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ADVANCEMENTS IN TRAFFIC SAFETY: A NOVEL SPEED DETECTION SYSTEM USING INFRARED SENSORS AND ARDUINO TECHNOLOGY

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Abstract: In modern urban environments, ensuring traffic safety remains a critical concern, necessitating the advancement of technology for efficient traffic management. This report introduces a novel Speed Detection System for Vehicles utilizing Infrared (IR) sensors and Arduino microcontroller technology. By strategically positioning two IR sensors along roadsides, the system accurately measures vehicle speeds in real-time. The Arduino microcontroller processes sensor data, calculates speeds, and displays information on an LCD unit. LED indicators highlight speed violations, enhancing visibility for both drivers and authorities. The report explores existing literature on Arduino applications in traffic management, human-machine interfaces, and IR-based speed detection, emphasizing the system's innovative approach. The proposed algorithm employs time measurements between sensors to compute vehicle speeds, enhancing accuracy and reliability. Results from hardware implementation demonstrate the system's effectiveness in detecting speed violations and displaying relevant data. Future enhancements may include wireless communication for remote monitoring, data logging for historical analysis, and machine learning algorithms for improved classification. Integration with smart city initiatives and collaboration with authorities further extend the system's capabilities. The report concludes that the Speed Detection System offers a cost-effective and accessible solution for enhancing road safety and traffic management. Acknowledgments express gratitude to project contributors and highlight the significance of collaborative research in advancing transportation technologies. The system's potential for widespread implementation underscores its importance in promoting safer roadways and shaping future traffic management strategies.

Keywords: Arduino; Infrared; Safety; Speed