IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

National Level Conference – AITCON 2K25

Adarsh Institute of Technology & Research Centre, Vita, Maharashtra

Vol. 12, Special Issue 1, March 2025

Use of Artificial Intelligence in Civil Engineering

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Abstract: In today's modern work everywhere there is a hype of computer technology and Artificial intelligence. In civil engineering it is helpful to manage all the manpower, resources, decision making, safety related issues like to predict accidents before happens. The real time cost reduction of any site under construction can be made with the help of AI. The parameters such as Quality, Assurance, Efficiency, Production, sustainable infrastructure too can be related to AI. In this Paper an attempt is made to use Artificial intelligence software in ready mix concrete plants, which provide an innovative feature that will help concrete manufactures to manage, control, Predicts, regulate, Networks.

Keywords - Artificial intelligence, Ready mix Concrete plant, Artificial neural

I. INTRODUCTION

It is the art and science of creating intelligent machines, particularly intelligent computer programmes. It resembles the task of using computers to understand human intelligence. Basically, Artificial Intelligence refers to the intelligence displayed by machines. Artificial Intelligence (AI) has grown extremely prevalent in today's world. It is the simulation of human intelligence in computers that have been programmed to learn and mimic human actions. These machines can learn from their mistakes and do activities that are similar to those performed by humans. [1].

Civil engineering, the backbone of our modern infrastructure, has always been about designing, building, and maintaining the physical and natural environment. In today's fast-paced world, the field is undergoing a transformative evolution, thanks to the infusion of artificial intelligence (AI). AI is changing how civil engineers plan, construct, and manage projects, offering unprecedented opportunities for innovation, efficiency, and sustainability. Artificial intelligence (AI) is a branch of computer science that aims to create machines and systems that can perform tasks that normally require human intelligence, such as learning, reasoning, and problem-solving. AI has been rapidly developing and advancing in recent years, thanks to the availability of large amounts of data, powerful computing resources, and sophisticated algorithms. AI has been applied to various domains and industries, such as healthcare, education, finance, and entertainment, to provide new solutions and opportunities. [2]

Artificial intelligence-based technologies may frequently offer useful options in effectively addressing challenges in civil engineering, as traditional approaches for modelling as well as optimizing building and engineering networks need immense quantities of computational power. Artificial intelligence (AI), also referred to as enhanced intelligence (AI), seems to be a transformative method that uses machines to carry out tasks intelligently, effectively, and efficiently. This is regarded as being one of the methods which combines human strengths in what seems like a way that enables the project to be completed neither robot neither person by itself can perform. By taking into account AI ideas, whatever knowledge may be made standardized and easily accessible towards consumers, enabling them to make the best decision possible while taking into account both facts at hand as well as verifiable evidence. [3]

AI models in civil engineering can be used for accurate, cheaper, and less disruptive construction projects. In modern structures, artificial intelligence is being utilised to plan the routing of electrical and plumbing systems. Artificial intelligence (AI) is being used to track real-time interactions between personnel, machinery, and items on the job site and supervisors for potential safety hazards, construction errors, and productivity concerns. Simulated intelligence makes it simpler for those who engage with the development business by making it more sensible. It gives more open doors in a structural design by making it an appealing field of work. [4].

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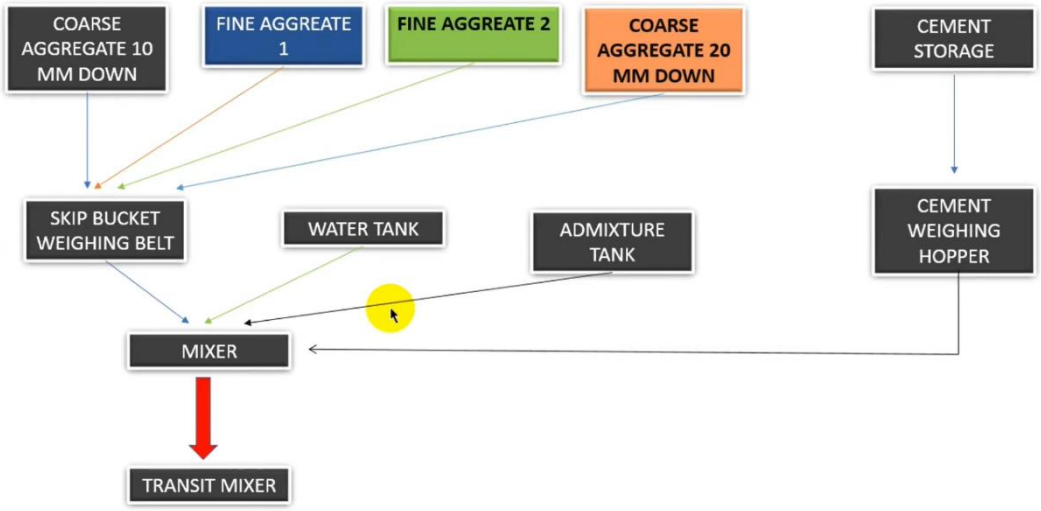

Fig. Working of RMC Plants

II. USES OF ARTIFICIAL INTELLIGENCE IN CIVIL ENGINEERING

For many years, deep learning technologies have been successfully applied in many different sectors—civil engineering included. In fact, machine learning technique took the centre stage in the industry long ago with the emergence of complex buildings such as skyscrapers. Now more than ever, we see the application and development of AI in the construction industry, which includes the use of intelligent algorithms, big data, and deep learning machines that have transformed productivity performance.

