Research

SMART Aqua system monitors water quality to produce quality crayfish

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PEKAN, 29 December 2021 - Redclaw crayfish *Cherax quadricarinatus,* also known as freshwater crayfish or lobster, is no stranger to seafood lovers to enjoy despite its high price in the market.

The high demand in Malaysia has also encouraged and produced many freshwater crayfish entrepreneurs and farmers.

However, they need to have knowledge in crayfish farming; wrong steps will cause losses.

Concerned with the problems faced by freshwater crayfish farmers has prompted researcher and lecturer of the College of Engineering (KKEJ), Universiti Malaysia Pahang (UMP), Professor Ir. Dr. Mohd Faizal Jamlos, 38, to produce a SMART Aqua system which can monitor water quality to ensure good crayfish production.

According to Professor Ir. Dr. Mohd Faizal, the idea started when he saw the industry's problem, which does not have a system capable of monitoring and predicting early prevention to reduce freshwater crayfish mortality.

"Water quality monitoring has become a problem for farmers because predictions on water quality can be observed only through experience.

"This SMART Aqua system works through the integration of internet of things (IoT) and data analytics technology to predict the size development and water quality in real time and the next 24 hours.



The system consists of various sensors such as electrical conductivity (EC), total dissolved solids (TDS), dissolved oxygen (DO), pH, temperature, and humidity that are integrated into a microprocessor to detect and transmit data.

“This IoT system is called end node unit (ENU),” he said.

He added that the sensors were measured with reference to the data sheets to ensure the reliability of the data collected.

“To date, 25,920 data has been successfully compiled from August 2020 to January 2021.

“The data was sent wirelessly from ENU, then this data was uploaded in parallel to Cayenne Cloud through MQ telemetry transport (MQTT) and stored in a server database via Wi-Fi.

“Through this research, farmers can also monitor remotely and access information on freshwater crayfish farming through a website that can be accessed via browsers and Android devices,” he said.

Based on this research report, he said that real-time data collection from ENU was channelled via SQL and directly to RStudio, and ARIMA forecasting was done on query tables.

“Seventy per cent of the real-time data queries is taken as a training data set, and another 30 per cent of the data is taken as a test data set.

“More interestingly, it can help farmers perform remote control and obtain every information of parameter level changes in the crayfish tank via a short message service (SMS).

To date, the obtained forecasts are at a rate of 90 to 95 per cent, and the effectiveness of the

SMART Aqua system is 92.8 per cent.

At the same time, it can reduce the freshwater crayfish mortality rate from 110 in June 2020 to only 14 deaths from August 2020 to January 2021.

According to this Pahang native, he is currently developing a freshwater crayfish farm in collaboration with UMP and UMPT Sdn. Bhd. at an industrial scale with an area of more than three acres in Permatang Habib, Pantai Sepat, Kuantan.

He hoped this product could help farmers and is willing to share expertise in SMART Aqua system research as well as consultation services to smallholders and aquaculture industries such as tiger prawns, white prawns, lobsters, sea bass, and agriculture.

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