PROTOTYPE OF A SAFE DISTANCE DETECTION SYSTEM FOR VEHICLES USING A LIDAR SENSOR COMBINED WITH A SPEED SENSOR

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ABSTRACT

The increasing number of vehicles in Indonesia has led to traffic congestion and heightened collision risks due to limited maneuvering space. Many vehicles are still not equipped with advanced safety systems for maintaining safe distances. This study proposes a solution in the form of a prototype safe distance detection system based on a LiDAR sensor combined with a speed sensor, which activates only when the vehicle travels above 20 km/h. The system is developed using an Arduino Mega as the main controller, a servo motor for 180° area scanning, an OLED display for real-time information output, and a buzzer for alert notifications.

Test results show that the LiDAR sensor has an average measurement deviation of ±2 cm compared to a manual ruler. The system's response time to objects in the danger zone (<1 meter) is less than 0.5 seconds. The speed sensor effectively activates and deactivates the system automatically according to the set speed threshold. The system can detect objects up to a distance of 7 meters and accurately provide directional alerts (front, left, right) based on the servo's scanning direction. Speed, zone status, and distance data are displayed in real-time on the OLED screen.

The findings conclude that the system operates as designed, offering fast and accurate detection and response performance. It presents a viable, efficient, and cost-effective microcontroller-based safety solution for vehicle applications.

Keywords: LiDAR, Arduino Mega, speed sensor, safe distance, buzzer alert.