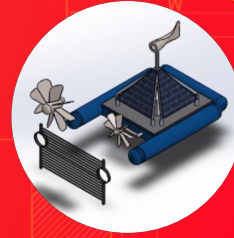




IoT INNOVATION CHALLENGE

2019 SMART WATER FINALIST

IoT Detachable Waterway Monitoring Device with LoRa and Self-Sustainability



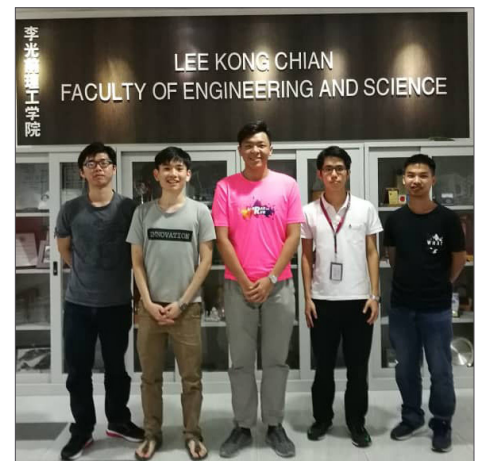
UTAR students work to prevent gas leak disasters from impacting thousands with a new water monitoring system

This past March, more than 2,500 people fell ill from gas poisoning in the city of Johor, Malaysia. The toxic gas, which was caused by the illegal dumping of chemical waste in a river, sparked an emergency situation that lasted three days. During that time, some 111 schools had to close, impacting 55,000 students. The Malaysian Armed Forces dispatched medics and experts in chemical and radioactive waste to swiftly assist with clean-up efforts.

After the incident, a team of students from Universiti Tunku Abdul Rahman (UTAR) in Malaysia—Lim Wen Qing, Au Jin Cheng, Yap Sheng Yao, Khor Jun Bin and Tan Kai Shang—were left wondering how they could innovate a sensor network plan to prevent a disaster like this from occurring in the future. They wanted to use their expertise and studies in mechatronic engineering, actuarial science and robotics to create a device that could improve the lives of many.

"If we had possessed something that could have helped us prevent this incident, we could have saved thousands of people from suffering," said UTAR student Lim Wen Qing.

Their efforts led to a concept called **IoT Detachable Waterway Monitoring Device with LoRa and Self-Sustainability**, which has advanced as the Smart Water finalist for the Asia-Pacific and Greater China region in the Keysight IoT Innovation Challenge. This device monitors and reports on major waterways



UTAR-Malaysia-IoT-Detachable-Waterway

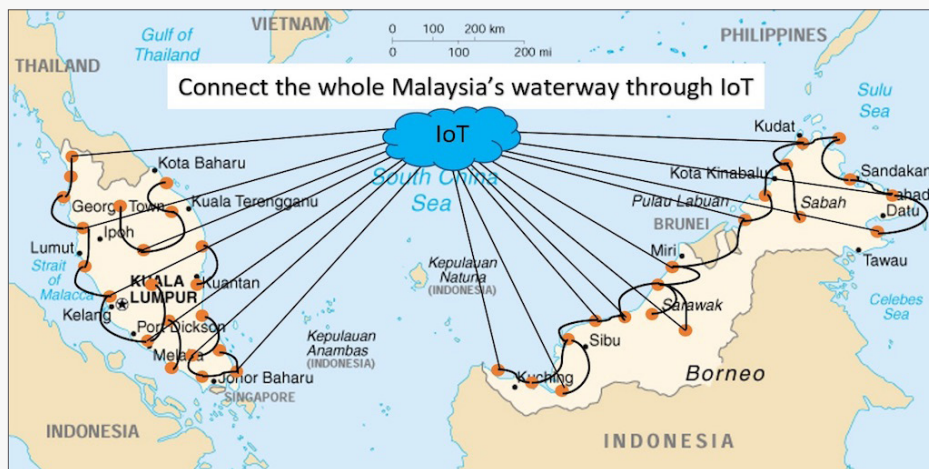
From left to right: Yap Sheng Yao, Lim Wen Qing, Tan Kai Siang, Khor Jun Bin, Au Jin Cheng, from Universiti Tunku Abdul Rahman (UTAR) in Malaysia. They are the Asia-Pacific/Greater China finalist in the Smart Water track for their entry, **IoT Detachable Waterway Monitoring Device with LoRa and Self-Sustainability**.

using sensors that measure acidity, temperature, total dissolved solid, turbidity and conductivity. The sensors, which will be embedded into a 3D-printed main frame, can harvest energy from the wind, sun and water.

