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## Advancing Roadway Safety through Intelligent Directional Indicators

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Abstract: This Roadway safety remains a critical concern worldwide, with millions of accidents occurring annually, leading to significant loss of life and economic damage. Conventional directional indicator systems, reliant on manual control or mechanical switches, often fall short in providing timely and accurate directional information to other road users, resulting in confusion and potential accidents. To address this challenge, the project "Advancing Roadway Safety through Intelligent Directional Vehicle Indicators" proposes a novel solution leveraging advanced technologies such as the ESP32 microcontroller and the ADXL345 accelerometer. This project aims to develop a robust system capable of accurately detecting and signaling left and right turns in real-time, thereby enhancing situational awareness and reducing the risk of accidents caused by signaling errors or ambiguity. The system integrates hardware components including the ESP32 controller, ADXL345 accelerometer, and OLED display, along with software components comprising firmware for the ESP32, algorithms for directional detection using accelerometer data, and display logic for the OLED display. Through a comprehensive methodology involving calibration of the accelerometer, data processing, and integration of hardware and software components, the system achieves enhanced safety, reliability, integration, and efficiency. Experimental results demonstrate the effectiveness of the proposed system in providing accurate and timely directional indicators, with minimal false positives or negatives under various environmental conditions. The project contributes to advancing roadway safety and lays the foundation for the widespread adoption of intelligent transportation systems, offering significant potential for reducing accidents and improving the efficiency of transportation networks

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