ABSTRAK

IMPLEMENTASI SISTEM MONITORING SUNGAI BERBASIS *INTERNET OF THINGS* DAN *WEBSITE* DI AREA ALIRAN SUNGAI 24 ILIR KOTA PALEMBANG

(2025 : xx + 148 Halaman + 63 Gambar + 14 Tabel + Lampiran)

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Pemantauan kondisi sungai secara konvensional di area urban padat seperti Sungai 24 Ilir, Kota Palembang, menghadapi kendala efektivitas dalam penyediaan data yang cepat dan akurat, sehingga meningkatkan risiko keterlambatan mitigasi bencana banjir. Untuk mengatasi permasalahan tersebut, penelitian ini merancang, mengimplementasikan, dan mengevaluasi sebuah sistem pemantauan hidrometeorologi *end-to-end* berbasis *Internet of Things* (IoT) dan website. Arsitektur sistem ini mengintegrasikan sensor radar non-kontak untuk pengukuran ketinggian air beserta sensor pendukung untuk parameter atmosfer dan curah hujan. Data dari seluruh sensor kemudian ditransmisikan secara *real-time* ke *cloud broker* melalui IoT Gateway 4G dengan protokol MQTT, yang selanjutnya diproses oleh arsitektur layanan *backend* modular berbasis Node.js dan Python dan disajikan pada *platform website* berbasis Laravel. Hasil pengujian kuantitatif yang dilakukan berhasil memvalidasi kinerja sistem yang sangat andal; akurasi sensor ketinggian air primer mencapai rata-rata persentase error di bawah 1%, reliabilitas komunikasi data tercatat 100%, dengan rata-rata latensi *end-to-end* 5.26 detik. Selain itu, pengujian fungsionalitas membuktikan bahwa sistem peringatan dini mampu mengirimkan notifikasi alarm secara proaktif dan efektif. Dengan demikian, sistem yang dikembangkan terbukti menjadi solusi yang valid, reliabel, dan responsif, yang mampu menyediakan data krusial untuk mendukung pengambilan keputusan dan meningkatkan kesiapsiagaan terhadap bencana banjir.

Kata kunci : Sistem Monitoring, *Internet of Things* (IoT), Peringatan Dini Banjir, Sensor Radar, MQTT, *Website*, Hidrometeorologi.

ABSTRACT

IMPLEMENTATION OF INTERNET OF THINGS AND WEBSITE-BASED RIVER MONITORING SYSTEM IN 24 ILIR RIVER AREA OF PALEMBANG CITY
(2025 : xx + 148 Pages + 63 Pictures + 14 Tables + Attachment)

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Conventional river condition monitoring in densely populated urban areas, such as Sungai 24 Ilir in Palembang City, faces limitations in providing fast and accurate data, thereby increasing the risk of delayed flood disaster mitigation. To address this issue, this study designs, implements, and evaluates an end-to-end hydrometeorological monitoring system based on the Internet of Things (IoT) and a web platform. The system architecture integrates a non-contact radar sensor for water level measurement along with supporting sensors for atmospheric parameters and rainfall. All sensor data is transmitted in real time to a cloud broker via a 4G IoT Gateway using the MQTT protocol. The data is then processed through a modular backend service architecture based on Node.js and Python, and visualized on a Laravel-based web platform. Quantitative testing results validate the system's high reliability; the primary water level sensor achieved an average error percentage of less than 1%, data communication reliability reached 100%, and the average end-to-end latency was recorded at 5.26 seconds. In addition, functional testing demonstrated that the early warning system can proactively and effectively send alarm notifications. Therefore, the developed system proves to be a valid, reliable, and responsive solution capable of providing crucial data to support decision-making and enhance flood disaster preparedness.

Keywords : *Monitoring System, Internet of Things* (IoT)*, Flood Early Warning, Radar Sensor, MQTT, Website, Hydrometeorology.*