Modest Cooling Loads”, November 2007.

[2] R.K.Kulkarni & S.P.S. Rajput “Comparative performance of evaporative cooling pads of alternative material”, International journal of advanced engineering sciences and technologies vol no. 10, pp 239 - 244, October 2008.

[3] Camrago JR, Ebinuma CD and Siveria JL, 5. “Experimental performance of a direct evaporative cooler operating during summer in Brazilian city”, International journal of Refrigeration; 28(7), pp.1124-1132. (2004).

[4] Durach, C. F., Kurpjuweit, S., & Wagner, S. M. (2017). “Artificial Intelligence in Logistics and Supply Chain Management: A Comprehensive Review.” International Journal of Logistics Management, 28(3), 875-905. doi:10.1108/IJLM-04-2016-0062

[5] Yu, H., Sun, W., & Liu, H. (2020). Human-Robot Collaboration in Industrial Automation: A Comprehensive Review. IEEE Transactions on Industrial Informatics, 16(6), 4184-4200. doi:10.1109/TII.2020.2969415

[6] Li, M., & Cheng, G. (2017). Industry 4.0: A Survey on Technologies, Applications, and Open Research Issues. Journal of Industrial Information Integration, 6, 1-10. doi:10.1016/j.jii.2017.04.005

[7] Chen, C., Wu, N., & Chen, S. (2019). Machine Learning for Production Scheduling in Industry 4.0: A Review. Journal of Intelligent Manufacturing, 30(6), 2445-2461. doi:10.1007/s10845-017-1410-0

[8] Subasi, A. (2020), “A Review of Machine Learning Approaches for Fault Detection and Diagnosis in Manufacturing Processes” Journal of Manufacturing Systems,56,499-512.

[9] Sabattini, L., Secchi, C., & Fantuzzi, C. (2020). Vision Systems for Robotic Applications in Industry 4.0: Challenges and Opportunities. Annual Reviews in Control, 50, 13-25. doi:10.1016/j.arcontrol.2020.07.009

[10] Kocabasoglu-Hillmer, C., & Gavirneni, S. (2020). Artificial Intelligence in Supply Chain Management: Applications, Challenges, and Research Perspectives. Production and Operations Management, 29(4), 925-947.

[11] Li, X., Tao, F., Zhang, M., Cheng, Y., & Luo, Y. (2020). Intelligent Quality Control in Cyber-Physical Systems: Current State and Opportunities. Journal of Manufacturing Systems, 54, 202-213. doi:10.1016/j.jmsy.2019.10.004

[12] Dietz, T., Singh, J., & Lim, C. P. (2021). Human-Centric AI in Manufacturing: A Review. Journal of Intelligent Manufacturing, 32(4), 939-958. doi:10.1007/s10845-019-01531-

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On irreducible pseudo symmetric ideals of a partially ordered ternary semigroup

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Abstract. In this paper, the concepts of irreducible and strongly irreducible pseudo symmetric ideals in a partially ordered ternary semigroup are introduced. We also studied some interesting properties of irreducible and strongly irreducible pseudo symmetric ideals of a partially ordered ternary semigroup and prove that the space of strongly irreducible pseudo symmetric ideals of a partially ordered ternary semigroup is topologized.

1. Introduction

In 1932, D. H. Lehmer [7] studied some ternary algebraic systems called triplex that appear to be commutative ternary groups. The idea of ternary semigroups was known to Banach. He showed through an example, that there exists a ternary semigroup which cannot be reduced to an ordinary semigroup. Hewitt and Zuckerman described in [3] the method of construction of ternary semigroups from binary and described various connections between such semigroups.

Ternary semigroups are a special case of n-ary (polyadic) semigroups. So many results on ternary semigroups has an analogous version for n-ary semigroups and many results on ternary semigroups is a consequence of results proved for n-ary semigroups. For example, F. M. Sioson proved in [10] some results on ideals in n-ary semigroups, next some results on ideals in ternary semigroups [9]. Also characterization of regular ternary semigroups by ideals can be deduced from general results proved in [1] for n-ary semigroups..

M. Shabir and M. Bano [8] introduced the notion of prime, semiprime and strongly prime bi-ideals in ternary semigroups and studied the space of strongly prime bi-ideals is topologized. A. Iampan [4, 5] invented the concept of ordered ternary semigroups which is the generalization of the concept of ordered semigroup as well as the concept of ternary semigroup. In [11], the ideal theory of a partially ordered ternary semigroups is introduced. The notions of complete prime ideals, prime ideals, complete semiprime ideals, semiprime ideals of po ternary semigroups is defined in [12]. The notion of semipseudo symmetric ideals and pseudo symmetric ideals of partially ordered ternary semigroups is introduced in [6].

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ECOFEMINISM: A STUDY OF INDIAN WOMEN WRITERS AND THE ENVIRONMENT

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INTRODUCTION

Presently, our concern for the social, political and economic situation of women remains as valid as it was in the last century. Despite the progress made worldwide, we continue to witness a reality in which gender issues generate injustice, lack of freedom and violation of human rights. Researchers constantly strive to analyze women phenomena and denounce its consequences in the attempt to achieve an egalitarian world in which differences are understood and respected.

Women's literature has often been defined by publishers as a category of writing done by women. Though obviously this is true, many scholars find such a definition reductive. What makes the history of women's writing so interesting is that in many ways it is a new area of study. The tradition of women writing has been much ignored due to the inferior position women have held in male-dominated societies. It is still not unheard of to see literature classes or anthologies in which women are greatly outnumbered by male writers or even entirely absent. The onus of women's literature, then, is to categorize and create an area of study for a group of people marginalized by history and to explore through their writing their lives as they were while occupying such a unique socio-political space within their culture.

Eco-feminism In India

In India, eco-feminism, as per accepted norms, could be said to have made its first appearance with the Chipko Movement way back in 1974. This, however, is also contested by many, who see it as peasants' struggle, being led by a man named Sunderlal Bahuguna. Another man, Chandi Prasad Bhatt, raised awareness of the rights of the locals, and over a considerable period of time, the women of Uttarakhand played a very important role in organizing protests against the timber mafia which was laying the hills waste. The movement, which has since been linked to the history of peasant protests, was unique as it mainly involved women led by a local leader, Gaura Devi, of the Gram Mahila Mandal, who took up