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A Review on Cardiovascular Disease Prediction using Machine Learning Techniques

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ABSTRACT

Heart disease is one of the most significant causes of mortality in the world today. The main challenge is to predict the cardiovascular disease. In the last decade, along with the life of a machine, many diseases, including cancer and cardiovascular disease have been common in many societies that kill many people every year.
Machine learning is a subset of artificial intelligence that enables software programmers to grow more precise at predicting outcomes. Machine learning is very useful technique for predicting cardiovascular disease.
Machine learning techniques are used to predict the heart disease, such as Hybrid random forest with linear model, Ensemble classifier, Fuzzy approach, K-nearest neighbor, Artificial neural network, Apriori algorithm and Support vector machine. This paper provides an insight of the existing algorithm and it gives an overall summary of the existing work.

Keyword: - *Random Forest, Logistic Regression, Naïve Bayes, KNN, Decision Tree, SVM, Machine Learning, CVD***.**

1. Introduction

Heart disease is main reason for death in the world [1]. Heart disease is a major problem from the world. Heart disease is leading cause of death in the world over the past few years [6]. In recent years, incidence rate of heart disease has been increasing along with industry development and modernization of life. Approximately 19.1 million deaths were attributed to heart disease globally. The number of deaths due to heart attacks in India has remained consistently over 25,000 in the last four years, and over 28,000 in the last three year.

Heart disease remains one of the leading causes of mortality worldwide, imposing a significant burden on healthcare systems and affecting countless individuals' quality of life. Early and accurate prediction of heart disease is crucial for timely intervention and effective management. In recent years, machine learning (ML) techniques have emerged as powerful tools in the field of cardiovascular medicine, offering promising solutions for predictive modeling and risk assessment.

It is difficult to identify heart disease because of several contributory risk factors such as diabetes, high blood pressure, high cholesterol abnormal pulse rate and many other factors [1]. Therefore, it is essential to detect high risk persons before incidence to reduce the mortality rate [2].

There are several attributes like Age, Sex, Chest Pain, Trestbps, Chol, Fbs, Resting, Thali, Exhang, Oldpeak, Slope, Ca, Thal, Targets.

Machine Learning is the science of teaching machines to teach them how to learn by themselves. Machine learning is superset of Deep learning and subset of Artificial Intelligence. Machine Learning (ML) has been shown to be effective in assisting in making decisions and predictions from the large quantity of data produced by the healthcare Industry [1] [2].

This review paper aims to provide a comprehensive and up-to-date overview of ML techniques employed in heart disease prediction. By synthesizing existing knowledge, we aim to offer insights that can guide researchers, clinicians, and policymakers in the development and implementation of robust, accurate, and clinically relevant predictive models for the early detection and management of heart disease.

2. Literature Review

Heart disease remains a leading cause of mortality worldwide, necessitating the development of accurate and reliable prediction models to identify individuals at high risk. Over the years, researchers and healthcare professionals have explored various approaches to predict heart disease, ranging from traditional risk factor assessments to the integration of advanced machine learning techniques. This literature survey aims to provide an overview of the existing body of knowledge, highlighting the advancements made in heart disease prediction and shedding light on the emerging perspectives in this critical field. Following are the numerous works which were done on the heart disease prediction using Machine Learning techniques.

In 2019," Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques", Mohan et al. [1] have proposed a novel method that aims at finding significant features by applying machine learning techniques resulting in improving the accuracy in the prediction of cardiovascular disease. The prediction model is introduced with different combinations of features and several known classification techniques. We produce an enhanced performance level with an accuracy level of 88.7% through the prediction model for heart disease with the hybrid random forest with a linear model (HRFLM).

In 2019, "Utilizing IoT wearable medical device for heart disease prediction using higher order Boltzmann model: A classification approach", Zafer and Amr [2] have introduced an Internet of Things-based medical device for collecting patients' heart details before and after heart disease. The information, which is continuously transmitted to the health care center, is processed using the higher order Boltzmann deep belief neural network (HOBDBNN). The deep learning method learns heart disease features from past analysis, and achieves efficiency by the effective manipulation of complex data. Experimentation outcome demonstrate that the prediction of heart disease was better in terms of accuracy as portrayed by the presented approach.

In 2017, "Cardiovascular disease detection using a new ensemble classifier", Hamidreza et. al [3] have established a new systematic approach for the heart diseases and the related medical data is generated by using the UCI Repository dataset. The ability of a new data mining technique was investigated foe early diagnosis of heart diseases. This data mining technique uses a fusion strategy in which three classifiers including neural network, rough set and naïve bayes have been combined by a weighed majority vote. The ensemble classifier was evaluated on a data set of 303 patients. the result indicate that fusion of outputs can improve the classifier performance. The proposed classification approach achieved an 86.6% accuracy.

In 2011, "Clinical decision support system: Risk level prediction of heart disease using weighted fuzzy rules", P.K. Anooj [4], Proposed a system with weighted fuzzy rule based logical clinical decision support system for computer diagnosis. The automatic procedure to generate the fuzzy rule and the weighted procedure introduced in system. Which works with two step, generation of weighted fuzzy rule and developing of fuzzy rule-based system. The experiment where carry on UCI repository finally this system where high accuracy, sensitivity and specificity
.
In 2020, "Heart Disease Prediction Using Machine Learning Algorithms", Archana Singh and Rakesh Kumar [5] calculated the accuracy of machine learning algorithms for predicting heart disease by using UCI repository datasets for training and testing k-nearest neighbor, decision tree, linear regression and support vector machine (SVM).

In 2017, "Analytical Study of Heart Disease Diagnosis Using Classification Techniques", C. Sowmiya and Dr. P. Sumitra [6] investigated the potential of nine (9) classification methods to predict heart disease. Namely, decision tree, naive Bayes neural network, SVM.ANN, KNN. This is the Apriori algorithm and SVM (Support Vector Machine) algorithm in predicting heart disease. Using medical profiles such as age, gender, blood pressure, chest pain, fasting blood sugar. It can predict, for example, patients with heart disease. Therefore, the medical community is interested in the detection and prevention of heart disease. Analysis showed that classification-based techniques promote high efficiency and achieve high accuracy compared to previous methods.

