



# INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

## FUTURE OF AI IN CONSTRUCTION INDUSTRY OF INDIA

Sanjib Ali, Rudranath Saha, Kumari Pallavi Rani, Rudra Kanta Gouri, Abhinaba Dipankar Dey.

Designation all of the Author's is M. Tech (Structural Engineer) Narula Institute of Technology .

### Abstract:

Artificial intelligence (AI) is proving to be an efficient alternative approach to classical modeling techniques. AI refers to the branch of computer science that develops machines and software with human-like intelligence. Compared to traditional methods, AI offers advantages to deal with problems associated with uncertainties and is an effective aid to solve such complex problems. In addition, AI-based solutions are good alternatives to determine engineering design parameters when testing is not possible, thus resulting in significant savings in terms of human time and effort spent in experiments. AI is also able to make the process of decision making faster, decrease error rates, and increase computational efficiency. Among the different AI techniques, machine learning (ML), pattern recognition (PR), and deep learning (DL) have recently acquired considerable attention and are establishing themselves as a new class of intelligent methods for use in structural engineering. The objective of this review paper is to summarize techniques concerning applications of the noted AI methods in structural engineering developed over the last decade. First, a general introduction to AI is presented and the importance of AI in structural engineering is described. Thereafter, a review of recent applications of ML, PR, and DL in the field is provided, and the capability of such methods to address the restrictions of conventional models are discussed. Further, the future of AI in India is discussed.

### INTRODUCTION

In recent years, technology is increasingly being used in a range of ways to make construction more efficient and innovative. It is no longer odd to fly a drone over a construction site, to optimise work schedules to improve workplace safety or choose the best setting based on predictions. All possible because of artificial intelligence (AI).

Despite a retarded initial adoption pace, construction leaders are beginning to take a greater interest in the transformative prospects of AI tech. During the next upcoming years, expect an increasingly quick rate for tech acceptance as applications and products targeted for construction continue hitting the market.

## Roles of AI in Construction Work

### 1. Prevent cost overruns

Most mega projects go over budget despite employing the best project teams. Artificial Neural Networks are used on projects to predict cost overruns based on factors such as project size, contract type and the competence level of project managers. As a result, project delivery is expedited.

### 2. AI for Better Design of Buildings Through Generative Design

Building Information Modeling is a 3D model-based process that gives architecture, engineering and construction professionals insights to efficiently plan, design, construct and manage buildings and infrastructure. In order to plan and design the construction of a building, the 3D models need to take into consideration the architecture, engineering, mechanical, electrical, and plumbing (MEP) plans and the sequence of activities of the respective teams. The challenge is to ensure that the different models from the sub-teams do not clash with each other.

### 3. Risk Mitigation

Every construction project has some risk that comes in many forms such as Quality, Safety, Time, and Cost Risk. There are AI and machine learning solutions today that general contractors use to monitor and prioritize risk on the job site, so the project team can focus their limited time and resources on the biggest risk factors. Subcontractors are rated based on a risk score so construction managers can work closely with high-risk teams to mitigate risk.

### 4. Project Planning

An AI Startup launched in 2018 with the promise that its robots and artificial intelligence hold the key to solving late and over budget construction projects. The company uses robots to autonomously capture 3D scans of construction sites and then feeds that data into a deep neural network that classifies how far along different sub-projects are. If things seem off track, the management team can step in to deal with small problems before they become major issues. This technique allows algorithms to learn based on trial and error. It can assess endless combinations and alternatives based on similar projects.

### 5. AI Will Make Jobsites More Productive

There are companies that are starting to offer self-driving construction machinery to perform repetitive tasks more efficiently than their human counterparts, such as pouring concrete, bricklaying, welding, and demolition. Excavation and prep work is being performed by autonomous or semi-autonomous bulldozers, which can prepare a job site with the help of a human programmer to exact specifications. This frees up human workers for the construction work itself and reduces the overall time required to complete the project. Project managers can also track job site work in real time. They use facial recognition, onsite cameras, and similar technologies to assess worker productivity and conformance to procedures.

