STUDY ON ROBOTICS IN INDIAN CONSTRUCTION INDUSTRY

[1]Alisha S Hameed, [2]P Gokuldeepan, [3]Dr.M.Rama

[1] ME Student, Department of Civil Engineering, Easa College of Engineering and Technology, Coimbatore, India

[2]Assistant Professor, Department of Civil Engineering, Easa College of Engineering and Technology, Coimbatore, India

[3]Assistant Professor, Department of Civil Engineering, Goverment College of Technology, Coimbatore, India

*Abstract:*The construction industry's contribution to the gross domestic product (GDP) in the developing countries like that of in India is around 10%. Under the Make in India scheme, it is expected that $1000 Billion investments for infrastructure sector would be accomplished in the next few years. Today the construction industry is one of the most un-practiced fields in terms of automation. The importance of construction automation has grown rapidly in developed countries. In developing countries like India, the construction industries need automation technologies such as new machineries, electronic devices, the automation of road, tunnel, and bridge construction; earthwork, etc. Robotics technology developed rapidly during the 1980s, particularly in Japan, to tackle labour shortages due to an aging workforce and younger workers being reluctant to do hard physical labour. Every developed country and region is now experiencing this aging problem. Injuries are more severe among older workers thus compensation costs increase with the age of workers. It is hoped that robots can do all the high-risk tasks (like demolition and working at height) and solve labour shortages in specific skilled tasks. The construction industry being labour intensive requires more numbers of skilled labour, good quality of work, and increase in productivity etc. The problems associated with construction work such as decreasing quality of work, labour shortages, and safety of labour and working condition of projects can be overcome by new innovative technologies such as automation which has the potential to improve the quality, safety, and productivity of the construction industry.

Today, it is evident that the level of automation in construction is very low in comparison with current technological advances. That is why we must make new efforts to increase the automation level of this important sector to enhance productivity and quality along with economic growth.

Index Terms - *human resource automation, robotics*

I.INTRODUCTION

The construction industry of India is an important indicator of the development. It is visualized to play a powerful role in economic growth.Automation and robotics is the hot new trend in many different industries. Businesses are looking for ways of automating repetitive, time-consuming, and dangerous tasks to enhance efficiency and improve the safety of workers. The construction industry is no different. In fact, automation is an excellent solution for builders to increase operational efficiency and to cut down on costs.The scope of automation in the construction industry is quite broad, extending from initial planning stages all the way to operating and maintaining the final structure.

II. DATA COLLECTION

The procedure of collecting, measuring, and evaluating correct insights for research using established approved procedures is referred to as data collection. On the basis of the facts gathered, a researcher might evaluate their hypothesis. Regardless of the subject of study, data collecting is usually the first and most significant phase in the research process. Depending on the information needed, different approaches to data gathering are used in different disciplines of study. The most important goal of data collecting is to collect information-rich and accurate data for statistical analysis so that data-driven research decisions may be made.

III. LITERATUREREVIEW

Autonomous Robotic Manipulation: Real-Time, Deep-Learning Approach for Grasping of Unknown Objects Malak H. Sayour,[1] Sharbel E. Kozhaya,[2] and **Samer S. Saab(2022)** Recent advancement in vision-based robotics and deep-learning techniques has enabled the use of intelligent systems in a wider range of applications requiring object manipulation. Finding a robust solution for object grasping and autonomous manipulation became the focus of many engineers and is still one of the most demanding problems in modern robotics. This paper presents a full grasping pipeline proposing a real-time data-driven deep-learning approach for robotic grasping of unknown objects using MATLAB and convolutional neural networks. The proposed approach employs RGB-D image data acquired from an eye-in-hand camera centering the object of interest in the field of view using visual servoing. Our approach aims at reducing propagation errors and eliminating the need for complex hand tracking algorithm, image segmentation, or 3D reconstruction. The proposed approach is able to efficiently generate reliable multi-view object grasps regardless of the geometric complexity and physical properties of the object in question. The proposed system architecture enables simple and effective path generation and a real-time tracking control. In addition, our system is modular, reliable, and accurate in both end effector path generation and control. We experimentally justify the efficacy and effectiveness of our overall system on the Barrett Whole Arm Manipulator

G Beni, S Hackwood (2003) the construction project's requires people of different skills, equipment, materials and machinery for each and every activity as result of which the construction process becomes complicated. Apart from the difficulties faced by the construction industry the two factors safety and quality have been the major determining factors for the outcome of the construction projects. Due to faulty construction works and unsafe working conditions, the works have to be demolished and rebuilt leading to loss in labour time and escalation of cost the project

Yvonne Ludewig(2013)A service robot should provide useful features and be easy to use. As a social actor, a service robot should also demonstrate friendly and accommodating behaviour. This paper focuses on the socio-emotional requirements described above. A marketable shopping robot was equipped with an extravert personality to improve its social acceptability

H N Divakar(2018) Automationthrough robots is not a new concept. Many of the manufacturing and service sectors are adopting most sophisticated robots to increase productivity and reliability. Construction industry which is most unorganized and labour intensive is no different. Robots are employed to map the construction site, to lay bricks, to fulfill materials as required etc. But still the modern huge structures and buildings are painted by human laborers. The chemical paints, working height poses high threat to the safety of painters. Adopting a Robot may eliminate these problem by working at great heights and improving the tangible benefits like productivity of painting process, reducing manpower, reducing construction lead time and construction costs thereby improving quality, work conditions, safety. Along with reviewing the development of automated wall painting, two new concepts of light weight, easy to handle exterior wall painting robot is discussed in this paper.