In 2020, "Heart Disease Prediction Using Machine Learning Techniques", Vijeta Sharma, Shrinkhala Yadav and Manjari [7] Gupta builds an ML model based on parameters related to predicting heart disease. In this research, the UCI reference material, which consists of 14 parameters related to various heart diseases, is used to predict heart disease. Machine learning algorithms such as Random Forest, Support Vector Machine (SVM), Naive Bayes and Decision tree were used in the development of the model. In this paper study, they also tried to use standard machine learning methods to find correlations between different attributes of the material and use them effectively to predict the probability of heart disease. The result shows that compared to other ML techniques, Random Forest provides higher accuracy and shorter prediction time. This model can be useful as a decision support system for clinicians.

In 2015, "Prediction and Diagnosis of Heart Disease by Data Mining Techniques", Boshra Brahmi et al, [8] developed different data mining techniques to evaluate the prediction and diagnosis of heart disease. The main objective is to evaluate the different classification techniques such as J48, Decision Tree, KNN, SMO and Naïve Bayes. After this, evaluating some performance in measures of accuracy, precision, sensitivity, and specificity are evaluated and compared. J48 and decision tree gives the best technique for heart disease prediction.

In 2015, "Efficient Heart Disease Prediction System Using Decision Tree", Purushottam et al, [9] proposed an efficient heart disease prediction system using data mining. This system helps medical practitioner to make effective decision making based on the certain parameter. By testing and training phase a certain parameter, it provides 86.3% accuracy in testing phase and 87.3% in training phase.

Table -1: A comparative study of various algorithms in literature review

Year	Author	Name of Paper	Adopted methodology	Accuracy
2019	Senthilkumar Mohan	Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques	HRFLM	88.04%
2019	Zafer Al-Makhadmeh	Utilizing IoT wearable medical device for heart disease prediction using higher order Boltzmann model: A classification approach	HOBDBNN	99.23%
2017	Hamidreza Ashrafi Esfahani	Cardiovascular disease detection using a new ensemble classifier	Ensemble Classifier	89.00%
2011	P.K. Anooj	Clinical decision support system: Risk level prediction of heart disease using weighted fuzzy rules	Fuzzy Approach	57.851%
2020	Archana Singh	Heart Disease Prediction Using Machine Learning Algorithm	K-Nearest Neighbor	87.04%
2017	C.Sowmiya Dr.P.Sumitra	Analytical Study of Heart Disease Diagnosis Using Classification Techniques	Apriori algorithm and SVM	>76.20%
2020	Vijeta Sharma	Heart Disease Prediction using Machine Learning Techniques	Random Forest	99.00%
2015	Boshra Brahmi, Mirsaeid Hosseini	Prediction and Diagnosis of Heart Disease by Data Mining Techniques	Naïve Bayes,KNN	83.732%

	Shirvani			
2016	Purushottam, Prof. (Dr.) Kanak Saxena, Richa Sharma	Efficient Heart Disease Prediction System Using Decision Tree	Decision Tree Classifier	86.3%

4. CONCLUSIONS

In this study various researchers developed a heart disease prediction model based on machine learning techniques. They used dataset comprising various clinical features of patients. Through their analysis, they found that the proposed model achieved high accuracy in predicting the presence or absence of heart disease.
The results suggest that machine learning algorithms can be effective tools for heart disease prediction. As identified by various literature survey, there is a higher requirement on increasing the accuracy of complex or combined machine learning techniques. There are many advancements required in the reliability of machine learning model, scalability and accuracy of this prediction system.

5. REFERENCES

[1] SENTHILKUMAR MOHAN, CHANDRASEGAR THIRUMALAI, "Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques, "VOLUME 7, 2019 publication June 19, 2019 Article 81554.

[2] Zafer Al-Makhadmeh, Amr Tolba, "Utilizing IoT wearable medical device for heart disease prediction using higher order Boltzmann model: A classification approach, "Measurement, vol. 147, December 2019, Article 106815.

[3] Hamidreza Ashrafi Esfahani, Morteza Ghazanfari, "Cardiovascular disease detection using a new ensemble" IEEE 2017 Dec 22, 2017.

[4] P.K. Anooj "Clinical decision support System: Risk level prediction of heart disease using weighted fuzzy rules, "Journal of king saud university computer and information technology Vol 24, 22 Nov 2011.

[5] Archana Singh, Rakesh Kumar "Heart Disease Prediction Using Machine Learning Algorithms ICE3-2020.

[6] C. Sowmiya, Dr. P. Sumitra, Analytical Study of Heart Disease Diagnosis Using Classification Techniques" "2017 IEEE.

[7] Vijeta Sharma, Shrinkhala Yadav "Heart Disease Prediction Using Machine Learning Techniques", 2020 ICACCCN.

[8] Boshra Brahmi, Mirsaeid Hosseini Shirvani, "Prediction and Diagnosis of Heart Disease by Data Mining Techniques", Journals of Multidisciplinary Engineering Science and Technology, vol.2, 2 February 2015.

[9] Purushottam, Prof. (Dr.) Kanak Saxena, Richa Sharma, "Efficient Heart Disease Prediction System", 2016.

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A Review on Exam Management System

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Abstract: *The Exam Management System (EMS) is a vital component of educational institutions, facilitating efficient and organized administration of exams. This paper presents a comprehensive review of existing literature on EMS, highlighting its functionalities, benefits, challenges, and future prospects. The primary objective of this review is to provide researchers, educators, and system developers with a comprehensive understanding of the current state of EMS and its potential for improvement. The review begins by discussing the core functionalities of an EMS, including exam scheduling, registration, question bank management, exam administration, result processing, and report generation. The benefits of implementing an EMS are then explored, such as improved accuracy, reduced administrative burden, enhanced transparency, and increased accessibility for both students and faculty*

Keywords: Exam, Timetable, Notices, Supervision chart, Marksheet, Attendance, EMS

I. INTRODUCTION

In educational institutions, the management of exams plays a crucial role in assessing student knowledge and evaluating their academic progress. Traditionally, this process has been manual and time-consuming, involving numerous administrative tasks such as exam scheduling, registration, question paper preparation, invigilation, result processing, and report generation. However, with the advancements in technology, the introduction of Exam Management Systems (EMS) has revolutionized the way exams are managed.

