

# **Digital Twin Platform for Remote Assessment: Application in Extensive Ship Engine Inspection**

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A large-scale ship engine composed of more than 15,000 parts takes effort time and money for inspection. Moreover, the specialists must visit every ship engine for assessment. For this issue, a pre-built 3D model of the engine (digital twin model) allows remote access to the ship engine for the inspection. This can be done by a digital twin platform that consists of LiDAR and RGB cameras for providing a colorized 3D map of the engine and its components. This 3D-built model (metaverse) can then be inspected by entering with a virtual or augmented reality (hereafter, VR and AR) device. In this virtual space or metaverse, specialists in the office with VR device can freely assess the ship engine and leave annotations for the flaws. Moreover, real-time communication is possible between the field engineer for immediate action on the ship engine by wearing an AR device. On the AR device, the field engineer inspects both the real ship engine and any comments that the VR user (specialist) left. As a result, the specialists can assess ship engines remotely and give real-time feedback to the field engineer. In this work, we generated a digital twin model of the real-scale ship engine for the process of remote assessment. This approach has been studied in CViSS Lab., University of Waterloo, and MEIC Lab., The State University of New York, Korea for inspecting buildings and bridges.