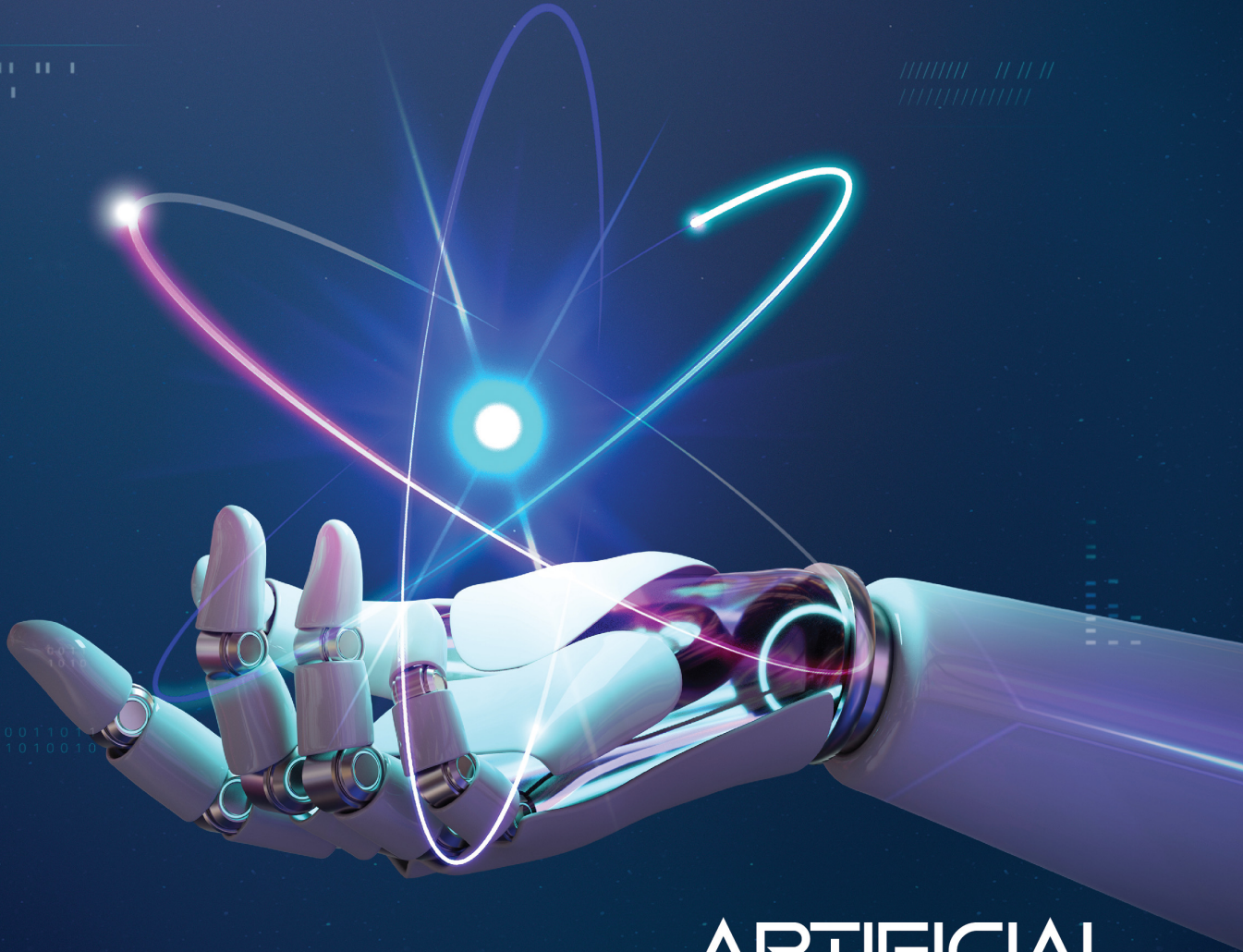


RISE

Catalysing Global Research Excellence



ARTIFICIAL
INTELLIGENCE (AI):
Embracing the Future

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ABOUT THE MAGAZINE

RISE Magazine is published by Office of the Deputy Vice-Chancellor (Research and Innovation) with aims to highlight a research and innovation on multidisciplinary expert of fields in UiTM. It serves as a platform for researcher to showcase their high quality and impactful findings, activities and innovative solution through publication. Contribution of these ideas come from academicians, researchers, graduates and universities professionals who will enhance the visibility of research and stride to elevate Universiti Teknologi MARA to global standards. This is an effort to promote research as a culture that is accepted by all expertise.

ABOUT UiTM

Universiti Teknologi MARA (UiTM) is a public university based primarily in Shah Alam, Malaysia. It has grown into the largest institution of higher education in Malaysia as measured by physical infrastructure, faculty and staff, and student enrollment. UiTM is the largest public university in Malaysia with numerous campuses throughout all 13 states in Malaysia. There is a mixture of research, coursework and programmes offered to the students. The Office of the Deputy Vice-Chancellor (Research and Innovation) also known as PTNCPI (*Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi)*) serves as a *Pusat Tanggungjawab* (PTJ) for navigating the research and innovation agenda of the university to achieve UiTM's goals. The PTNCPI office strives to mobilize faculty and campuses, fostering collaboration among researchers, with the aim of transforming the University into a Globally Renowned University by 2025

Artificial Intelligence in the Construction Industry



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he 'old' construction industry has obvious issues in terms of labour shortage, waste of manpower, delays, and inefficiency in planning, forecasting and budgeting.