An Exam Management System is a software application designed to automate and streamline the entire exam management process. It provides a centralized platform for administrators, faculty, and students to efficiently handle various tasks related to exams. By digitizing and integrating multiple exam-related functions, EMS offers significant advantages in terms of accuracy, efficiency, transparency, and accessibility.

This review paper provides an overview of Exam Management Systems, exploring their functionalities, benefits, challenges, and future prospects. By examining existing literature and synthesizing key findings, this paper contributes to the understanding of EMS and its potential for improving exam management in educational institutions. The insights and recommendations presented herein serve as a valuable resource for researchers, educators, and system developers aiming to enhance the effectiveness and efficiency of exam management processes.

II. LITERATURE REVIEW

In recent years, the field of education has witnessed significant advancements in technology, leading to the adoption of digital solutions to enhance various aspects of academic administration. One such area that has seen considerable transformation is exam management. Traditional paper-based examination systems are being replaced by innovative and efficient exam management systems, which streamline the entire examination process, from question paper generation to result declaration.[1] These systems not only reduce the administrative burden on educational institutions but also offer numerous benefits to students and faculty members.

To conduct this literature review, a comprehensive search was conducted across various academic databases, including IEEE Xplore, ACM Digital Library, and Google Scholar. Keywords such as "exam management system," "online examination," "automated assessment," and "computerized testing" were used to identify relevant studies published. The search was further refined by considering studies that focused on exam management systems in educational institutions, including schools, colleges, and universities.

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Overall, this literature review aims to contribute to the existing body of knowledge by providing a comprehensive analysis of the research conducted in the field of exam management systems. By synthesizing the findings from various studies, this review intends to shed light on the challenges, opportunities, and best practices associated with the implementation and utilization of exam management systems, thereby facilitating informed decision-making and future advancements in this domain.

In 2019, Manish Kumar Thakur [1] have created an android application with SQL server is used and data is stored in college server. This android application has three logins as Admin, Student and Teacher. The existing system drawbacks like not User-friendly UI, more calculations, Extra manual work, Errors are corrected in this application. The proposed system is very user friendly so no need of training for users to operate this application.

In 2018, M Ashok Kumar [2] This is android application used by students, teachers, and parents. This is college activities management system application which is used to maintain fest, functions, celebrations, workshops etc. This application can remove drawbacks like not good user interface, slow calculations and more manual work.

In 2022 Rushikesh Basatwar [3] This College Management System application provides an autonomous solution of the paper-based work. This is controlled and monitored by admin. The man power is reduced by using this application. It provides accurate information all the time as faculty member or student needed. The college management can make useful decision using the data that are stored in the university database server. All the administrator, authorities, faculty, student and guardians will get the desired data directly.

In 2016 Srikant Patnaik [4]This project is based on College Management System. It manages the college information, student information , placement information , various different types of event going on in our college . It also keeps track records of all the information regarding students those who are placed in the various organization. It has a notice board which contains information about various cultural or technical or any sports which is supposed to be held soon. With the help of this project, you can view the previous videos with the help of internet connection.

In 2018 [5] The main purpose behind the system is for assigning a user-friendly user interface. This system also maintains the data properly and up to date which is conserved for a long period of time. The storage facility will make the task easy of the handler.

III. CONCLUSION

This review paper has provided a comprehensive analysis of the Exam Management System (EMS), exploring its functionalities, benefits, challenges, and future prospects. The literature reviewed demonstrates that EMS offers significant advantages for educational institutions in terms of accuracy, efficiency, transparency, and accessibility.

The functionalities of EMS, including exam scheduling, registration, question bank management, exam administration, result processing, and report generation, have been identified as crucial components that streamline the exam management process. By automating these tasks, EMS improves administrative efficiency, reduces errors, and saves time and effort.

REFERENCES

[1]. SUMAN CHATTERJEE, MANISH KUMAR THAKUR, “Smart College Management System” International Journal of Engineering Research & Technology (IJERT) NCRAEM – 2019 Conference Proceeding.

[2]. M. ASHOK KUMAR, CH. MOHAN SRINIVAS, K. VISHU VARDHAN REDDY, K. KIRAN KUMAR“College Activity Management System” Proceedings of the Second International Conference on Intelligent Computing and Control Systems (ICICCS 2018).

[3]. RUSHIKESH BASATWAR, AAKASH PATIL, RUSHIKESH TAIWADE, PRATEEK SAHU, PROF. PRIYADARSHANI PATIL “College Management System” International Journal of Advanced Research in Science, Communication and Technology (IJARSCT) volume 2, may 2022.

[4]. Asst. Professor Srikant Patnaik, Khushboo kumari Singh, Rashmi Ranjan, Niki Kumari “College Management System” International Research Journal of Engineering and Technology (IRJET) volume 03, may 2016.

[5]. Prof. Mandar Ganjapurkar, Sachin Tripathi, Sahil Vedpathak, Abhishek Walavalkar “College ERP System” International Journal of Creative Research Thoughts (IJCRT) volume 6, Issue 2 April 2018

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Perimetric Brakes

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ABSTRACT: A disc brake is a type of brake that uses callipers to squeeze pairs of pads against a disc in order to create friction that retards the rotation of a shaft, such as a vehicle axle, either to reduce its rotational speed or to hold it stationary. The energy of motion is converted into waste heat which must be dispersed. Hydraulic disc brakes are the most used form of brake for motor vehicles, but the principles of a disc brake are applicable to almost any rotating shaft. Compared to drum brakes, disc brakes offer better stopping performance because the disc is more readily cooled. Consequently, discs are less prone to the brake fade caused when brake components overheat. Drum brakes and disc brakes are most of the brakes used today with disc brakes being more efficient but costly than drum brakes. A disc brake consists of brake callipers that squeeze the pair of pads against the rotating brake disc and with the help of friction the speed of rotation is reduced. They are better at managing heat and since they are open to environment convection can occur easily because of this less brake fade occurs and consistent braking is obtained. The brake pads are found to last longer than the brake shoes in the drum brakes. The disc braking system is simple and effective in its operation this leads to easy replacement of the damaged parts.

