ABSTRAK

RANCANG BANGUN SISTEM *MONITORING* DAN PENGENDALIAN KAPAL NIRAWAK BERBASIS *GLOBAL POSITIONING SYSTEM*

(2025 : xv + 78 halaman + 49 gambar + 4 tabel + Lampiran)

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Perkembangan teknologi navigasi dan sistem kendali nirkabel telah membuka peluang luas dalam pengembangan kendaraan nirawak, termasuk kapal tanpa awak yang dapat dikendalikan dan dimonitor dari jarak jauh. Penelitian ini bertujuan untuk merancang dan merealisasikan sistem *monitoring* dan pengendalian kapal nirawak menggunakan modul GPS Neo-6M sebagai penentu lokasi, mikrokontroler ESP32 sebagai unit pemroses utama, serta modul *Bluetooth* HC-05 untuk komunikasi dengan aplikasi Android. Sistem dirancang agar pengguna dapat mengetahui posisi kapal secara *real-time* dan mengendalikannya melalui aplikasi BT Car Controller. Hasil perancangan menunjukkan bahwa sistem mampu menampilkan koordinat posisi kapal dengan akurasi 13 meter dan merespon perintah gerak maju, mundur, kiri, dan kanan dalam jangkauan 13 meter secara stabil. Pengujian juga menunjukkan bahwa ESP32 dapat menangani komunikasi GPS dan *Bluetooth* secara bersamaan tanpa konflik sistem. Meskipun terdapat keterbatasan seperti jangkauan kontrol yang terbatas dan sensitivitas sinyal GPS terhadap kondisi lingkungan, sistem ini telah berfungsi sesuai dengan tujuan dan dapat dijadikan dasar untuk pengembangan lebih lanjut pada aplikasi otomasi maritim berbasis *Internet of Things* (IoT).

Kata Kunci: kapal nirawak, GPS Neo-6M, ESP32, *monitoring*, kendali jarak jauh, *Bluetooth*

ABSTRACT

DESIGN AND DEVELOPMENT OF A REMOTE MONITORING AND CONTROL SYSTEM FOR UNMANNED BOATS BASED ON GLOBAL POSITIONING SYSTEM

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The advancement of navigation and wireless control technologies has opened up wide opportunities in the development of unmanned vehicles, including unmanned boats that can be monitored and controlled remotely. This study aims to design and implement a monitoring and control system for an unmanned boat using the GPS Neo-6M module for positioning, the ESP32 microcontroller as the main processing unit, and the HC-05 Bluetooth module for communication with an Android application. The system is designed to allow users to track the boat's position in real-time and control its movement using the BT Car Controller application. The design results show that the system can display the boat's coordinates with an accuracy of approximately 13 meters and respond to movement commands—forward, backward, left, and right—within a range of 13 meters in a stable manner. Testing also indicates that the ESP32 can handle GPS and Bluetooth communication simultaneously without system conflicts. Although there are limitations such as restricted control range and GPS signal sensitivity to environmental conditions, the system functions according to its objectives and provides a solid foundation for further development in maritime automation based on the Internet of Things (IoT).

Keywords: unmanned boat, GPS Neo-6M, ESP32, monitoring, remote control, Bluetooth