

SUMMARY

Implementation of Coolbox Using Solar Energy to Optimize Storage of Fishermen's Catch In Muara Sungsang Based on IoT GSM

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x + 45 page, 5 table, 24 picture, attachment (19 pages)

This study designs an independent solar-powered coolbox system to optimize the storage of fishermen's catches in Muara Sungsang, aiming to address the issue of declining fish quality caused by the limited availability of ice blocks and the lack of electricity grid infrastructure in coastal areas. Monocrystalline solar panels are utilized to generate electrical energy, which is stored in Valve Regulated Lead-Acid (VRLA) batteries via a Maximum Power Point Tracking (MPPT) charge controller to power an environmentally friendly thermoelectric cooling (TEC) Peltier module. The system integrates GSM-based Internet of Things (IoT) technology using an ESP32 microcontroller to monitor and control temperature remotely in real-time through cellular networks. Furthermore, the efficiency of solar energy absorption is enhanced by an automatic solar tracking system based on Light Dependent Resistor (LDR) sensors and a wiper motor to adjust the panel position dynamically. The novelty of this research lies in the integration of thermoelectric cooling technology with an IoT GSM monitoring system and a solar tracking mechanism, specifically applied to meet the needs of traditional fishermen in river environments. This innovation is expected to increase fishermen's income while supporting digitalization and the adoption of renewable energy in small-scale traditional fisheries.

Keywords: *Coolbox; Solar Energy; Fishermen's Catch; Muara Sungsang; Internet of Things (IoT); GSM; Thermoelectric Cooling; Solar Tracking System*

RINGKASAN

Penerapan Coolbox Menggunakan Energi Surya Untuk Optimalisasi Penyimpanan Hasil Tangkapan Nelayan Di Muara Sungsang Berbasis IoT GSM

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x+ 45 halaman, 5 tabel, 24 gambar, lampiran (19 halaman)

Penelitian ini merancang sistem coolbox mandiri berbasis energi surya untuk mengoptimalkan penyimpanan hasil tangkapan nelayan di Muara Sungsang, guna mengatasi masalah penurunan kualitas ikan akibat keterbatasan es batu dan akses listrik di daerah pesisir. Panel surya monokristalin digunakan untuk menghasilkan energi listrik yang disimpan dalam baterai VRLA melalui charge controller MPPT untuk mengoperasikan modul pendingin Peltier (TEC) yang ramah lingkungan. Sistem ini mengintegrasikan teknologi Internet of Things (IoT) berbasis GSM menggunakan mikrokontroler ESP32 untuk memantau dan mengontrol suhu secara real-time dari jarak jauh melalui jaringan seluler. Selain itu, efisiensi penyerapan energi surya ditingkatkan dengan sistem tracking cahaya matahari otomatis berbasis sensor LDR dan motor wiper untuk menyesuaikan posisi panel secara dinamis. Penelitian ini memiliki kebaruan pada penggabungan teknologi pendingin termoelektrik dengan sistem monitoring IoT GSM dan mekanisme pelacak matahari yang diaplikasikan secara spesifik untuk kebutuhan nelayan tradisional di wilayah perairan sungai, sehingga diharapkan mampu meningkatkan pendapatan nelayan serta mendukung digitalisasi dan penggunaan energi terbarukan di sektor perikanan rakyat.

Kata kunci : *Coolbox*, Energi Surya, Hasil Tangkapan Nelayan, Muara Sungsang, *Internet of Things (IoT)*, *GSM*, Modul Pendingin *Peltier*, Sistem *Tracking* Cahaya Matahari