KEYWORDS: Brakes, Disc Brakes, drum

I. INTRODUCTION

A disc brake is a type of brake that uses callipers to squeeze pairs of pads against a disc in order to create friction that retards the rotation of a shaft, such as a vehicle axle, either to reduce its rotational speed or to hold it stationary. The energy of motion is converted into waste heat which must be dispersed. Hydraulic disc brakes are the most used form of brake for motor vehicles, but the principles of a disc brake are applicable to almost any rotating shaft. Compared to drum brakes, disc brakes offer better stopping performance because the disc is more readily cooled. Consequently, discs are less prone to the brake fade caused when brake components overheat. Disc brakes also recover more quickly from immersion (wet brakes are less effective than dry ones). Most drum brake designs have at least one leading shoe, which gives a servo-effect. By contrast, a disc brake has no self-servo effect, and its braking force is always proportional to the pressure placed on the brake pad by the braking system via any brake servo, braking pedal, or lever. This tends to give the driver better "feel" and helps to avoid impending lockup. Drums are also prone to "bell mouthing" and trap worn lining material within the assembly, both causes of various braking problems. The brake disc (or rotor in American English) is usually made of cast iron but may in some cases be made of composites such as reinforced carbon– carbon or ceramic matrix composites. This is connected to the wheel and/or the axle. To retard the wheel, friction material in the form of brake pads, mounted on a device called a brake calliper, is forced mechanically, hydraulically, pneumatically, or electromagnetically against both sides of the disc. Friction cause the disc and attached wheel to slow or stop. When it comes to manufacturing any vehicle, brakes are a crucial part of the system and thus a lot of attention is given to the problems associated with it. Drum brakes and disc brakes are most of the brakes used today with disc brakes being more efficient but costly than drum brakes. A disc brake consists of brake callipers that squeeze the pair of pads against the rotating brake disc and with the help of friction the speed of rotation is reduced. They are better at managing heat and since they are open to environment convection can occur easily because of this less brake fade occurs and consistent braking is obtained. The brake pads are found to last longer than the brake shoes in the drum brakes. The disc braking system is simple and effective in its operation this leads to easy replacement of the damaged parts. However, there are certain problems associated with them like brake howl, brake judder and longer braking distance. Perimetric brake disc is a new concept that aims to reduce such issues and simultaneously improve the existing qualities of disc brake.

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MULTIPURPOSE AGRICULTURE CUTTER WITH FOLDABLE SLIM WIRE, SAW AND HEDGE CUTTER

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ABSTRACT

Agriculture is a labor intensive operation requiring a variety of agriculture implements. Grass cutting , hedge trimming operations are normally done manually which require considerable amount of time and effort. The back pack mounted portable hedge trimmers are available in the market but again they have to be mounted on the back to be operated. Thus to reduce the effort and the discomfort of vibrations it is necessary to develop a agriculture cutter that is vehicle mounted and with the versatility to be used as grass cutter as well as a hedge trimmer. The parts of the machine will be manufactured using suitable methods and testing will be done to evaluate the performance of the machine after assembly.

Keywords: Grass Cutter, Agriculture Implements, Hedge Trimmer, Design.

I. INTRODUCTION

A lawn mower is a machine that uses a revolving blade or blades to cut a lawn at an even height .Lawn mowers employing a blade that rotates about a vertical axis are known as rotary mowers, while those employing a blade assembly that rotates about a horizontal axis are known as cylinder or reel mowers .Many designs have been made, each suited to a particular purpose. The smallest types, pushed by a human, are suitable for small residential lawns and gardens, while larger, self-contained, rideon mowers are suitable for large lawns, and the largest, multigang mowers pulled behind a tractor, are designed for large expanses of grass such as golf courses and municipal parks..

II. LITERATURE REVIEW

Ms.Yadav Rutuja[1]

Husqvarna, a Swedish manufacturer, this year is also introducing its Automated grass cuterto the U. S. market (it's been sold in Europe for about three years). It works much the same as the Robomow with a boundary wire implanted at the border of your lawn. The Husqvarna model, however, takes care of itself. Whereas the Robomow has to be taken out and set up and watched by the owner, the Husqvarna Automated grass cutter lives outside, mows when it's programmed to mow and automatically returns to its base for recharging. The Husqvarna model is also significantly lighter than the Robomow (15 pounds vs. the Robomow's 42 pounds). According to Husqvarna, this not only makes it safer, but it leaves no tracks on the lawn.

Ms.Mahesh Kadam[2]

Need of low cost crop cutter for a farmers Most of the Indian farmers facing the problem of lack of labours, higher cost consumed for a harvesting, manpower and time in harvesting system. Some of the conventional methods require more cost for cutting crops due to its heavy construction as well as more advanced features, and it is have a prices in lakhs which is not suitable for small land owners in India, and due to small area of land farmers are moved towards a conventional method that is more time and cost consuming method

Ms.B.Satish Kumar[3]

The operational principle behind the process of simple mechanical cutting mechanism is four bar chain mechanism mainly crank and slotted lever mechanisms. The crank wheel is revolved by the motor-power. Therefore, the rotating motion of the crank is changed into reciprocating motion to the knife-edge through the join link. Then after the thing to be cut is place on the stand.

