ABSTRAK

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Program Studi : Teknik Elektro

Judul Skripsi : Sistem Monitoring Vibrasi Motor Induksi Tiga Fasa Berbasis *Internet of Things* (IoT) untuk Deteksi Gangguan Mekanis.

Motor induksi tiga fasa merupakan komponen vital industri yang rentan mengalami kegagalan mekanis seperti kondisi normal, misalignment, baud longgar, dan keausan bearing. Penelitian ini bertujuan merancang sistem pemantauan vibrasi dan peringatan dini berbasis *Internet of Things* (IoT) untuk mendeteksi anomali tersebut secara real-time berdasarkan standar ISO 10816-1. Sistem dibangun menggunakan mikrokontroler ESP32-S3 yang terintegrasi dengan sensor akselerometer 6-sumbu DFROBOT, sensor *receive*r laser, dan sensor jarak VL53L0X. Data diakuisisi dan dikirim menggunakan protokol MQTT ke dashboard Node-RED dengan tingkat packet loss 0%. Hasil pengujian menunjukkan sistem mampu mengklasifikasikan kondisi motor secara presisi. Pada simulasi cacat ganda (multi-fault) berupa keausan bearing dan baud longgar yang memicu terlepasnya kopling, kecepatan getaran radial melonjak ekstrem hingga 47,47 mm/s. Sistem merespons seketika dengan mengklasifikasikan kondisi tersebut ke dalam zona bahaya (*Unacceptable*). Alat ini terbukti andal sebagai instrumen pemeliharaan preventif untuk mencegah kerusakan fatal pada motor di industri.

Kata Kunci: Motor Induksi, Vibrasi, Internet of Things, Keausan Bearing, Node-RED, ISO 10816-1.

ABSTRACT

Name	:	Hasbi Anugrah
Study Program	:	Elektrical Engineering
Thesis Title	:	Internet of Things (IoT)-Based Three-Phase Induction Motor Vibration Monitoring System for Detection of Mechanical Faults

Three-phase induction motors are vital industrial components susceptible to mechanical failures such as misalignment, foundation looseness, and bearing wear. This research aims to design an Internet of Things (IoT)-based vibration monitoring and early warning system to detect these anomalies in real-time according to the ISO 10816-1 standard. The system utilizes an ESP32-S3 microcontroller integrated with DFRobot 6-axis accelerometer sensors, a laser receiver sensor, and a VL53L0X distance sensor. Data is acquired and transmitted via the MQTT protocol to a Node-RED dashboard with a 0% packet loss rate. Testing results proved the system's precision in classifying various motor conditions. In a multi-fault simulation involving bearing wear and loose bolts that triggered coupling detachment, radial vibration velocity spiked extremely to 47.47 mm/s. The system responded instantly by classifying the condition into the danger zone (Unacceptable). This instrument is proven reliable for predictive maintenance to prevent fatal damage to induction motors in industrial environments.

Keywords: Induction Motor, Vibration, Internet of Things, Bearing Wear, Node-RED, ISO 10816-1.