### 6. AI for Construction Safety

Construction workers are killed on the job five times more often than other laborers. The leading causes of private sector deaths (excluding highway collisions) in the construction industry were falls, followed by struck by an object, electrocution, and caught-in/between. A Bostonbased General Contractor is developing an algorithm that analyzes photos from its job sites, scans them for safety hazards such as workers not wearing protective equipment and correlates the images with its accident records. The company says it can potentially compute risk ratings for projects so safety briefings can be held when an elevated threat is detected.

### 7. AI Will Address Labor Shortages

Labor shortage and a desire to boost the industry's low productivity are compelling construction firms to invest in AI and data science. Report says that construction firms could boost productivity by as much as 50 percent through real-time analysis of data. Construction companies are starting to use AI and machine learning to better plan for distribution of labor and machinery across jobs. A robot constantly evaluating job progress and the location of workers and equipment enables project managers to tell instantly which job sites have enough workers and equipment to complete the project on schedule, and which might be falling behind where additional labor could be deployed. Experts expect construction robots to become more intelligent and autonomous with AI techniques.

### 8. Off-site Construction

Construction companies are increasingly relying on off-site factories staffed by autonomous robots that piece together components of a building, which are then pieced together by human workers on-site. Structures like walls can be completed assembly-line style by autonomous machinery more efficiently than their human counterparts, leaving human workers to finish the detail work like Plumbing and Electrical systems when the structure is fitted together.

### 9. AI and Big Data in Construction

At a time when a massive amount of data is being created every day, AI Systems are exposed to an endless amount of data to learn from and improve every day. Every job site becomes a potential data source for AI. Data generated from images captured from mobile devices, drone videos, security sensors, building information modeling (BIM), and others have become a pool of information. This presents an opportunity for construction industry professionals and customers to analyze and benefit from the insights generated from the data with the help of AI and machine learning systems.

## 10. AI for Post-Construction

Building managers can use AI long after the construction of a building is complete. Building information modeling, or BIM, stores information about the structure of the building. AI can be used to monitor developing problems and even offers solutions to prevent problems.

## Can AI transform India's construction industry?

Looking back at 2019, we can easily say that Artificial Intelligence (AI) has been one of the most potentially fueled technology whose proliferation revolutionized every industry it touched. The Indian construction industry contributes heavily to the nation's GDP and any development in this industry would majorly affect the country's GDP growth. India's Industry and Commerce minister Piyush Goyal has stated that AI and ML will contribute \$1 trillion to Indian economy by 2035. Hence, it becomes important for each and every industry to best leverage this booming technology for maximum gains. AI will be one of the top workloads that drives infrastructure decisions, and this is propitious for the construction industry. We are already witnessing a gradual transformation in industry's outlook to this change. As widely reported in Indian media in 2019, Larsen & Toubro announced a new strategic initiative, named L&T-Nxt, to focus on Artificial Intelligence (AI) and Internet of Things (IoT) amongst other cutting-edge technologies, to drive the change in industry's adoption of construction tech. Despite its huge scale and size the construction industry in India has been circumspect in unfolding itself to cutting edge technologies, quite similar to many other countries. Hence, building a case for embracing artificial intelligence can appear to be an uphill task, more so since many companies tend to believe that they need in-house capabilities for the change. However, the job can be outsourced to tech companies or even startups, who are typically unencumbered by corporate bureaucracies and lack of tech talent. Computer vision, AI, mixed and virtual reality, robotics, and building information modeling (BIM) are some of the key technologies and processes that these startups are betting on. Modern business software from some large tech companies, including Google, Microsoft and Oracle, and Trimble already incorporates machine learning and artificial intelligence. Perhaps the real challenge for the construction industry in India is to embrace greater digitization of its processes.

## Conclusion

The construction sector offers an unparalleled scale. If we are patient to fine-tune user experience and reach the product-market fit, AI can transform the lives of millions. As in the future, the use of AI and machine learning tech will be the rule in the industry rather than the exception. The use of AI and the underlying digitization can help the industry fundamentally transform itself. The completion of this journey will not only unlock unimaginable productivity gains for the industry players, but also reap long term economic rewards for our nation.

## REFERENCES

1. Ian Smith [Ed.]  
Artificial Intelligence in Structural Engineering. Information Technology for Design, Collaboration, Maintenance and Monitoring.
2. <http://www.researchgate.net>
3. <http://www.sciencedirect.com>