"Design and Construct of Internal Pipe Inspection Robot"

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ABSTRACT
Pipelines have proven to be safest way to transport and distribute gases and liquid. In pipeline regular inspection is required to safety of pipe. An IPIR is a device that is insert into pipe to check for obstruction and various defects like hole, dent marks, cracks, and material loss due to any chemical reaction. Most of the pipeline have small internal diameter which finish up inaccessible. This analysis objective to design and manufacture IPIR using different sensors like Aurdino Nano, Infrared Sensor, and Gas Sensors (MQ-135). Furthermore Boroscopic Camera was also used for optical examination. This IPIR robot adjust simply to the spherical shape of a pipe and works on DC motor that supply the sufficient torque to robot. The robot is designed to be able to traverse horizontal and vertical pipes and has capability to report and display the view.
Keywords: *Internal Pipe Inspection Robot, Non-Destructive Test*

INTRODUCTION

Robotics has arisen as of the rapidly expanding engineering fields in current technology. Robots are directed to eliminate the involvement of mortals in hazardous workstations. Pipelines have proven to be the safest way to transport and distribute gases and liquids. In the pipeline, regular inspection is required to ensure the safety of the pipe. Usually, it is impractical to modify piping systems for internal pipeline inspection, so internal pipe inspection robots are developing robotic inspection services for pipeline systems. As it is generally impractical to modify piping systems for in-line inspection, pipe inspection robots continue to develop robotic inspection services for pipeline systems that are currently inaccessible. Primarily robots are designed in such a way that they reduce human intervention in labor intensive and hazardous work environment; sometimes it is also used to discover inaccessible workplace which is generally impossible to access by humans.

Many types of pipes are used to transport important lifelines like water and gas supply in our modern society. But newly many problems are happening in the pipelines because of natural climate and mechanical damages. If the damages in the pipe are caused due to corrosion then it is tough to check out the defects and the exact place of the defects. This examination must be required. If we decide to do this examination manually then a great amount of time, effort and labor are needed.

PROBLEM STATEMENT

- As it is generally impractical to modify piping systems for in-line inspection, pipe inspection robots continue to develop robotic inspection services for pipeline systems that are currently inaccessible.
- Recently, many industries use various diameter pipes for different applications, Hence there may be chances of problems like corrosion, cracking, dents, metal losses and leakages. These problems are unavoidable. The conventional method is very complicated, boring and costly. These problems are in industry, houses and power plants.

OBJECTIVES

1. To ensure the safety in pipeline industry.
2. To build a semi-autonomous internal pipeline inspection robot.
3. To design a robot that can move inside the pipeline.
4. To move the robot inside the pipe and inspect the area with minimum possible time.
5. It should be able to move in various diameters of pipe. (Range- 250mm to 350mm)
6. To detect hazardous gases.
7. To find location of defects such as cracks, blowholes, dent marks, damage at joints or at weld and blockage

LITERATURE REVIEW

M .N. Mohammed [1] Robots are devised in such way to dispose of human intervention from labour extensive and hazardous work environment. At times they are also used to travel to unreachable workplaces that are typically not possible to access by

"DEVELOPMENT OF NATURAL FIBER COMPOSITE FOR STRUCTURAL APPLICATION"

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Abstract

this study is to investigate the mechanical, hygral, and interfacial strength of continuous bamboo fiber reinforced epoxy composites. The untreated and alkali-treated continuous bamboo fibers were prepared from cutting the nature bamboo Culm. The basic characteristics of the bamboo fibers, such as density, equivalent diameter, and tensile properties were experimentally measured. The bamboo fiber reinforced epoxy (BF/EP) composites were fabricated by the resin transfer molding (RTM) process with the resulting fiber volume fraction about 42%. The strength of bamboo fiber was found to decrease with the alkaline treatment. However, alkali-treated bamboo fiber reinforced epoxy composites acquired better tensile strength than those with untreated bamboo fibers. The untreated bamboo fiber was believed to have weak interface with the epoxy resin, which was verified by the subsequent interface strength tests. The size effect of bamboo fibers on the tensile properties of the BF/EP composites was also studied. The results showed that the tensile strength and Young's modulus of the composite increase with the decrease of the bamboo fiber diameter. For the hydrothermal aging test, BF/EP composites are highly sensitive to moisture absorption, and the moisture has a detrimental effect on the mechanical properties of the BF/EP composite

Keywords – Epoxy, Composite, Fiber, Bamboo etc.

INTRODUCTION

Fiber Reinforced Polymer (FRP) is the most widely used composite. According to literature, glass fiber reinforced composites began mass production in the industry in the 1940s. Later, the advent of carbon fiber reinforced composites played an important role in defense and aerospace industry. In recent years, environmental awareness has emerged, and fossil fuels have gradually become depleted at the same time. The commonly used synthetic fibers such as carbon fiber and glass fiber are not easily decomposed in the natural environment and subjected to the problem of environmental pollution. As a result, the development of green composites and biodegradable materials has attracted much attention. In the 2010s, about 315,000 tons of natural fibers were made into composites, which accounted for 13% of the total reinforcing materials which include glass fiber, carbon fiber and natural fiber. It is estimated that by 2020s it will increase to about 830,000 tons. In the field of natural fiber reinforcement, a large number of plant fiber reinforced polymer composites have been used in the past years. Commonly used plant fibers include bananas, sisal, cotton, bamboo, and wood. These plant fibers have the advantages of low density, good thermal insulation and mechanical properties, low cost, durability, sustainability and biodegradability.

Bamboo is a suitable choice for the development of natural fiber composites. It grows rapidly, up to several centimeters per day, and has excellent mechanical properties. There were numerous bamboo fiber extraction methods such as retting, steam explosion, alkali treatment, and degumming, etc. All the extraction methods will directly affect the quality and strength of the fibers.

Bamboo is a natural honeycomb fiber-reinforced composite material. Vascular Bundles are surrounded by parenchyma cells. The vascular bundle consists of vessels, a phloem, and a large number of fibers. Parenchyma cells are a lignified wall composed of lignin, cellulose and hemicelluloses. In the entire bamboo stalk, fiber and parenchyma occupy 40% and 50% respectively. The cell structure of fiber in the vascular bundle has a small hole in the middle, which is surrounded by a multi-layer structure consisting of a secondary wall and a primary wall from the inside to the outside. These cell walls consist of cellulose, hemicelluloses, polysaccharides and pentose sugars. There is also an intermediate layer outside the primary wall between fibers. There is also an intermediate layer outside the primary wall between vascular bundles.

