Intelligent Vehicle-To-Vehicle Communication System For Driver Safety & Hazard Prevention

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Abstract*: The rapid growth of vehicles on roads has significantly increased the risk of accidents caused by delayed driver response, poor visibility, and lack of communication between vehicles. To address these challenges, an Intelligent Vehicle-to-Vehicle Communication System for Driver Safety and Hazard Prevention is proposed using an ESP32 microcontroller and multiple sensing modules. The system is designed to enhance road safety by detecting potential hazards and providing real-time alerts to the driver as well as nearby vehicles. In this model, sensors such as infrared sensors, ultrasonic sensors, and eye-blink detection sensors continuously monitor both the driving environment and the driver's condition.*

The ESP32 microcontroller acts as the central processing unit that collects and analyzes the data obtained from all sensors. When a risky condition is identified, such as a vehicle approaching too closely, an obstacle detected on the road, or signs of driver fatigue, the system immediately generates warning signals. These warnings are displayed through a display module and can also be transmitted to nearby vehicles using wireless communication capabilities of the ESP32. Additionally, manual switches allow the driver to trigger emergency alerts or hazard notifications when necessary. By integrating real-time sensing, wireless communication, and intelligent decision making, the proposed system helps drivers react faster to potential dangers and minimizes the chances of collisions. Overall, the system provides a cost-effective and efficient approach to improving transportation safety by enabling proactive hazard detection and communication between vehicles.

Keywords: Vehicle-to-Vehicle Communication, Driver Safety System, ESP32 Microcontroller, Hazard Detection, Eye Blink Sensor, Ultrasonic Sensor, Intelligent Transportation System