

## **ABSTRACT**

Fish farming in Indonesia, especially in rural areas, requires monitoring of pond conditions such as temperature, pH, and water turbidity to ensure high-quality harvests. However, technological limitations often hinder farmers. While some farmers use monitoring systems, they rely on screens, making it difficult to manage numerous and distant ponds.

The Universal Communication System is designed to address this issue by integrating various monitoring systems using SPI, I2C, WiFi, and Bluetooth. The collected data is uploaded to Blynk for remote access, with LoRa enabling data transmission up to 500 meters and a power-saving mode reducing battery consumption.

Testing indicates that the system functions well, integrating data from up to four ponds and sending it to a gateway for upload to Blynk. The system accurately receives data with 100% accuracy, and wireless communication reaches over 10 meters without data loss. The power-saving mode captures data for 20 seconds and then sleeps for 30 minutes, consuming 10-15mA per cycle. With two 9600mAh batteries, the product can operate for up to 70 days non-stop with four simultaneous communications. This system aims to enhance data integration in agriculture and fish farming, benefiting the broader community.

Keywords: communication, data, monitoring, gateway, universal