The main component of this layer is lignin with the content of more than 90%. The cell wall structure and mechanical properties of bamboo fibers were studied using scanning electron microscopy (SEM), Atomic

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Mobile Crane for Workshop

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Abstract: ***In material handling, the cranes play a vital role in modern manufacturing industries. In our project we aim to fabricate a hydraulic operated floor crane for handling various kinds of materials. The hydraulic floor crane consists of mast, boom, base, lift cylinder, hand lever, hook and wheels. The hydraulic cylinder is pumped with the help of hand lever at the same time the material with the help of hook and hydraulic cylinder released to the pressure valve so the material is unloaded. The material from one place goes to the other place with the help of hydraulic floor crane. The crane reduces the worker's fatigue and increases the overall efficiency of production process with good safety. The crane is fabricated with complete clear front, small compact frame, good reach, high lift. The crane has the capacity of lifting 250kg to half ton with wide spread application in the shop floor. Thus the floor crane would serve as a safe and versatile model for material handling operations.***
Keywords: Hydraulic, Material handling, crane, fatigue.

I. INTRODUCTION

The development of lift machine or crane has reached through different time starting the first crane for lifting heavy load was invented by ancient Greeks in the late 6th century BC. The heydays of crane in ancient times come during Roman Empire when construction activity soared and buildings reached enormous dimensions. The Romans adapted the Greeks cranes and developed it further. The simplest Romans crane is the trespasses, which consists of a single beam jib, a winch, a rope, and a block containing three pulleys. Having this mechanical advantage of 3:1, it has been calculated that a single man working the winch could raise 150kg [3pulles*50kg=150kg], assuming that 50kg represent the maximum effort of a man can exert. Over a long time period heavier crane type featured five pulleys (pentaspastos) or in case of the largest one a set of three by five pulleys (polyspestos) and came with two, three, or four masts depending on the maximum loads. The polyspestos when operated by four men at both side of the winch could readily lifts 3000kg[3 ropes*5 pulleys*4 men*50kg=3000kg] If the winch was replaced by a trade wheel, the maximum load could be doubled to 6000kgs, because the trade wheel have much bigger mechanical advantages due to its higher diameters. This means comparing with the construction of Egyptian pyramid where in 50 men are needed to move 2.5 tons of stone up the ramp (50kg per persons). The lifting capability of the Roman polyspastos is proved to be 60 times higher than the Egyptian system of lifting stones. During the high middle age the trade wheel was introduced on large scale after the technology had fallen in the Western Europe with dismiss of Western Roman Empire. The earliest reference to the trade wheel reappears in the archival literature in France about 1225. Generally vertical transport could be done more safely and inexpensively by crane than customary method. Typical areas of application were harbors, mines, and in particular building sites where the trade wheel crane played a pivoted role in the construction of lofty Gothic cathedrals. In contrast to the modern cranes, middle age cranes and hoists –much like to their counter parts in Greece and Rome were primarily capable of a vertical lift, not used to move loads for considerable distance horizontally as well. It is not worthy that middle age cranes rarely featured ratchets or brakes to forestall the loads from running backwards. This curious absence is explained by a high friction force exercised by middle age trade wheels, which normally prevented the wheel from accelerating beyond control. With the onset of the industrial revolution, the first modern cranes were installed at harbors for loading cargo. It gains a dominant relevance in engineering workshops and warehouses for carrying, loading and unloading of heavy materials, mostly where there are no provisions for overhead crane. At that times even when there are overhead cranes, space might be a limiting factor to their use which makes the portability nature of the mobile floor crane a great advantage. In repair garages, it is also used in handling engines and its parts. It is also used in industries for transporting materials from one place to another. It gains relevance also in the installation of new machine, where it is used in proper positioning of the machine. Most importantly, its simplicity reduces the cost of labour as it does not require any special skill in its operation.

A. Problem Definition

Mobile cranes have specified lifting capacities based on their design and configuration. Exceeding the crane's lifting capacity can put excessive stress on the crane's structure and compromise its stability, leading to accidents and potential collapse. Overloading a mobile crane carries significant risks, including the potential for accidents, property damage, and harm to workers or bystanders.

AUTOMATION OF DEBURING PROCESS FOR PT CUP

Sachin Desai, Ishwar Kamble, Krushna Chendge, Pooja Thopate, Abhijit Bhise

Abstract:

Deburring is recognized as an ideal technology for robotic automation. However, since the low stiffness of the robot can affect the deburring quality and the performance of an industrial robot is generally inhomogeneous over its workspace, a cell setup must be found that allows the robot to track the toolpath with the desired performance. In this work, the problems of robotic deburring are addressed by integrating components commonly used in the machining industry. A rotary table is integrated with the robotic deburring cell to increase the effective reach of the robot and enable it to machine a large workpiece.

A genetic algorithm (GA) is used to optimize the placement of the workpiece based on the stiffness of the robot, and a local minimizer is used to maximize the stiffness of the robot along the deburring toolpath. During cutting motions, small table rotations are allowed so that the robot maintains high stiffness, and during non-cutting motions, large table rotations are allowed to reposition the workpiece. The stiffness of the robot is modeled by an Artificial Neural Network (ANN). The results confirm the need to optimize the cell setup, since many optimizers cannot track the toolpath, while for the successful optimizers, a performance imbalance occurs along the toolpath.

Key words: PT cup - Pressure Time cup Fuel Injector part. Deburring- Removing metallic burr, COBOT- Collaborative robot

Introduction:

Cobot, short for collaborative robots, are advanced robotic systems designed to work alongside humans in a shared workspace. They are specifically designed to enhance productivity and safety in industrial applications. One area where Cobot have made significant advancements is in the automation of the deburring process for PT (Pressure Time) cups. Deburring is the process of removing burrs or sharp edges from metal components, such as PT cups, after machining operations. Traditionally, deburring has been a labor-intensive and potentially hazardous task, requiring manual handling of sharp tools. However, the introduction of Cobot has revolutionized this process.

Firstly, it eliminates the need for manual labour, reducing costs and improving productivity. The consistent and precise deburring performed by Cobot also ensures high-quality finished products. Additionally, Cobot can work continuously without fatigue, leading to improved overall through put. It will explore how these technologies have been integrated into the PT CUP deburring process to achieve higher levels of automation and improved process control.

