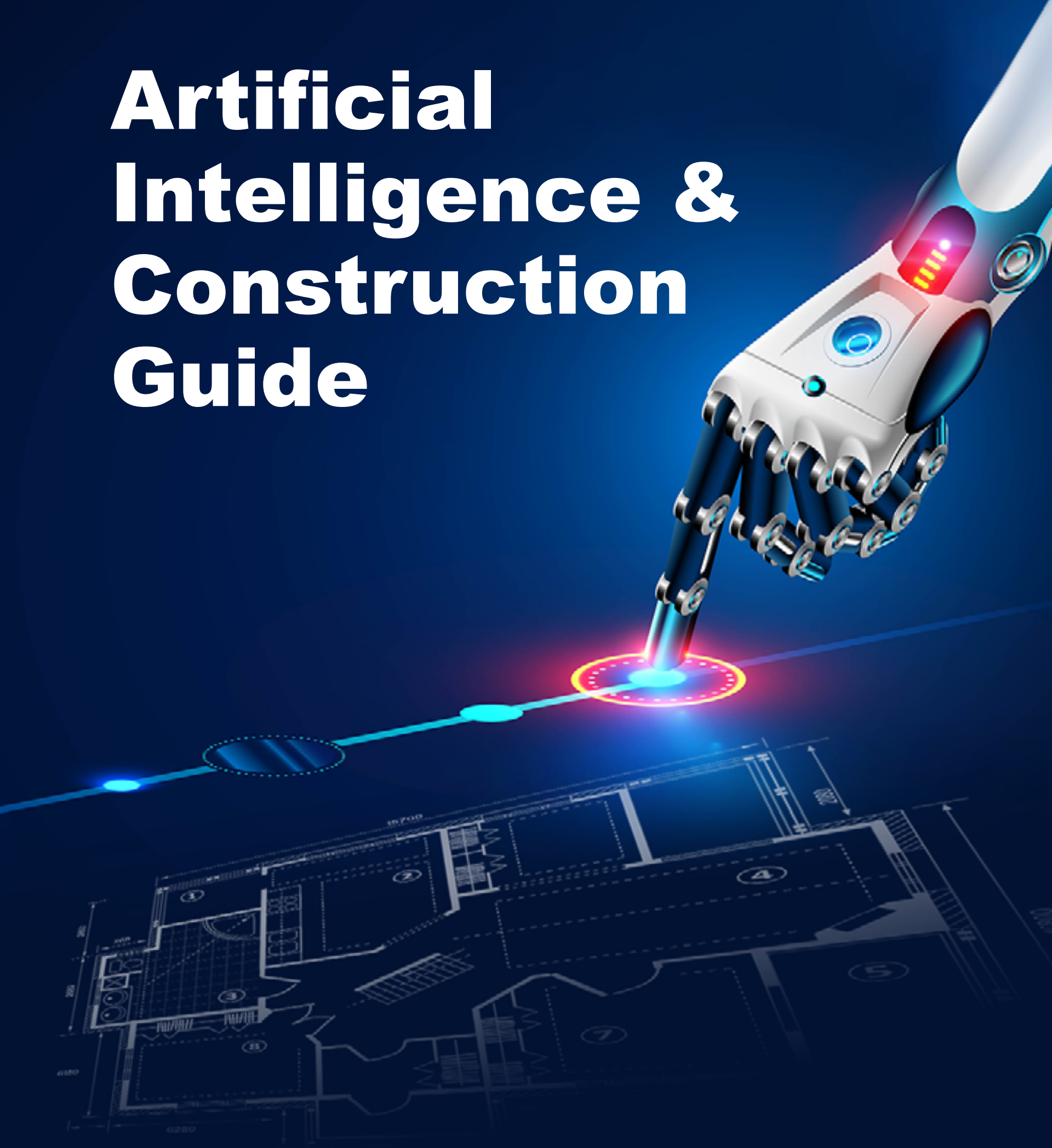




# Artificial Intelligence & Construction Guide





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## The Importance of AI

Transformative, revolutionary, game-changing, and astounding are all words to define Artificial Intelligence (AI). AI is now permeating our daily lives, although the rapid evolution of this technology and its implications remain a mystery for many. Recent advances in AI and its applications are not only working themselves into our everyday personal lives but in the business realm too. This includes the construction industry.



***“The adoption of AI has doubled in the past five years.  
It is a tool and skill for the present and the future.”***

[McKinsey & Company](#)

AI provides an opportunity to improve performance and outcomes in both the present and future of construction. This Guide explores artificial intelligence through that lens, providing a foundational understanding of AI, its evolution, and its current and future uses in the construction industry.

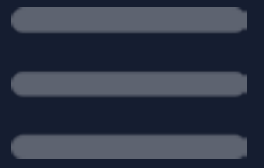


## Where did AI come from?

Artificial intelligence is not new. Humans have been trying to incorporate human-like intelligence into machines for decades, which remains a driving motivation behind the advancing capabilities of artificial intelligence.



You most likely have already had AI present in some of your daily activities, perhaps without even knowing about it. For example, in the early 2000s, search engine pioneer Google put machine learning to work for its online advertising and to improve the accuracy of search engine results.



## Artificial Intelligence

Artificial intelligence refers to the ability of machines to perform tasks that usually require human intelligence, such as understanding a natural language, recognizing images, and making decisions. Human intelligence revolves around the capacity to acquire information and apply it to situations and skills.

