Research

UMPSA researcher, Professor Ir. Ts. Dr. Kamarul Hawari, develops iSenseFishery, AI-Based Aquaculture Management System

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PEKAN, 22 January 2025 – It is widely known that the aquaculture industry is among the largest contributors to the seafood industry.

However, in Malaysia, the main challenges in the aquaculture industry include water quality uncertainty, high operational costs, and difficulty in continuously monitoring fish farm conditions.

Recognising these challenges, the Principal Research Fellow at the Centre for Advanced Industrial Technology, who is also a lecturer at the Faculty of Electrical and Electronic Engineering Technology (FTKEE), Universiti Malaysia Pahang Al-Sultan Abdullah (UMPSA), Professor Ir. Ts. Dr. Kamarul Hawari Ghazali, has developed iSenseFishery, an AI-based aquaculture management system.

According to Professor Ir. Ts. Dr. Kamarul Hawari, sensor technology and machine learning are seen as solutions to enhance aquaculture management and operational efficiency, providing real-time, accurate data for better decision-making.

“The main goal of this project is to improve overall aquaculture operations management, reduce waste, optimise costs, and enhance product quality.

“Using this technology, fish farmers can make better decisions regarding feeding, environmental conditions, and fish health, ultimately contributing to increased profitability and sustainability in the industry.

“This study focuses on developing a smart aquaculture management system using sensor technology and machine learning to increase the efficiency of fish farming operations.

“The system integrates smart sensors to monitor key parameters such as water quality, temperature, dissolved oxygen, and fish behaviour,” he said.



He further explained that the collected data is analysed to make better decisions regarding fish feeding, environmental management, and maintenance scheduling.

“This system not only helps fish farmers reduce operational costs but also increases yield and ensures the sustainability of aquaculture operations.

“The research began in 2024 and is expected to be fully completed by 2025, with prototype development and system testing currently underway and continuous improvements being made based on user feedback.

“The system uses smart sensors to monitor parameters such as pH, temperature, dissolved oxygen, and fish behaviour,” he explained.

He added that the developed instrument functions to collect data for the purpose of generating an artificial intelligence system.

“For instance, monitoring fish behaviour is crucial to determining whether the fish are active, especially during feeding times, as waste occurs if the fish are inactive and feed is still provided.

“The collected data is sent to a cloud platform and analysed using machine learning algorithms.

“This analysis provides recommendations on fish feeding, environmental adjustments, and optimal maintenance schedules, allowing fish farm owners to monitor the status of their farms through a digital dashboard that can be accessed remotely,” he said.

Additionally, he emphasised that this data is particularly valuable when analysed by AI after a rearing cycle or season, enabling farmers to identify practices that can be improved based on the analysed data.

“I hope that in the future, this system can be expanded for use in farming other species such as shrimp, tilapia, and other aquaculture species.

“We also plan to integrate blockchain technology to enhance the transparency and security of fish farm data, as well as introduce predictive systems to help farmers address potential issues in the long term.

“Moreover, we aim to expand the application of this technology within the aquaculture industry in Malaysia,” he added.

He also intends to involve more stakeholders within the fish farming community to widely adopt this technology, including enhancing training capacity and technical support for small- and medium-scale fish farmers.

Professor Ir. Ts. Dr. Kamarul stated that, in line with the government’s recommendation to introduce technology in the aquaculture sector, this system aligns with the government’s call to assist small and traditional farmers in adopting the latest technologies to improve farming productivity.

“This project has received support from a KPT translational grant and collaboration with Maraie Sdn. Bhd., the owner of the fish cages used in the study.

“It also involves the participation of research institutions such as UMPSA, several universities, and government agencies related to aquaculture and technology.

“The estimated cost for initial prototype development is approximately RM10,000, which can be reduced through mass production, allowing for a lower price for a wider market,” he said.

In fact, he anticipates that the product will be available to farmers at a cost of approximately RM1,000 to RM3,000, depending on the system features they require.

Apart from iSenseFishery, he has developed several other research products related to sensor technology and machine learning in the fields of agriculture and aquaculture, including an AI-based water quality monitoring system for water treatment plants and a data analysis system to enhance productivity in modern agriculture.

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