

ABSTRAK

MUHAMMAD AENUL RAFIK. Rancang Bangun Alat Ukur Pasang Surut Air Laut Berbasis Tekanan Hidrostatik menggunakan Sensor MS5837-30BA. Dibimbing oleh HOLLANDA ARIEF KUSUMA dan M. HASBI SIDQI ALAJURI.

Pasang surut air laut merupakan parameter penting dalam berbagai kegiatan kelautan dan pesisir sehingga diperlukan sistem pengukuran yang mampu merekam perubahan tinggi muka air laut secara langsung dan kontinu. Penelitian ini bertujuan merancang dan membangun alat ukur pasang surut air laut berbasis tekanan hidrostatik menggunakan sensor MS5837-30BA yang dilengkapi pemantauan suhu eksternal dan internal, akses data nirkabel berbasis jaringan lokal, serta sistem manajemen daya yang efisien. Metode penelitian yang digunakan adalah rekayasa teknik melalui tahapan perancangan perangkat keras, perangkat lunak, integrasi sistem, pengujian laboratorium, dan pengujian lapangan. Hasil penelitian menunjukkan bahwa sistem mampu mengukur tinggi muka air laut secara kontinu dengan nilai *Root Mean Square Error* (RMSE) sebesar 1,63 cm terhadap *tide staff* dan 16,00 cm terhadap data prediksi pasang surut. Sistem juga mampu menyediakan akses data melalui *web page* tanpa membuka wadah perangkat. Penerapan mode *deep sleep*, transistor PNP sebagai sakelar daya, dan regulator HT7833 berhasil menurunkan konsumsi daya sebesar 89,96%, sehingga waktu operasi sistem mencapai 279,38 jam. Hasil penelitian menunjukkan bahwa sistem yang dikembangkan layak digunakan sebagai alternatif alat ukur pasang surut yang hemat energi.

Kata kunci: Pasang surut laut, tekanan hidrostatik, MS5837-30BA, ESP32, *Deep sleep*.

ABSTRACT

MUHAMMAD AENUL RAFIK. Design and Development of a Sea Tide Measurement Instrument Based on Hydrostatic Pressure Using the MS5837-30BA Sensor. Supervised by HOLLANDA ARIEF KUSUMA and M. HASBI SIDQI ALAJURI.

Tides are an important parameter in various marine and coastal activities, so a measurement system is needed that is able to record changes in sea level directly and continuously. This study aims to design and build a hydrostatic pressure-based seawater tide measuring device using the MS5837-30BA sensor equipped with external and internal temperature monitoring, local network-based wireless data access, and an efficient power management system. The research method used is engineering engineering through the stages of hardware design, software, system integration, laboratory testing, and field testing. The results showed that the system was able to measure sea level continuously with a *Root Mean Square Error* (RMSE) value of 1.63 cm for *tide staff* and 16.00 cm for tidal prediction data. The system is also able to provide data access through *web pages* without opening the device container. The application of *deep sleep mode*, PNP transistor as a power switch, and HT7833 regulator successfully reduced power consumption by 89.96%, resulting in a system operation time of 279.38 hours. The results of the study show that the developed system is feasible to be used as an alternative to energy-efficient tidal measuring instruments.

Keywords: sea tide, hydrostatic pressure, MS5837-30BA, ESP32, deep sleep.