Artificial Intelligence is defined as a field in data science that blends computer technology with substantial amounts of data to enable problem-solving. AI is a broad field with several sub-fields -- such as machine learning (ML) and deep learning (DL).



In relation to construction, AI supports tasks such as planning and organizing and making the physical demands of building easier. Some examples include robotic heat welders, remote-controlled demolition robots, and AI-assisted takeoff solutions.



## 1. Predictive Maintenance

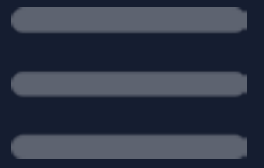
AI can be used to analyze data from building systems, such as HVAC and electrical systems to predict when maintenance will be needed and help prevent equipment failure.

## 2. Site Safety

AI-powered cameras and sensors can be used to monitor construction sites for potential safety hazards before they happen and alert workers and managers to potential dangers.

## 3. Project Management

AI can be used to optimize scheduling, allocate resources like equipment, and cost estimation, making construction projects more efficient and cost-effective.



## 4. Quality Control

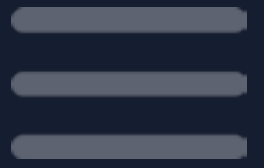
AI-powered cameras and sensors can be used to monitor the quality of construction work, identify defects, and alert workers and managers to issues that need to be remedied.

## 5. Building Performance

AI can be used to analyze data from sensors and building systems to optimize energy efficiency, indoor air quality, lighting, and other performance metrics.

## 6. Takeoff & Estimating

AI is a natural fit for performing linear and area takeoff measurements as well as counting objects on architectural drawings. Those measurements can then be used to calculate material quantities and labor costs.



## Automate Repetitive Tasks

By automating repetitive tasks with AI, construction companies can improve their efficiency and potentially make faster decisions, offering an advantage over competitors who rely on manual processes.

## Improve Accuracy

With AI-powered design and cost estimation tools, construction companies can increase their accuracy and reduce the risk of errors, giving them a competitive edge in terms of project quality, responsiveness, and profitability.

## Provide Valuable Insights

By leveraging AI to provide valuable insights on project management and supply chain optimization, companies can make more informed data-driven decisions, recognize and reduce risks, and maximize project speed and cost-effectiveness.

## Optimize Bidding

By using AI to analyze win/loss data to identify key patterns, construction companies can make more informed bid decisions and increase their chances of success.

## Reduce Waste & Enhance Sustainability

By using AI to analyze material usage and identify areas where waste can be reduced, construction companies can reduce their costs and demonstrate their commitment to sustainability, helping their reputation and customer loyalty.

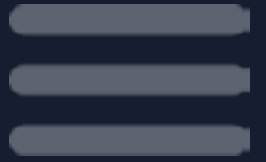


## What's next with AI?

AI in the construction industry is at a pivotal time. AI is poised to become more prominent in daily construction activities, much like it already is in the healthcare, financial services, and entertainment industries. AI can provide construction professionals the competitive edge they need to improve their productivity, efficiency, and generate more profitable bids.



ConstructConnect's AI-assisted estimating software, Takeoff Boost™, can help you save time and money – without compromising accuracy. Request your [free demonstration](#) to learn how we can help you estimate, bid, and win more projects.



**Algorithm:** A set of specific instructions designed to achieve a predetermined goal.

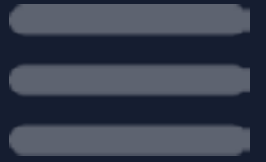
**Automation:** Technology that performs tasks with a device or system and reduces human input.

**Building Information Modeling (BIM):** A digital model of a building accurately represented in a digital format. BIM can represent the entire building lifecycle from design and planning through construction, maintenance, and end-of-use.

**Cognitive Computing:** A type of AI that is designed to simulate human thought processes, using techniques like natural language processing and machine learning to analyze and understand complex data.

**Computer Vision (Visual Recognition):** A field of AI that focuses on enabling machines to interpret and understand visual data and includes tasks like object recognition, facial recognition, and image grouping.

**Deep Learning (DL):** A subset of AI that uses artificial neural networks to process substantial amounts of data and solve problems with limited human help.



**Digital Twin:** A digital replica of a physical object like a building or HVAC (Heating, Ventilation, and Air Conditioning) system. Digital twins can be used for tasks like simulation, testing, and monitoring.

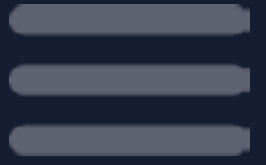
**Generative AI:** An approach to AI that involves training algorithms to create new data that is like existing data, and is used to generate new images, text, or audio.

**Image Recognition:** The ability of a machine to identify objects, people, or other features in digital images.

**Human Intelligence:** The thinking abilities typically associated with people, such as learning, reasoning, problem-solving, and creativity.

**Machine Learning (ML):** A subset of artificial intelligence that learns from experience, adapts, and improves performance without being explicitly programmed.

**Natural Language Processing:** The ability of machines to understand and analyze human language. This can include speech recognition, sentiment analysis to detect the emotion, intent or tone of messages, and language translation.



**Robotics:** A field of engineering that involves designing and building machines that can perform tasks autonomously or with little human interaction. Robotics often involves integrating AI technologies such as computer vision and natural language processing to carry out tasks.

**Speech Recognition:** The ability of machines to recognize and interpret human speech and is used for tasks like voice assistants, dictation, and transcription.

## Resources

[A Closer Look at AI-Assisted Takeoff Solutions](#)

[A New World of Construction with AI & Robotics](#)

[How AI and Construction are Teaming Up](#)