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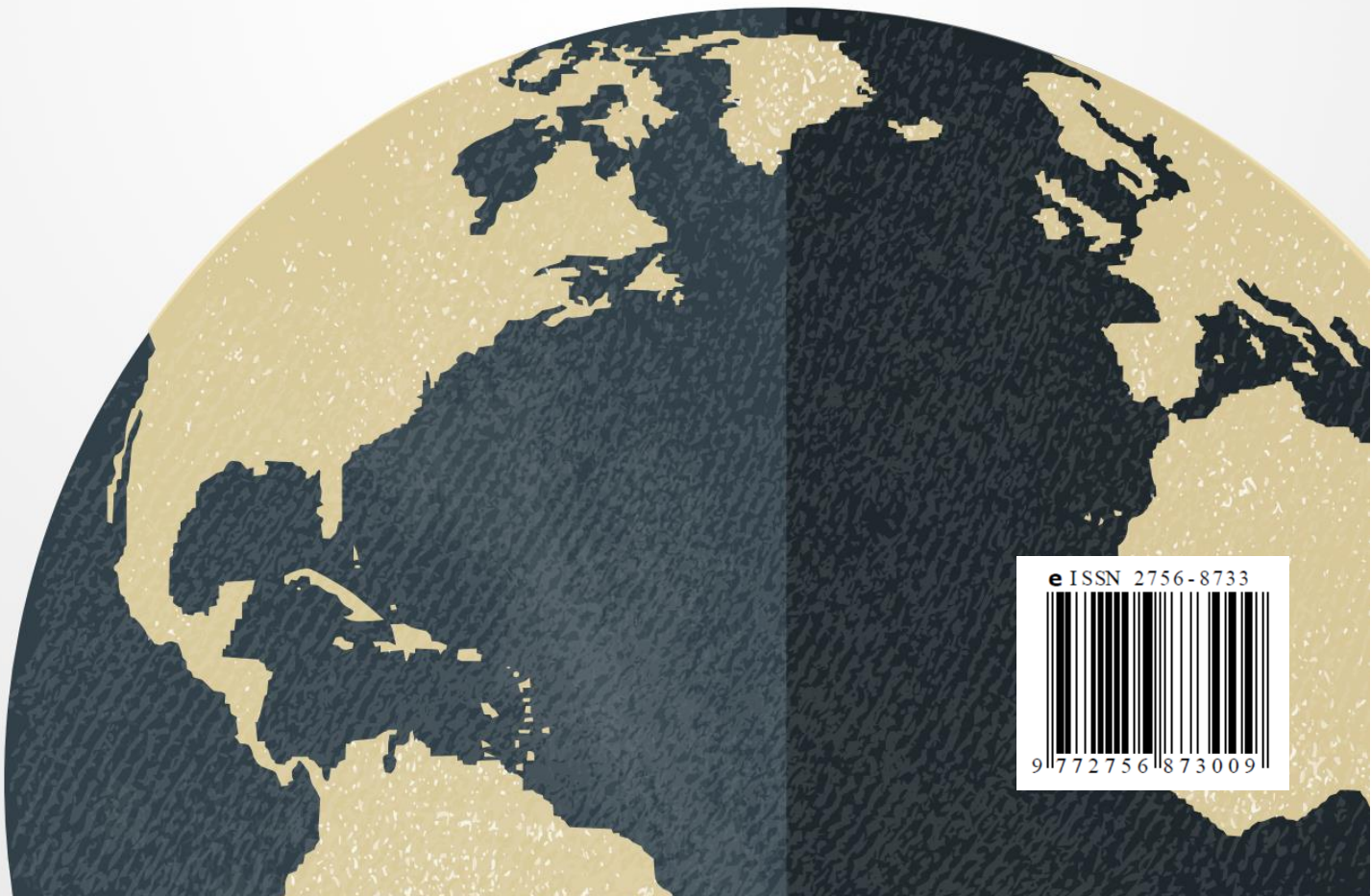

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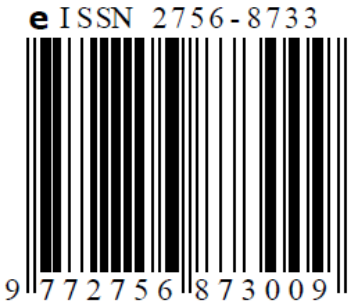

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REALTRACK: REAL-TIME TRACKING SYSTEM FOR CONSTRUCTION SITE PROGRESS

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ABSTRACT

Construction site progress tracking is essential in providing the overall construction site progress tracking in which innovation needs to be immersed. Therefore, an innovation in real-time tracking systems, which is the RealTrack system has been proposed, mainly to facilitate the current conventional tracking method, which is paper-based, obtained data not digitally stored, inaccurate data attainment, and time consuming. The RealTrack system functioning by an observer such as a project manager, needs to be either on-site or off-site, using the Radio Frequency Identification (RFID) controller to control the drone with the RFID scanner to scan the RFID tags on the structural elements. Later the scanned data will be transferred to a data bank. The data will be processed in the scheduling software using the 4D Building Information Modelling (4D BIM) and the integration of project planning software before it is ready for reporting, which results in real-time data. This innovation is an improvisation of the conventional tracking method by assisting the project manager to track the numerous constructions progresses, tracking project ahead or delay days more easily, and provide digital data from the construction site that is more accurate in faster way and improve the communication among the construction project team.