Numerous studies have revealed that unsafe working conditions and lack of monitoring relates to concerns on safety, drawing attention to the need for management in the construction industry to ensure safety and to prevent accidents. Due to the remarkable growth of artificial intelligence (AI) technology and its application in the construction industry, it has been proven that AI based approaches have the ability to assist in addressing significant weaknesses of traditional construction management that rely on manual observation and operational, which are more susceptible to bias and rather confusing. Building and construction industry continuously develop new technologies that drives economic growth linked to intensification of the productivity, quality and safety of the project.

Artificial intelligence (AI) is a subfield of computer science that enables machine to perceive and develop human-like inputs for perception, knowledge representation, reasoning, planning and problem solving, so they may cope with complex and fuzzy issues in a deliberate, intelligent and adaptive way. There are numerous applications of AI in



analysis, loading capacity prediction, and damage level prediction of existing structures for retrofitting. AI algorithms and models could function to enhance the analysis of buckling and fatigue of structural components. In fact, AI could also be used to improve the loading capacity and improve damage level prediction in existing structures for retrofitting.

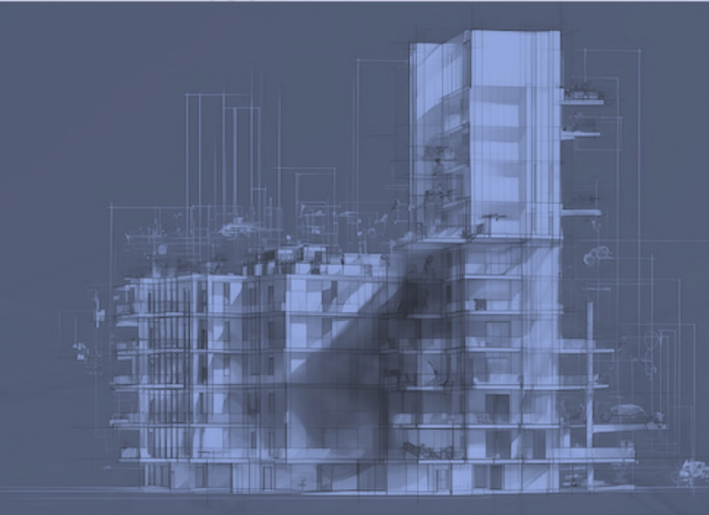
As for the on-site monitoring, advance development in construction technology have increased construction quality and reduced construction times. Project planning, coordination, budgeting, and supervision are all parts of the process of managing construction project. The engineers' expertise and variety software are currently needed to complete these tasks. The manual extraction of data from websites, including the capturing of pictures and documentation of the progress, is another method used to monitor construction work. On-site manual supervision is conducted manually to manage safety of construction activities. However, rapid development of digital technology has led to the adoption of AI. This has gained attention where automation of these monitoring operations improved the accuracy and efficiency of the process.

To obtain a broader view of the site through different project stages without human intervention, drones and sensors are used to automatically record data and take images and videos about the construction status, as well as its environment, and progress. AI has been primarily used for risk detection, assessment, and prioritisation as the technology is able to monitor, recognise, evaluate, and anticipate possible risks in terms of safety, quality, efficiency, and cost, across teams and work areas irrespective of conditions of high uncertainty. This demonstrates that use of AI has the benefit of preventing unnecessary works, disputes, delays, and issues deriving from the lack of cooperation from the team. As a result,

the construction industry such as architectural design and visualisation, structural design and analysis, construction management, onsite monitoring, risk management, and others.

AI helps to generate various architectural layouts, structural analysis and design by using various available software in the market such as PRIMAVERA, AutoCAD, Revit, SketchUp, and others. AI supports architectural and structural design by speeding up the design processes, obtain accurate results, and reduce overall design expenditures. AI can also help with architectural design and modelling, by looking for previously collected data concerning design to produce a new one. Deep learning algorithms have been used in architectural design which includes the generation of 2D and 3D designs, the classification of building types and architectural styles, the recognition of spaces in architectural drawings, and the synthesis of indoor scenes.

In structural engineering, AI has been utilised in designing process after construction material has been chosen through specific AI algorithm. Structural design would typically involve analytical models derived from fundamentals, codes of practise, or numerical simulations, such as Finite Element Analysis. The advantages of AI in eliminating uncertainties exceed the drawback often experienced when using traditional construction method. The use of AI has enhanced specific elements of structural engineering such as seismic design, buckling and fatigue



strategic decisions can be made timely to resolve issues, leading to an improvement of operational effectiveness.

In conclusion, various AI techniques are proven to have significantly advanced the construction industry. It has greatly benefited the construction industry by transforming it, resulting in a more accountable, convenient and economical construction process. Nevertheless, AI is presently in the early stage of development, with great potentials of transforming the construction industry.