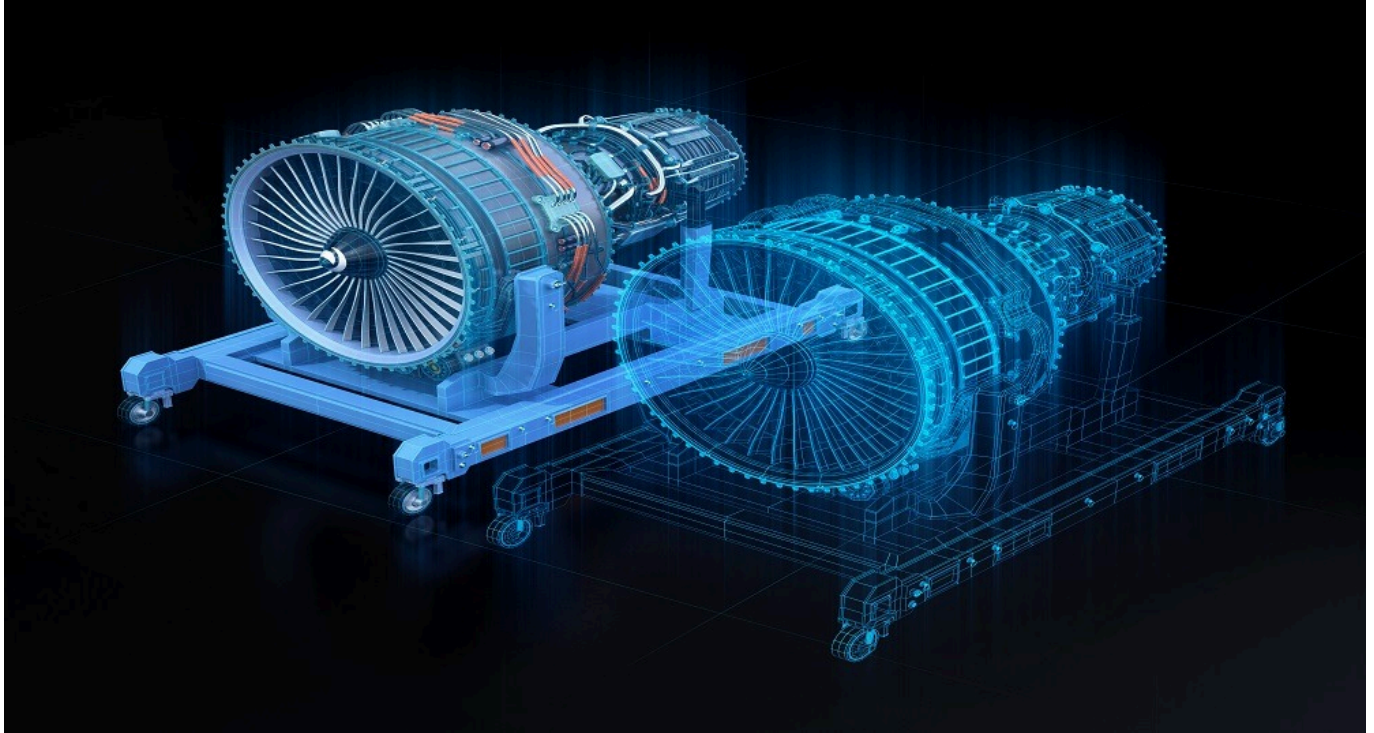## TECH OFFER

Low-Latency Digital Twin For Industrial Applications

KEY INFORMATION

TECHNOLOGY CATEGORY:

Infocomm - Augmented Reality, Virtual Reality & Computer-Simulated Environments

Infocomm - Enterprise & Productivity

Infocomm - Smart Cities

Infocomm - Computer Simulation & Modeling

Infocomm - Human-Computer Interaction

TECHNOLOGY READINESS LEVEL (TRL): TRL8

COUNTRY: SINGAPORE

ID NUMBER: TO174639

OVERVIEW

In this modern age of data, many systems and Internet-of-Things (IoT) information sources are independent and scattered, resulting in the increased complexity of processing heterogeneous data for visualisation purposes. Digital twins can help to mirror their physical, real-world equivalents in three-dimensional (3D) space to improve spatial perception and are ideally suited for high-risk environments that are physically inaccessible by humans. In such cases, IoT sensors are put in place to support real-time remote fault identification, operation, training, maintenance, and synchronise with various types of management dashboards to facilitate decision-making processes.