Keyword: *Construction tracking, Real-time tracking, Construction site progress tracking*

1. INTRODUCTION

One of the crucial tasks that must be completed according to the timetable established during the early stages of construction planning is the monitoring of the project's progress. The best way to ensure that a project is done according to schedule, under budget, with suitable quality, and with an acceptable safety record is to conduct frequent progress monitoring evaluations of the project's performance during each of its several stages. Ineffective paper-based documentation, data collected from the construction site that is not digitally recorded, erroneous data collection, and excessive time consumption are all frequent progress monitoring problems that can occasionally result in a drop in project productivity. As a result, the first step in this innovation project is to identify the flaws and concerns with the progress monitoring system for building sites. This stage is crucial for identifying any innovation or enhancement that may be made to raise the standard of the building. Consequently, a real-time tracking system, or RealTrack, will be developed and suggested for the building site's progress in order to resolve any issues that may arise.

1.1 Issues and Challenges in Construction Site Progress Tracking

The practice of tracking progress on building sites currently encounters a few difficulties, including time commitment, poor data quality, and slow technological advancement. Firstly, a lot of construction projects are not routinely followed up on, which makes it harder to challenge time-based remedial actions. Daily site visits will be conducted by the site construction tracker, who will then relay the data to the project manager in the form of as-built data, daily/weekly/monthly progress reports, graphs, and site images (Navon & Sacks, 2007). Second, the data gathered from the building site was of poor quality. The data obtained are based on the interpretation of the tracker's observations of the progress of the construction site, which does not accurately reflect the percentage of work completed on the site (Omar & Nehdi, 2016). As a result, the overall construction site progress complete percentage of work is calculated incorrectly. Thirdly, real-time tracking, which includes RFID, BIM, and other tracking technologies, must be integrated to the standard construction site progress tracking system. Malaysia is still lagging in terms of technological adaptability and is currently preparing for technology adaptation.

2. METHODOLOGY

For this study, various construction reports, including the Construction Industry Transformation Program (CITP) 2016-2020 by CIDB, articles on construction work progress, and the most recent technology for tracking construction site progress, including RFID, the Internet of Things (IoT), and Unmanned Aerial Vehicles (UAV), were reviewed for this study. Information pertaining to the tracking of building site progress will be gathered from the review. RealTrack system, a real-time tracking system for Industrialized Building System (IBS) components, will be utilised as the UAV that will scan the RFID tags on the IBS components. Drones will also be integrated with the RealTrack system. The data of the elements, including the project name, the precast element being used, the date it was manufactured, its weight, the stage of installation, and the Quality Control (QC) result, will then be transmitted to a database and the installation process will be analysed using 4D BIM software. Construction site progress data and schedule data may be easily analysed using 4D BIM. After the report is produced by the BIM programme, the construction installation data for the elements will be retrieved. Clients, consultants, and contractors will have access to the report to keep track of the construction's progress, particularly on large-scale projects where the likelihood of errors caused by duplication of effort is significant.

3. FINDINGS

According to a statistic on the percentage of IoT applications used in Malaysia (Mahmud et al., 2018), the usage of Augmented Reality (AR) is at 9%, building structure health monitoring is at 11%, BIM is at 15%, worker productivity monitoring with drones is at 16%, site layout monitoring with drones is at 22%, and drone working progress monitoring is at 27%. The proportion of IoT application usage in Malaysia is currently low but is gradually rising,

demonstrating the country's readiness to utilise the technology for tracking construction site progress in the building sector. The high cost of technology and software, high training costs, a lack of BIM-related expertise, and inadequate BIM training are the five main obstacles preventing Malaysia from adopting BIM (Construction Industry Development Board, 2017). The Malaysian Construction Industry (MCI) is changing every year as a developing nation. BIM and the Internet of Things (IoT) are two of the 12 new technologies that are being implemented to alter the construction sector, according to the Construction 4.0 Strategic Plan 2021–2025 (Construction Industry Development Board, 2020). The traditional construction site progress tracking has to be updated with real-time tracking technology, which includes Light Detection and Ranging (LiDAR), BIM, and other tracking technologies. Apart from BIM as scheduling software and UAV which to promote the semi-autonomy and fully autonomy construction site progress tracking, there are various tracking technologies that can be used to help in real-time construction site progress tracking, such as Geographic Information System (GIS), Global Positioning System (GPS), Laser Scanning (LS), LiDAR, and RFID (Omar & Nehdi, 2016).

4. CONCLUSION

To sum up, RealTrack will promote technology adoption using UAV, RFID, and BIM in overall systems, increasing the use of IoT among industry participants in Malaysia's construction sector (MCI). This invention will go hand in hand with the Fourth Industrial Revolution (IR4.0), which encourages technological adaption through innovation. Additionally, RealTrack can resolve the previously described problems, including the lack of regular project monitoring, the poor quality of data collected from construction sites, and the slow adoption of new technologies. It is crucial to upgrade the present method of tracking construction site progress, make it easier for the construction team to discuss and track how the project is progressing, and encourage the adoption of a paperless reporting system and a time- and energy-efficient working culture.

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