IV. RESEARCH METHODOLGY

- o Data collection on existing system
- o Examination of present state of robotics
- o Examine construction in the view of robotics and automation
- o Study on implementation needs
- o Analysis on productivity and economic growth
- o Conclusions

V.OBJECTIVES OF THE STUDY

To study the how much amount of Automation is utilized in current construction industry and its future trends , and study which barriers are highly affect to apply in construction and how it can be minimized. Intelligent and integrated control over all construction processes to optimize resource value. To improve and achieve ideal optimum value of construction quality, safety, profitability and productivity.

VI. NEED OF THE STUDY

The reason for this study is to identify Benefits of automation, and future trends of automation in construction. To Analyse, which are the main obstacles to implementation on site and how it can be minimized.

VIII. DATA COLLECTION

Data were collected with the incorporation and analysis of various stages of construction and planning for the examination and comparison of the effects of application of the robotics in the construction industry. A wide study was made on the point and various barriers , challenges and even outcomes were the subject for review.

IX. RESULTS AND DISCUSSIONS

STUDY ON POOR QUALITY AND SAFETY STANDARDS

In today's construction process, due to involvement of huge amount of materials, manpower and machinery and at the same time high pressure and effect of deadlines, a compromise is made on safety and quality standards to achieve the required goals of the project. In this project, an effort is made to study the major safety and quality lacunae that are widely present such as ,

Placement of reinforcement bars of appropriate dimensions with required spacing and direction with proper binding,Proper finishing of surface of floors and walls to ensure complete finish and lack of damage and rough surface. Quality inspections carried out in finished structures to ensure that the final outcome confirms with the required standard of quality and finish as required. Spray of paints and other finishes on surface of falls with proper uniformity in application. Carry of loads manually by labour from one place to another which may contribute to trip and fall and also has a serious effect on ergonomics. Possibility of working personnel to trip and fall into excavated area which may lead to injury and at times even act fatal. Accidents and injuries that may occur due to fall of debris on personnel during process of demolition of structures. Possibility of working personnel to fall from height due to absence of safety belt or other protective provisions which may result in heavy injury or death.

STUDY ON ROBOTICS AND AUTOMATION IN MANUFACTURING SECTOR

The use of robotics and automated equipment's are used to a large extent in order to increase the productivity and work efficiency of manufacturing sector. Also the dependency on labor for many major work practices is reduced to a maximum thus leading to a mechanized work culture in industries.

Once the economic analysis and cost comparison between automated process and manual procedure of performing activities in construction is performed, final conclusion based on the summary of analysis is provided as to such automated techniques are feasible to be used in construction and are practically and economically viable or not. Based on it, suggestions for betterment of the study to enable complete automation in construction to enhance safety and quality standards is provided, which can be usd in future studies as well.Based on the inputs and data obtained from the types of robots used in manufacturing sector, innovation was made to utilize similar technology to suit the needs of the construction industry in order to enhance the safety and quality output obtained from each project.

Once the different types 1of robots were finalized, economic analysis using various tools and procedures are carried out to ascertain if it is practically feasible for application of thetechnology in the field of construction to obtain maximum benefits in its performance in various aspects like time and material consumed, cost incurred etc.

X.CONCLUSION

With little hope of reversing a long-standing labour shortage, automation technologies are the way forward for the construction industry when it comes to enhancing productivity and boosting profits. The adoption and integration of automation, and the widespread use of prefabrication may be the best opportunities for the construction business to thrive in the next decade.

A robotic manipulator is combined to suit various working conditions and building materials as module type. Therefore it is possible to handle a variety of building materials in various construction sites. To improve technology of human-robot cooperative manipulation, lightweight robot link, robust robot force control, flexible robot arm and tele operation based on force feedback will be developed in the future.By using of automation technologies in construction had a major influence on project performance with greater influence on improved work quality, time saving, improving working condition, safety improvement, and high productivity in work. The benefits of executing automation technologies s is the need of the present infrastructure project and development firms to increase the productivity great, increase the safety for workers, and good quality of work. Small and

medium size firm are the need of automation advances to implementation in various areas.Quality of output is greatly increased and cost incurred for rework and scrap is reduced by 66.76% by employing automation. Also accidents and man hours lost are reduced to a great extent as labour participation in works involving automated machinery is minimal.Also, based on the output obtained from the performance of the project, the following recommends can be made.

Robotics and automation if not to a large extent, can be slowly introduced into the construction sector in the Indian context to keep abreast of foreign technologies.Low cost indigenous robots usage can be promoted, resulting in lower cost and interest among public to carry on research in the field.Replacement of labours completely by automated machinery in hazardous working conditions to Preserve health of labour and also to reduce occurrence of accident. The ideas presented in the project are a prototype of the possibilities that can be further developed and utilized for practical applications in real life scenario.

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