In summary, the automation of the deburring process for PT cups using Cobot brings numerous advantages, including increased productivity, improved quality, and enhanced workplace safety. With their collaborative nature and advanced capabilities, Cobot are transforming industrial processes and revolutionizing the way tasks like deburring are performed.

Problem Statement:

The deburring process for PT cup is currently performed manually, which is time-consuming, labor-intensive, and prone to inconsistencies. The process involves removing excess material and smoothing the edges of the cups to ensure their precision and quality. The manual deburring process not only leads to inefficiencies and inconsistencies but also poses potential risks to worker safety due to the repetitive nature of the task. The manual deburring process for PT cups is time-consuming, labour-intensive, and prone to human errors. There is a need to automate the deburring process to improve efficiency, productivity, and consistency while ensuring high quality.

Manually deburring process:

The deburring process for PT cup is currently performed manually, which is time-consuming, labour-intensive, and prone to inconsistencies. The process involves removing excess material and smoothing the edges of the cups to ensure their precision and quality. The manual deburring process not only leads to inefficiencies and inconsistencies but also poses potential risks to worker safety due to the repetitive nature of the task.

Solar Operated Maize Separator

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Abstract

The objective of this work is to construct a simple and affordable maize shelling machine that is powered by solar energy. The method adopted involves the selection of a direct current (DC) operated motor which consumes less power and is locally available. Based on the available motor, the mechanical part is fabricated to work with the motor. Chain drive power transmission method is adopted between the motor and the mechanical tool. he improvement in this work is the introduction of a sustainable and affordable powering method. Design calculation has suggested the use of a 20-watt solar panel. A battery of 18Ah capacity is used as storage. Test carried out on the maize separator machine shows that it has the ability to shell 24 kg of kernel in one hour. It has also been shown that the developed device has an efficiency of 97.56%. The total production cost of this sheller (together with the solar power system) is approximately eight thousand rupees (8000rs.).

Keywords—*Motor, Mechanical Tool, Solar Panel, Maize, Chain Drive, etc.*

I. INTRODUCTION

Corn is cultivated globally, being one of the most important cereal crops worldwide. It is, after wheat and rice, the most important cereal grain in the world, providing nutrients for humans and animals and serving as a basic raw material for the production of starch, oil and protein, alcoholic beverages, food sweeteners and more recently, fuel. In ancient days, people processed maize by hand to tear the skins of corn and take off the kernel by simple tools even by hand. Many farmers grow maize but could not afford the cost of acquiring some of the imported threshing machines because of their cost. Such people resort to manual means of threshing which results into low efficiency, high level of wastage and exerting of much labor. Corn threshing machine was constructed to shell maize and separate the cob from the grains. Large scale shelling for commercial purposes is not possible due to fatigue. Traditional shelling methods do not support large-scale shelling of maize. Hand shelling takes a lot of time, even with some hand operated simple tools. There are many machines which can shell maize, but these are usually unaffordable for rural farmers.

The hand shelling method usually involves using conventional finger–palm method for the removal of kernels by pressing it between thumb and palm. Some simple hand-held device has also been developed. These methods are tedious, painful and time consuming as it takes a lot of time before farmers complete the shelling of their maize. Beating by stick method usually result to damage to the kernel which reduces its commercial value. In order to reduce the efforts and time needed by the farmers in shelling, engine or electric motor driven maize sheller has been developed. Many of these shellers are expensive and as a result of this, are out of reach of the local farmers. Also, these shellers are usually powered either by combustible engines or alternating current (AC) driven electric motor. The combustible engine needs fuel (petrol or diesel) while the electric motor requires the presence of national electric grid or generator. These two sources of powering the shellers are usually not available or affordable to the local farmers. As a result of the aforementioned problems, farmers have continued to shell maize by hand not minding the disadvantages involved, thus, the need to develop a simple and affordable motorized sheller that is powered by solar energy system. It is important to state that solar systems can also be used to power AC motor with the help of an inverter. However, the introduction of inverter increases the cost of production and reduces the reliability of the developed sheller.

Solar power is the largest source of energy available today. The energy from sun cannot be exhausted, so, it far exceeds any foreseeable future need. The photovoltaic (PV) solar cells which are used to convert the energy from sunlight into electrical energy. The method adopted in this work is the usage of PV systems. Figure 1 shows the block diagram that describes the connection of a PV solar power systems. The solar panel converts the sun's energy into electrical energy in form of DC. The DC from the panel is used to charge the battery through the charge controller. The charge controller is used to regulate the charging of the battery. The charge controller also has terminals to connect DC loads. In case the solar system is to supply an AC load, an inverter is needed to convert the DC from the battery to AC. This work modifies a simple maize sheller by to accommodate DC powered motor. It should be noted that, with the DC motor, the inclusion of inverter has been eliminated in the solar power systems, which increases the affordability and reliability of the developed device. Since the

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Solar Operated Air Compressor

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Abstract: ***Solar energy is a renewable energy source which can be used in many applications such as energy production, heating, cooking, etc. Air compressors, sometimes called gas compressors, are devices or tools which reduce the volume of a gas thereby creating pressure and heat in the compressor tank ,to operate these air compressors, a lot of electrical power is required based on the air outlet pressure. Non-renewable resources for electricity generation have become limited and are about to disappear, leading to high energy costs or an energy crisis. In such situations, renewable sources such as solar are very useful and the application of this technology for running the air compressor is called solar air compressor.***
Keywords: Air compressor, Solar Energy.

I. INTRODUCTION

When we see the scenario of today, it is clear that there is a worldwide demand for Clean and Renewable Energy. The first problem is that fossil fuels are becoming depleted rapidly and it will be more difficult to recover them. That's why, if we don't take care of it now, we could face energy crises in the future. The cost of energy will skyrocket, and a lot of individuals or countries won't have it. We need to find alternatives and use them to their full potential in order to avoid such a disaster scenario. The land is warming up, and the climate has changed. The parts of the world are going to get drier if more rains and sunshine came, but other parts won't be as dry. The thinner Ness of the ozone layer is a further bad thing, which will also lead to Earth warming. In addition to these two effects, it is more important than ever to take another step in a different direction. We're going to make use of renewables in this step.

