

ABSTRAK

Azhar, Maulana. 2025. Rancang Bangun Sistem Otomasi dan Pemantauan Pompa Air pada Kolam Budidaya Ikan Kerapu Cantang di Hatchery D-Marine Aquaculture. Skripsi. Tanjungpinang: Program Studi Teknik Elektro. Fakultas Teknik dan Teknologi Kemaritiman. Universitas Maritim Raja Ali Haji. Pembimbing I: Hollanda Arief Kusuma, S.IK., M.Si. Pembimbing II: Prof.Dr.Ir.Dwi Eny Djoko Setyono, Msc.

Budidaya ikan kerapu cantang memiliki potensi besar dalam mendukung ketahanan pangan dan ekonomi maritim Indonesia. Salah satu aspek penting dalam budidaya ini adalah pengelolaan pasokan air yang bersumber dari laut ke kolam tandon secara efisien dan terukur. Hatchery D-Marine Aquaculture di Tanjungpinang sebelumnya masih mengandalkan pemantauan manual dan pengoperasian pompa secara konvensional, yang kurang responsif terhadap dinamika kondisi air. Oleh karena itu, dikembangkan sistem otomasi dan pemantauan pompa air berbasis Internet of Things dengan dukungan mikrokontroler ESP32, sensor ultrasonik JSN-SR04T, *relay*, *OLED Display*, *SD Card*, komunikasi ESP-NOW, sinkronisasi waktu NTP, dan *Platform* Ubidots. Sistem terdiri dari dua perangkat, yaitu *Master* dan *Slave*, yang masing-masing berfungsi memantau ketinggian air tandon dan air laut, serta mengontrol pompa secara otomatis dan manual. Hasil pengujian menunjukkan tingkat akurasi sensor setelah kalibrasi mencapai 99,62% untuk perangkat *Slave* dan 99,33% untuk perangkat *Master*, dengan RMSE masing-masing sebesar 0,25 cm dan 0,98 cm. Sistem berhasil mencatat dan mengirim data ke *Platform* Ubidots secara berkala setiap lima menit, dengan kinerja komunikasi ESP-NOW yang stabil dan responsif terhadap perubahan tinggi permukaan air. Penerapan sistem ini dinilai efektif dalam mendukung efisiensi operasional hatchery serta meningkatkan ketepatan pengisian air dalam proses budidaya kerapu cantang.

Kata Kunci : Ultrasonik JSN-SR04T, *Relay*, Kontrol manual dan otomatis, ESP NOW, Ubidots

ABSTRACT

Azhar, Maulana. 2025. *Design and Development of an Automated Water Pump Monitoring System for Cantang Grouper Fish Cultivation Ponds at the Hatchery D-Marine Aquaculture*. Thesis. Tanjungpinang: Study Program of Electrical Engineering. Faculty of Engineering and Maritime Technology. University of Maritim Raja Ali Haji. Supervisor I: Hollanda Arief Kusuma, S.IK., M.Si. Supervisor II: Prof.Dr.Ir.Dwi Eny Djoko Setyono, Msc.

Grouper cantang fish farming has great potential in supporting Indonesia's food security and maritime economy. One important aspect in this farming is the management of water supply from the sea to the reservoir pond efficiently and measurably. The D-Marine Aquaculture Hatchery in Tanjungpinang previously relied on manual monitoring and conventional pump operation, which was less responsive to the dynamics of water conditions. Therefore, an automation and monitoring system for water pumps based on the Internet of Things was developed with the support of an ESP32 Microcontroller, JSN-SR04T ultrasonic sensor, relay, OLED Display, SD Card, ESP-NOW communication, NTP time synchronization, and the Ubidots Platform. The system consists of two devices, namely Master and Slave, each of which functions to monitor the height of the reservoir water and sea water, and control the pump automatically and manually. The test results showed that the level of sensor accuracy after calibration reached 99.62% for the Slave device and 99.33% for the Master device, with RMSE of 0.25 cm and 0.98 cm, respectively. The system successfully recorded and sent data to the Ubidots Platform periodically every five minutes, with stable ESP-NOW communication performance and responsiveness to changes in water level. The implementation of this system is considered effective in supporting hatchery operational efficiency and increasing the accuracy of water filling in the cantang grouper cultivation process.

Keywords : JSN-SR04T Ultrasonic, Relay, Manual and Automatic Control, ESP-NOW, Ubidots.