

**DESIGN AND IMPLEMENTATION OF AN IOT-BASED VEHICLE TELEMETRY
AND TAMPER DETECTION SYSTEM USING ESP32, OBD-II, AND V2X
COMMUNICATION**

By

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STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.


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ABSTRACT

Design and Implementation of an IoT-Based Vehicle Telemetry and Tamper Detection System Using ESP32, OBD-II, and V2X Communication

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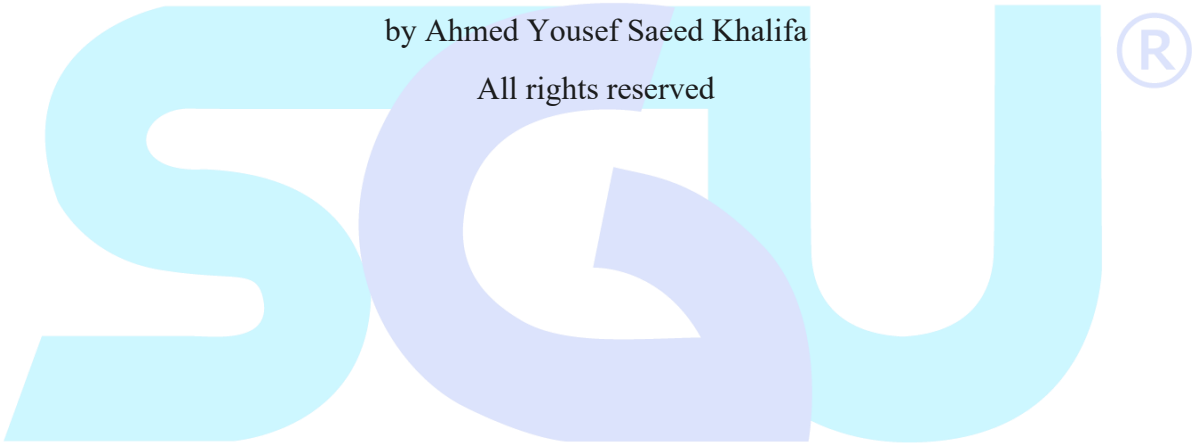
Fleet operators in Indonesia face persistent challenges related to fuel theft, equipment tampering, and unreliable vehicle telemetry due to the limitations of conventional monitoring systems. Many existing solutions rely solely on GPS or OBD-II devices, which are vulnerable to disconnection, data manipulation, and network instability. This study presents the design and implementation of an intelligent IoT-based smart vehicle telemetry and tamper detection system that integrates an ESP32 microcontroller with OBD-II telemetry, GPS positioning, LTE communication, data storage, and a solar-assisted independent power supply. The proposed system operates independently of vehicle ignition and continuously monitors vehicle telemetry, detects tampering and abnormal behavior, and preserves data locally during internet outages. Anomaly detection is performed using threshold-based and time-series analysis, while alerts are generated for events such as OBD disconnection, abnormal fuel behavior, and network loss. Experimental field testing is conducted to evaluate system performance, detection reliability, data integrity, and communication stability. The results demonstrate that integrating multiple sensing and communication components into a unified system improves telemetry reliability, enhances tamper detection, and ensures continuous data availability, making the proposed solution suitable for secure fleet monitoring in tamper-prone and connectivity-limited environments.

Keywords: Internet of Things (IoT), Vehicle-to-Everything (V2X), Fleet Monitoring and Tamper Detection, ESP32, OBD-II, Solar Energy

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