Digital Twins Meet Mixed Reality in the Australian Mining Industry

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Abstract

Mining in the twenty-first century presents a complex set of challenges to the Australian mining industry. With shifting global demands due to the COVID-19 pandemic and shifted focus from a booming phase into an operational phase, mining companies are looking for ways to maximise long-term sustainability. Meanwhile, in the booming age of Industry 4.0 and IoTs, Mixed Reality (MR) Simulation had demonstrated its values in improving training, safety, and plant maintenance. However, MR technologies' adaptation remains limited on advanced mining applications such as real-time data analysis, scenario simulation, and process optimisation that have higher potential to improve long-term operational decision-making. While such tasks were typically accomplished by the mining industry using Digital Twins (DT) combined with sophisticated A.I. algorithms, there is a possibility to combine DT technology with MR visualisation centred around human interaction. This study aims to answer the question of whether the concept could be of value to the Australian mining industry; hence the combination of MR technologies and Digital Twins could support a sustainable mining operation by improving safety, economy, resource extraction efficiency, environment, and its fellow communities. A long-term vision coupled with an industrial strategy is needed for developing methodologies to provide the Australian mining industry with the tools and confidence to build sustainable MR digital twins. To achieve this, the purpose and context for employing such a concept will be examined against current needs. Doing so would help set priorities by filtering out the hype from the facts around the emerging technologies. The human factors around MR visualisation will be studied against traditional DT interfaces to better understand its potentials from a user perspective regarding immersion, safety, development cost, and user-friendliness.

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