This technology offer is a one-stop platform that empowers enterprises to create digital twins (or a one-to-one reproduction of

physical real-world objects/building/machinery) - where next-generation spatial hardware e.g. Augmented Reality/Virtual Reality (AR/VR) headsets or smart glasses can be used to interact with contextual, real-time information in a fully rendered 3D environment that blends the digital information (sensor data and digital mapping) and physical (real-world) layers for a range of industrial applications including continuous monitoring and predictive maintenance.

The technology owner is keen to collaborate with companies in the Port, Manufacturing, and Property (facility management, building management, energy management, security management) industries for test-bedding of existing use-cases on a project basis, leading up to product R&D collaboration and eventually licensing.

TECHNOLOGY FEATURES & SPECIFICATIONS

This technology is able to efficiently produce a high-fidelity digital replica of a real-world physical building/machine/object through the following steps:

1. **Digital World Construction** - import data to create a 1:1 digital world or factory
2. **Real-Time Data Synchronisation** - ingest real-time IoT sensor data and dynamic protocols to synchronise between the physical and digital world
3. **Artificial Intelligence/Machine Learning (AI/ML) Integration** - integrate AI/ML solutions and/or algorithms to augment the digital twin with simulation and predictive capabilities

Additionally, the following are key features of this technology:

- Multi-source heterogeneous sensor data fusion, supporting more than 30 types of data and over 200 types of dynamic protocols
- Provides contextual informatics relevant to a digitalised twin in a spatially accurate manner
- Pixel stream transmission for real-time simultaneous rendered content distribution
- AR quick-assist
- Digitalised Standard Operating Procedure (SOP)
- Multiple viewpoints including indoor/outdoor, orbital, x-ray, and first-person views
- API interfaces for secondary application development

POTENTIAL APPLICATIONS

This technology offer has a range of application areas which include, but are not limited to:

- Urban City Planning
- Smart Transportation
- Property Management/Smart Building (e.g. facility management, energy management, security management)
- Remote Assistance in the Manufacturing industry (e.g. complex and high-risk heavy equipment manufacturers)
- Advanced Manufacturing (e.g. operations, training)
- Port Systems (e.g. logistics, transportation)
- Marine Life (e.g. marine farming)
- Education (e.g. learning, training, assessment)
- Water Treatment Plants (e.g. operations system dashboard)
- Energy Generation Pants (e.g. power stations, sub-stations)

UNIQUE VALUE PROPOSITION

- Digital twin virtual building/object/machinery - combining 3D modeling with real-time IoT sensor data helps to organise data silos
- Bi-directional IoT connectivity (5G enabled) - enables simultaneous control over a variety of devices/equipment while receiving sensor data
  (changes made to the digital twin will be reflected in the physical space, while changes in the physical are similarly reflected in the digital space)
- Quick-assist feature - supports remote assistance and troubleshooting deep dive to further investigate the potential root cause of malfunctioning hardware for sustainable long-term maintenance
- Digital SOP - integrated AR module with step-by-step work instructions to assist on-site operators/technicians to resolve errors and facilitate remote collaboration/communication
- Seamless, low-latency transition between digital twin environment and direct camera access provides immersive and user-friendly experience
- Reduced cost and risk with remote operation and maintenance ensures safe, environmentally friendly, sustainable business operation in a digital environment