Practicing civil engineers, contractors, and service providers have all been using AI to solve a whole range of problems. For instance, Artificial Intelligence in civil engineering has become more sophisticated, with efficiencies feeding directly into construction processes.

AI is also applied in the initial stages of many projects in design optimization, risk control, and improving productivity .It is imperative to realize construction companies that have already started implementing AI practices are 50% more profitable. More importantly, Artificial Intelligence as a whole has a range of functions in civil engineering. In an age where machines can think rather than just do, engineers can make better judgments while discharging their services more effectively.

If not convinced, here are some uses of AI in civil engineering that have revolutionized the industry. BIM technology has been widely used and successfully implemented in many projects and allows e-information models of new solutions to be collaboratively shared and developed, thus saving time and improving delivery.

III. METHODOLOGY

Artificial intelligence in RMC plants offers a multitude of functions to help carry out batch sequences conveniently and more precisely. The application of artificial intelligence software in RMC plants provides a set of extraordinary and innovative features that help concrete manufactures to control, manage, regulate, predict, and put up with their fully mechanized and optimized production processes.

IV. RESULTS AND DISCUSSION

With artificial intelligence, concrete producers enhance production while supporting quality demands. One essential element for planning and controlling a construction project is an accurate prediction of the productivity of an RMC plant. A comprehensive evaluation is needed to ensure consistency of the construction equipment's nominal values and actual manufacture values on the site.

The application of intelligence machines helps in presenting Artificial Neural Networks, Genetic Algorithm (GA) for mathematical calculations, and Support Vector Machine, to help predict the productivity of an RMC plants. The application of AI in the concrete batch pre-sets more precise details from the SMV model and conventional techniques.

Before introducing AI in the concrete industry, the obsolete technologies were incapable of handling the nonlinear relation between components and high-performance concrete (HPC) due to the limitation of use, expensive costs, and incompetence. Thus, the application of AI in the concrete batch sector helps maximize the mixing design of HPC to deliver beneficial results for the construction industry.

The primary aim of introducing AI in the RMC plant production processes is to enhance organizational performance in the concrete sector, augment productivity, and reduce aggregate operations and ready-mix costs.
AI application in RMC plants helps predict failure, optimize production processes, remote operation, product design and quality, smart supply chain, and predictive maintenance. Artificial intelligence in the RMC plant is significant due to the machine's capacity to enhance knowledge and standardize in the aim of reducing human dependence.

The software can provide better support compared to conventional decision-making technologies by making complex decisions. AI paves the way for superior performance and high manufacturing power that are more adaptive to batch concrete manufacturing plants. They can be adjusted to any revised stratagem and manufacture plans. AI has enhanced the concrete batch plant's performance to attain high precision level details, resulting in optimal product quality, maximum batching productivity, and dispatching efficiency. This Technical paper is an effort that is based on secondary data that was gathered to understand ROI, mobility, reliability, and remote operations control.

AI software that has been successfully installed in more than one thousand concrete plants globally, replacing obsolete software. The software is suitable and applicable to any concrete production processes, PC hardware, RMC plant type, and automation. With this software, RMC concrete producers can effectively control, dispatch, batch, and conduct all managerial functions remotely at any time.

RMC plant automation presents automated systems for cement handling, aggregate handling, and any continuous or batching production processes. This software is applicable in various production automation features, like, order entry and ticketing, accounting integration, graphical user interface, and batch plant automation. Besides, the software is applicable in plant simulators, remote batching, slump adjustment, and mixer control.

V. CONCLUSION

Artificial intelligence has become an indispensable tool in modern civil engineering. Its ability to process vast amounts of data, improve design, optimize construction processes, enhance project management, and contribute to sustainability is revolutionizing the field. In a world where efficiency, sustainability, and safety are paramount, AI in civil engineering is a promising and exciting field of research and practice that can transform and revolutionize the civil engineering discipline and industry.

This Research paper is an effort that is to apply the knowledge and technology of Artificial intelligence in RMC plants to improvise the old conventional method to replace new era AI software.

VI. ACKNOWLEDGMENT

The completion of this Research paper would not have been possible without the support and guidance of Mr. S. S. Pawar, lecturer, Adarsh institute of technology and research Centre, vita. His dedication and overwhelming attitude towards helping his students is solely responsible for completing my technical paper. The encouragement and insightful feedback were instrumental in accomplishing this task.
I thank all the staff of Civil Engineering Department, Adarsh institute of technology and research Centre, vita for their cooperation and kind support throughout my research period.

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