RESEARCH INSTITUTE FOR SUSTAINABLE URBAN DEVELOPMENT (RISUD)

News Article for RISUD Emerging Frontier Area (EFA) Scheme

		Name	Department
1.	**Principal Investigator**:	Xinyan Huang	BSE
2.	**Name of EFA:**	Sustainable urban development	
3.	**Project Title:**	Smart Firefighting System for the Sustainable Development of the Greater Bay Area	

4. **Annual Progress/Achievement (***in layman's language, no more than two A4 pages, pls attach photos***)**

This project is targeting to develop a system for smart firefighting leveraging cutting-edge technologies. The general framework proposed and the potential application in tunnel fire is shown in Fig. 1. When a fire incident happens, data from sensor, camera and other devices will be recorded by an onsite network subsystem, and then they will be transferred to a data repository. With this incoming data, the real-time fire status can be identified. In addition, the further fire development can be forecasted by an AI engine subsystem. The AI engine is pre-trained with a large fire scenario dataset generated by a fire simulation engine subsystem. For example, thousands of tunnel fires are simulated to form a big database. The identified fire incidents can be vividly displayed on a building information modeling subsystem. The severity of the fire incident can be rated by a critical event dataset, and alert will be given to fire fighters if critical events will happen with high possibilities.

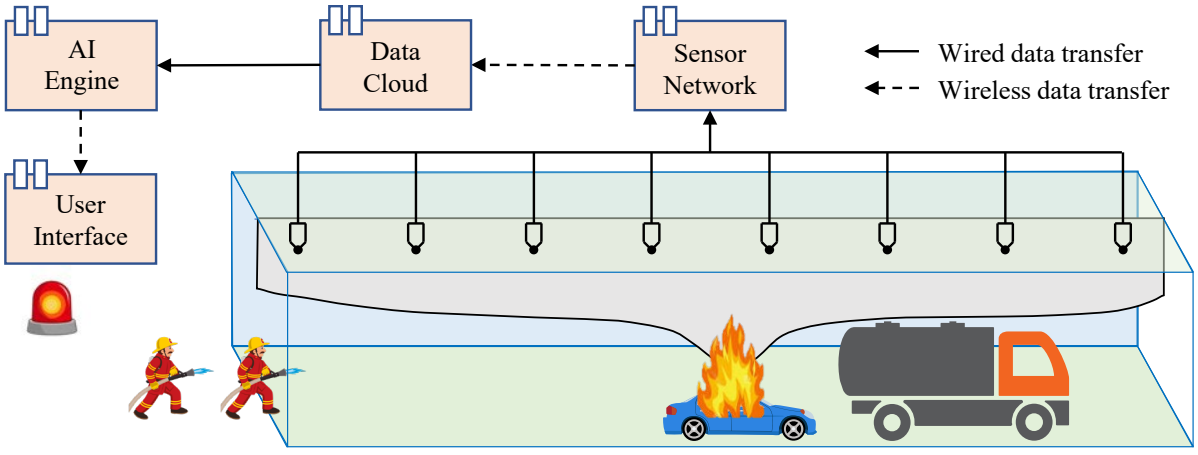

Fig. 1 Proposed framework for tunnel fire identification.

To monitor the fire and visualize the severe situations inside a structure, a Building Information Modelling (BIM) model is built and imported for rendering the fire conditions inside the building. Thus, fire commanders and firefighters can visualize the fire that is often covered by hot and heavy smoke layer. The general dimensions, size and location of the doors and windows and the construction materials of the model are set according to a real scale compartment located at HK Fire and Ambulance Services Academy (FASA). The feasibility of the framework is preliminarily demonstrated with fire tests in FASA. First, the temperature data measured by multiple thermocouples mounted on the inner wall of the compartment is transferred to a database. Then, a receiver terminal subscribes the database to retrieve the temperature data. Based on the features of the temperature data, a programming running on the terminal could adjust the rendering of the fire scenes. With this framework, the fire size, smoke density and state of the windows and doors (open or close) of the real compartment fire could be dynamically displayed on the established BIM model in real time.

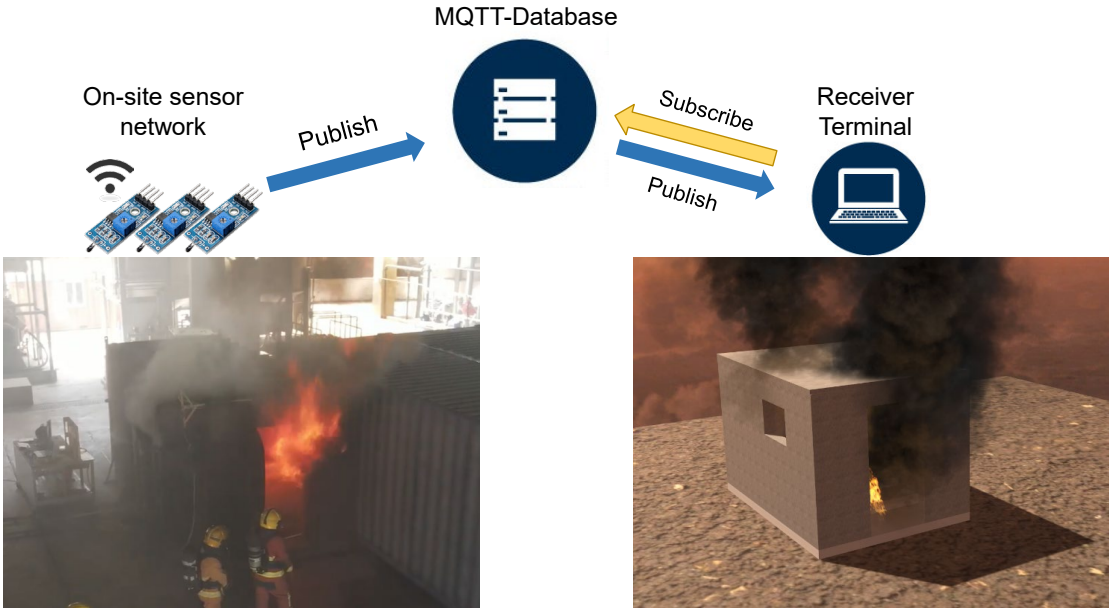

Fig. 3 The proposed AI model for smart safety design for atrium fires.