ABSTRAK

RANCANG BANGUN SISTEM MONITORING PERGESERAN TANAH PADA JALUR KERETA API HILIR AIRTUBA BERBASIS *Internet of Things* **(IoT) DENGAN** *WIRELESS SENSOR NETWORK* **(WSN)**

Oleh

DIAN NURBUDI LEKSONO

Penelitian ini bertujuan untuk merancang dan membangun sistem monitoring pergeseran tanah pada jalur kereta api hilir Airtuba dengan menggunakan teknologi *Internet of Things* (IoT) dan *Wireless Sensor Network* (WSN). Latar belakang penelitian ini adalah pentingnya keamanan dan keselamatan perjalanan kereta api di Indonesia, khususnya di daerah rawan bencana seperti Sumatera Selatan. Sistem ini menggunakan sensor akselerometer ADXL345 dan sensor tegangan DC untuk mendeteksi perubahan sudut kemiringan tanah dan tegangan baterai secara *real-time,* yang kemudian dikirimkan secara *wireless* dan ditampilkan melalui platform Blynk. Penelitian dilakukan di Laboratorium Teknik Elektro Terpadu Universitas Lampung dan jalur kereta api hilir Airtuba dari Januari hingga Mei 2024. Hasil penelitian menunjukkan bahwa sistem yang dikembangkan mampu mendeteksi pergeseran tanah dengan akurasi yang baik dan mengidentifikasi pengaruh kondisi Line of Sight (LOS) dan Non-Line of Sight (N-LOS) terhadap *Quality of Service* (QoS) dari jaringan sensor. Data dari sensor akselerometer menunjukkan stabilitas tanah saat tidak ada kereta melintas, namun fluktuasi yang lebih besar saat kereta melintas, menunjukkan perubahan akibat getaran kereta. Sistem monitoring ini diharapkan dapat memberikan peringatan dini terhadap potensi longsor dan tanah amblas, sehingga mengurangi risiko kecelakaan kereta api. Penelitian ini memberikan landasan bagi pengembangan sistem monitoring yang lebih canggih di masa depan, dengan peningkatan kualitas layanan (QoS) dan penambahan sensor yang mampu mengukur jarak perpindahan tempat.

Kata kunci : Sistem Monitoring, Pergeseran Tanah, *Internet of Things* **(IoT),** *Wireless Sensor Network* **(WSN), Sensor Akselerometer, Sensor Tegangan DC,** *Line of Sight* **(LOS),** *Non-Line of Sight* **(N-LOS),** *Quality of Service* **(QoS), dan Blynk**

ABSTRACT

RANCANG BANGUN SISTEM MONITORING PERGESERAN TANAH PADA JALUR KERETA API HILIR AIRTUBA BERBASIS *Internet of Things* (IoT) DENGAN *WIRELESS SENSOR NETWORK* (WSN)

By

DIAN NURBUDI LEKSONO

This research aims to design and build a soil shift monitoring system on the Airtuba downstream railway line using Internet of Things (IoT) technology and Wireless Sensor Network (WSN). The background of this research is the importance of the security and safety of train travel in Indonesia, especially in disaster-prone areas such as South Sumatra. The system uses ADXL345 accelerometer sensors and DC voltage sensors to detect changes in the angle of the ground slope and battery voltage in real-time, which are then transmitted wirelessly and displayed through the Blynk platform. The research was carried out at the Integrated Electrical Engineering Laboratory of the University of Lampung and the Airtuba downstream railway line from January to May 2024. The results show that the developed system is able to detect ground shifts with good accuracy and identify the influence of Line of Sight (LOS) and Non-Line of Sight (N-LOS) conditions on the Quality of Service (QoS) of the sensor network. Data from the accelerometer sensor shows the stability of the ground when no train is passing, but the greater fluctuation when the train is passing, shows changes due to the vibration of the train. This monitoring system is expected to provide early warning of potential landslides and landslides, thereby reducing the risk of train accidents. This research provides a foundation for the development of more sophisticated monitoring systems in the future, with improved quality of service (QoS) and the addition of sensors capable of measuring distance from place to place.

Keywords: Monitoring System, Land Shift, Internet of Things (IoT), Wireless Sensor Network (WSN), Accelerometer Sensor, DC Voltage Sensor, Line of Sight (LOS), Non-Line of Sight (N-LOS), Quality of Service (QoS), and Blynk