# ABSTRACT

*The vehicle rental industry faces significant challenges in fleet management, including dependency on obsolete 2G GSM technology, annual subscription costs of up to Rp 750,000 per unit, limited flexibility of proprietary systems, and suboptimal interfaces for mobile devices. These limitations create a need for more modern, cost-effective tracking solutions that can be customized to specific rental business requirements. This research develops a Real-Time Cloud-Based Internet of Things (IoT) Vehicle Asset Position System that integrates ESP32 microcontroller, UBLOX NEO-6M V2 GPS module, SIM A7670C 4G LTE Cat-1 cellular module, and relay module for remote control. Coordinate data is transmitted in real-time to Microsoft Azure servers via WebSocket protocol with PostgreSQL database. User interfaces are provided through Next.js website application with Leaflet visualization and React Native mobile application, featuring real-time tracking, geofencing, remote engine shutdown, and violation notifications. Test results demonstrate GPS accuracy of 4.78 meters in open areas and 13.12 meters in tree-covered areas. The relay module is responsive with response times of 3.34 seconds for activation and 2.21 seconds for emergency shutdown. The system is energy-efficient with power consumption of 2.97 W while moving and 1.78 W when parked. Geofencing features detect violations with 100% accuracy, and the system handles 100 vehicles without lag. Katalon Studio software testing achieved 100% success rate across 26 scenarios. User Acceptance Testing by Sukamenak Rental confirmed intuitive and responsive interfaces, while economic evaluation shows savings of Rp 450,000 per unit per year, proving VehiTrack as a technically superior and economically advantageous solution.*



***Keywords**: Vehicle Tracking System, Internet of Things (IoT), Cloud Computing, Real-Time, GPS, Geofencing, ESP32*