All data collected from the sensors will be sent to the cloud and processed by machine learning algorithms, which will help predict the future condition of the waterway based on large-scale monitoring. GPS data will locate the position of the sensors, and data will be visualized in the form of a choropleth map or heat map. The results will be converted into an app or website that anyone can access and where users can report pollution they find on the waterway. The hope is that the system could notify emergency personnel and the public to evacuate when an incident occurs.

The system uses LoRa as the wireless communication network protocols because it allows long-distance transmissions of more than 10km in rural areas and low-power consumption. Furthermore, LoRa is based on a peer-to-peer (P2P) system that enables direct communication between two devices using the concept of nodes.

The system is designed to notify emergency personnel and the public to evacuate when an incident occurs.

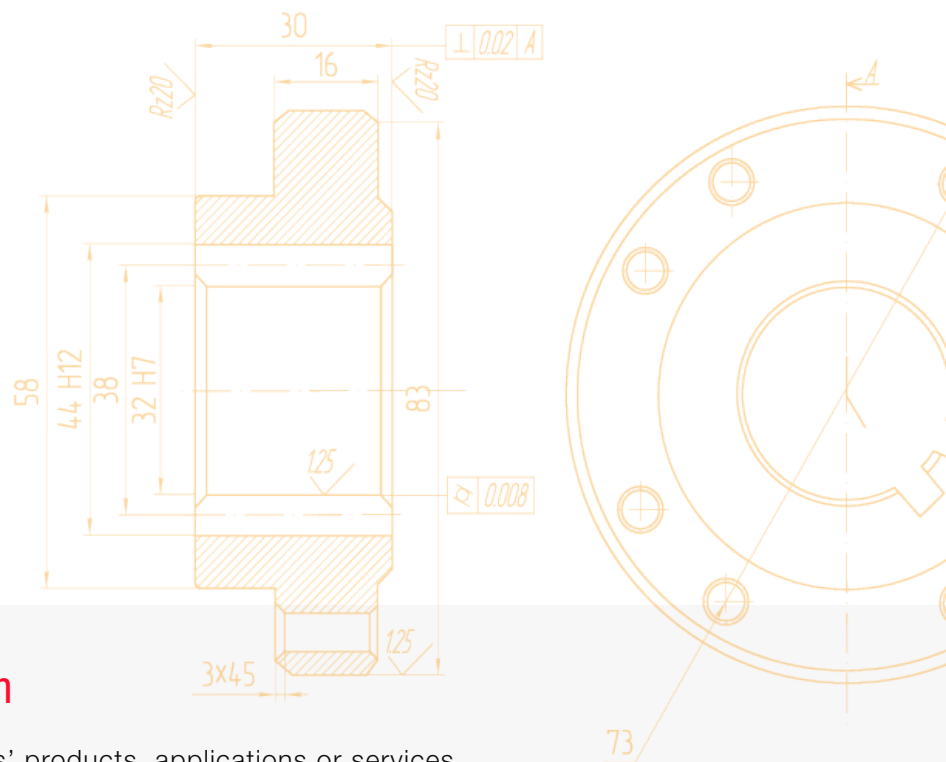


“We realized people tend to be ignorant about how badly polluted their surroundings are and are usually only made aware of their predicament when someone falls ill or is hospitalized due to the pollution,” Wen Qing said.

Right now, the team is developing their innovation by using equipment available at their university and is garnering feedback and help from professors and researchers knowledgeable in the field. UTAR lecturer Dr. Danny Ng served as the team's advisor and inspired the students to pursue the concept.

The students hope to align their system with local NGOs or government agencies in the future and then eventually, search for potential investors in order to start a company and mass-produce the device.

Ultimately, the students aspire to further enhance and employ the waterway monitoring system around the globe and believe that winning the Keysight IoT Innovation Challenge would be a great first step to make this dream a reality.



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