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Design and Implementation of Vehicle to Vehicle Communication Prototype with nRf24L01

Dr. Manasa K Chigateri[1], G R Sai Maharnisha[2], Supriya A[3], A S Madhushree[4]
Associate Professor, Electronics and Communication Engineering[1]
Students, Electronics and Communication Engineering[2-4]
Rao Bahadur Y. Mahabaleswarappa Engineering College, Ballari, Karnataka, India

Abstract: *The Road safety has become a major concern due to the rapid increase in the number of vehicles and traffic congestion. Traditional safety systems mainly rely on driver awareness and have limited capability to predict or prevent accidents in real time. Vehicle-to-Vehicle (V2V) communication technology enables direct information sharing between vehicles to improve safety and traffic efficiency. With advancements in embedded systems and wireless communication, low-cost and reliable V2V solutions can be effectively developed.*

This project presents the design and implementation of a Vehicle-to-Vehicle (V2V) communication system using Arduino and nRF24L01 wireless transceivers to enhance on-road safety and situational awareness. The system enables real-time exchange of critical information—such as vehicle speed, direction, and alert signals—between nearby vehicles over a low-power RF communication channel. The Arduino microcontroller processes sensor data and transmits or receives messages through the nRF24L01 module, ensuring reliable short-range communication with minimal latency. By providing timely warnings about potential hazards such as sudden braking, collision risks, and blind-spot detection, the system helps reduce accidents and supports intelligent transportation. This cost-effective prototype demonstrates the feasibility of using embedded systems and RF communication for improving vehicular safety and lays the foundation for further expansion into IoT-based smart mobility solutions..

Keywords: Vehicle-to-Vehicle (V2V) Communication, nRF24L01 RF Transceiver, Arduino-based Embedded System, Real-time Vehicular Safety Alerts

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