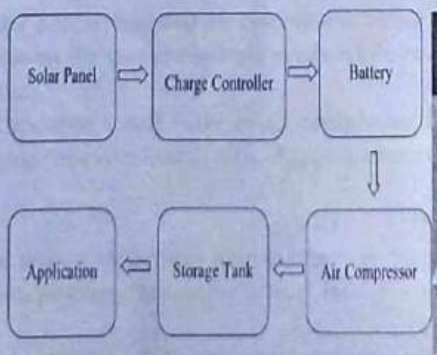
II. PROBLEM STATEMENT

Vehicle Puncture is suddenly occurring major problem. Puncture repairing shop is far away from our college and air compressor completely depends on electricity due to electricity fluctuation and unavailability of electricity in some rural areas we can't completely rely on electricity and also puncture repairing shop is far away from our college.

III. OBJECTIVE

1) To construct solar-operated air compressor to provide an environmentally friendly, cost-effective, and sustainable solution for compressed air needs while reducing reliance on traditional energy sources and minimizing the environmental impact.
2) To modify the auto cutoff valve of air compressor to set the maximum pressure at 60psi and find the charging time required of battery.

IV. EXPERIMENTAL SETUP



Layout

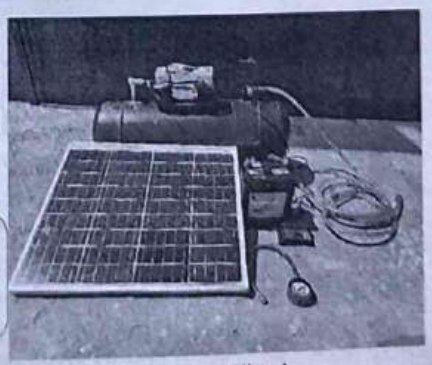


Fig. 1

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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]

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On pseudo-ideals in partially ordered ternary semigroups

Machchhindra Gophane and Dattatray Shinde

Abstract. We study the properties of different types of pseudo-ideals of a partially ordered ternary semigroup and prove that the space of all strongly irreducible pseudo-ideals of a partially ordered ternary semigroup is a compact space.

1. Introduction

In [2], Hewitt and Zuckerman specified the method of construction of ternary semigroups from binary and specified various connections between such semigroups. Ternary semigroups are a special case of n-ary semigroups. So many results on ternary semigroups has an analogous version for n-ary semigroups. F.M. Sioson [5] proved some results on ideals in ternary semigroups. In [1], W.A. Dudek and I.M. Grożdzińska characterized some classes of regular ternary semigroups by ideals can be deduced from general results proved for n-ary semigroups. The notion of prime, semiprime and strongly prime bi-ideals in ternary semigroups was introduced by M. Shabir and M. Bano in [4]. The concept of ordered ternary semigroups was developed by A. Iampan in [3].

Our aim of this article is to introduce the concepts of prime pseudo-ideals and irreducible pseudo-ideals in a partially ordered ternary semigroup and to study their properties. We also prove that the space of all strongly irreducible pseudo-ideals of a partially ordered ternary semigroup is a compact space.

2020 Mathematics Subject Classification: 20M12, 20N99, 06F99.
Keywords: partially ordered ternary semigroup, pseudo-ideal, prime pseudo-ideal, irreducible pseudo-ideal.

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On Prime Ideal Space of a Partially Ordered Ternary Semigroup

DATTATRAY SHINDE and MACHCHHINDRA GOPHANE

ABSTRACT. In this paper, we introduced the hull-kernel topology τ on the set $\mathcal{P}$ of prime ideals in a partially ordered ternary semigroup T and investigated various topological properties of the structure space $(\mathcal{P}, \tau)$. We also obtained some useful results about compactness and connectedness of the set of all prime full ideals of T.

1. INTRODUCTION

In 1932, Lehmer [8] studied the literature of a ternary algebraic system. The ternary semigroup is a particular case of n-ary semigroups. So many results on ternary semigroups have an analogous version for n-ary semigroups. The ideal theory in ternary semigroups was introduced by F. M. Sioson in 1965. Shabir and Bashir [11] introduced and studied the notion of prime, semiprime and irreducible ideals in ternary semigroups.

Iampan [2] has introduced the notion of partially ordered ternary semigroups, which is a generalization of an ordered semigroup and a ternary semigroup. In [9], the ideal theory of a partially ordered ternary semigroups is introduced. Siva Rami Reddy et al. [10] defined and studied the notions of complete prime ideals, prime ideals, complete semiprime ideals, semiprime ideals of partially ordered ternary semigroups. Shinde and Gophane [12] introduced and studied the notions of prime, semiprime and irreducible pseudo symmetric ideals in partially ordered ternary semigroups and proved that the set of all strongly irreducible pseudo symmetric ideals is topologized.

Kar [4] introduced and studied the concept of the structure space of ternary semirings. He also studied the various properties of this structure space. The notion of the structure space of Γ- semigroups was introduced by Kar and Chattopadhyay in [5]. Kostaq et al. [7] introduced the some special classes of all proper prime k-ideals, prime ideals and strongly irreducible ideals in Γ- semirings. They also obtained the topological spaces of these ideals of Γ- semirings. Jagtap and Pawar [3] studied the space of prime ideals of a Γ- semiring and properties of the space of prime ideals of a Γ- semiring.

In this article, we introduce and study the concept of the structure space of partially ordered ternary semigroups. We consider the set $\mathcal{P}$ of all prime ideals of a partially ordered ternary semigroup T and build the topology τ on $\mathcal{P}$ using the closure operator defined in terms of intersection and inclusion relations among these ideals of partially ordered ternary semigroup T. We investigate various topological properties of space $(\mathcal{P}, \tau)$. This topological space $(\mathcal{P}, \tau)$ is referred as the structure space of the partially ordered ternary semigroup T. We also studied the compactness, connectedness and separation axioms in this topological space $(\mathcal{P}, \tau)$.

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