Chotiwat Jantaerakasem: Imperial College, London

Winner: Engineering, Physical & Computer Sciences

Spatio-temporal monitoring of water turbidity in developing country settings using smartphone-based application.

This study aimed to develop a custom smartphone application and apply it in a voluntary participation program for turbidity measurement of water. If successful, it was envisioned that this crowdsourcing platform would be beneficial to enhance water quality data collection in low-resource settings. It would also serve to raise the public's awareness about the importance of water quality and empower them to demand better water quality from their suppliers.

The impacts of this research can be categorized into three main areas.

1. Novel tool for smartphone-based water quality assessment Thai citizens and people in developing countries have encountered contaminated drinking water sources for decades. A significant number of people got infected by waterborne diseases such as diarrhoea. Many alternatively choose to consume bottled water, resulting in unnecessary expenses and plastic waste. To tackle these issues, low-cost smartphone-based turbidity measurement has been developed for in-situ testing. This tool will be beneficial for Thais and people in developing countries because they will be able to test water quality before deciding for consumption. This enables them to reduce the risk of consuming contaminated water.

The water quality monitoring application developed as part of this research offers a technological solution for efficiently monitoring and displaying water quality results. This technology facilitates real-time monitoring of changes in water quality, enabling the formulation of timely management plans. Given the direct relationship between water quality and climate-related factors such as temperature and pollution, this application plays a crucial role in detecting and investigating sources of contamination, serving as a foundation for sustainable environmental protection. In addition, the development of the water quality monitoring application directly contributes to the achievement of SDG6, which aims to ensure sustainable management of water and sanitation. By effectively monitoring water contamination, this application also promotes SDG3, which focuses on ensuring healthy lives and well-being.

2. Smartphone-turbidity monitoring through citizen science. The citizen science monitoring program was designed to use a novel smartphone application for water turbidity measurement in rural areas in Thailand and evaluate if citizens are able to use this tool successfully to provide reliable turbidity data. Citizen

science has been employed to encourage public participation in scientific data measurement. Cultivating better technical knowledge through workshop will be a significant factor in ensuring successful water quality management. The developed smartphone can be used by anyone from anywhere. The valuable feedback and high-quality data obtained through collaborations with volunteers serve as evidence of the engagement and willingness of Thai citizens to participate in water quality monitoring efforts. Additionally, insights gathered from application users contribute to the ongoing development of user-friendly applications. Lastly, the measured turbidity data can be utilized to create a turbidity map of water sources, offering local communities crucial information for making informed consumption decisions. This citizen science monitoring program represents a pathway towards achieving continuous measurement and control of water quality in Thai society and other developing nations.

3. Low-cost tool and novel database for water authority in a remote area
This innovation enables water authorities in remote areas to ensure the safety of drinking water sources. The water quality data collected by participants can be used as a database for a water safety plan.

The Future:

My short-term goal is to establish an environmental research centre in Southeast Asia to coordinate water research and policy on environmental health. After gaining expertise in public health engineering, I hope to work for an international organisation that helps people in water scarcity areas. Additionally, I plan to continue developing a smartphone-based application for water quality monitoring, with the ultimate goal of turning it into an open-access platform for people in developing countries.