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. **First Year Progress/Achievement (***in layman's language, no more than two A4 pages***)**

This project is targeting to develop a system for smart firefighting leveraging cutting-edge technologies. The general framework proposed here 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 current fire scenario can be identified, and 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. 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.

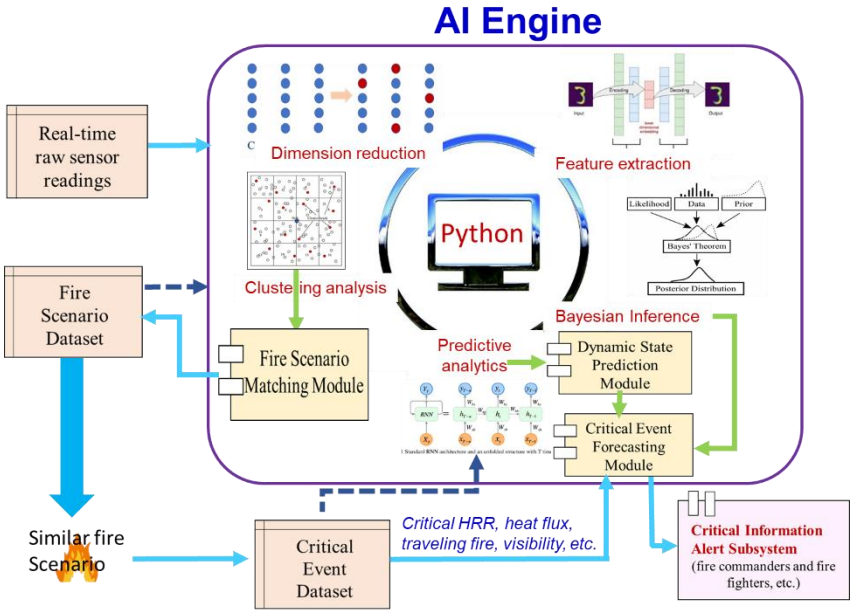

Fig. 1 Project framework

Currently, we have established a large database of 1000 simulating cases for infrastructures of tunnels. The numerical models are carefully verified, and all the simulating results are well organized for further studies. A key module of this framework is the AI engine. The effectiveness of artificial intelligence (AI) methods in fire safety engineering has been successfully demonstrated. As shown in Fig. 2, we proposed a method to integrate AI method with numerical simulation to identify the fire source in tunnels. After the sensor data mimicking the measured real-time data in a fire incident is captured, the AI model can give a 1st-order rapid decision support information such as the fire location, fire size and wind speed inside the tunnel. The fire information can be identified with a high accuracy of 94%. This part of work apparently shows the capability of AI methods in firefighting and paves the way for later-stage smart firefighting.

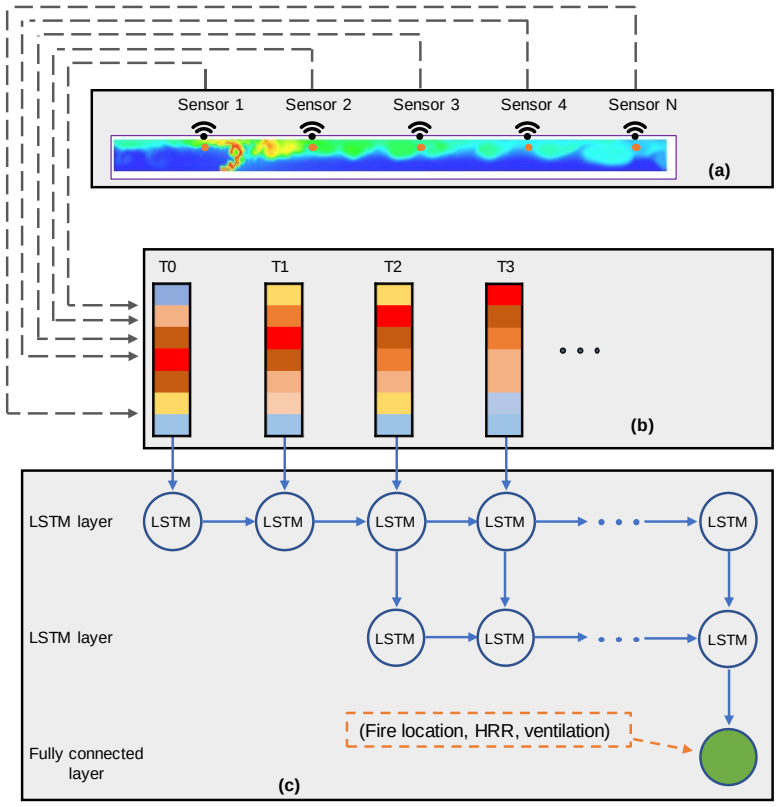

Fig. 3 AI methodology framework: (a) Simulation; (b) database; and (c) AI model