CITY TRAFFIC CONTROL SYSTEM

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Abstract. The research has been conducted in view of an advanced traffic management system to be developed, which is supposed to improve traffic flow and road safety, as well as the efficiency of public transportation. In the design, speed detection sensors, ultrasonic sensors for bus management, and intelligent traffic lights optimize vehicle and pedestrian traffic at intersections. It warns against speeding, provides efficient access for buses, and coordinates traffic lights to avert accidents. The aim of the project is, through the use of modern technology, to reduce congestion in order to improve urban living standards by concocting wiser and sustainable transportation solutions.

Keyword: smart, transportation, solutions, road, safety, traffic, management

INTRODUCTION

The current issue of traffic congestion in most urban cities is leading to time-wasting travel, more accidents, and a reduced quality of life. Traditional approaches to traffic signal management face problems like signal failures, inadequate law enforcement, and ineffective coordination. Introducing the Traffic Management System: This paper covers the development of an intelligent traffic management system that will be able to optimize traffic flow, ensure road safety, and increase efficiency for public transportation.

PROBLEM

The big problem with urban traffic congestion is contributed by the combination of signal failures, inadequate law enforcement, and poor practices of managing traffic. It exacerbates the problems in travel time, accident rates, and decreasing efficiency in public transportation. As the city is continuously growing, it puts pressure on current traffic systems, which causes frustration among commuters and deterioration in the quality of urban life. These challenges will continue to face the future if their proper solutions are not distinctly offered. This calls for more complex systems that may make traffic management efficient and safe.

APPROACH

The design phase includes detailed plans and specifications for integrating hardware and software components. Key elements involve IR sensors for speed detection, ultrasonic sensors for bus management, traffic light modules, and servo motors for gate operations.

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Software development focuses on programming microcontrollers to process sensor data and control outputs, using real-time algorithms for timely decision-making and alerts.

After design, the system is assembled, calibrated, and rigorously tested with tools like multimeters and simulation software to ensure accuracy and reliability. Ongoing monitoring and maintenance are crucial post-deployment to address any issues and adapt to changing traffic conditions, ensuring continued effectiveness.

The results indicate that the integrated traffic management system significantly enhances urban traffic control and safety. The integration of speed detection, bus management, and traffic light control improves road safety, reduces delays, and optimizes traffic flow. The system has proven reliable and effective, contributing to smoother and safer urban transportation while addressing modern traffic challenges.

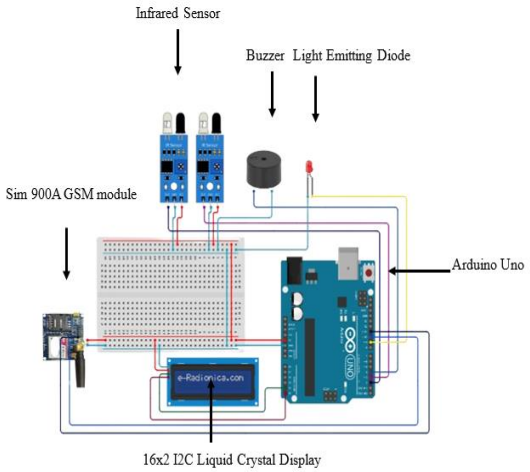

Figure 1:Circuit Diagram of Speed Detection System

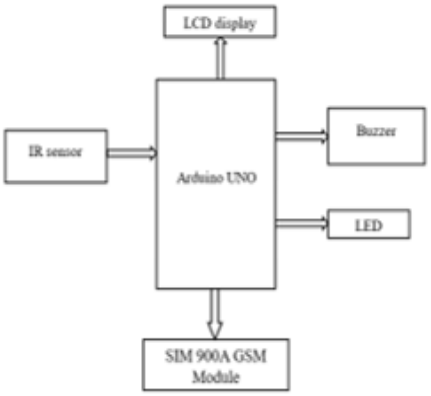

Figure 4:Block Diagram of Speed Detection System

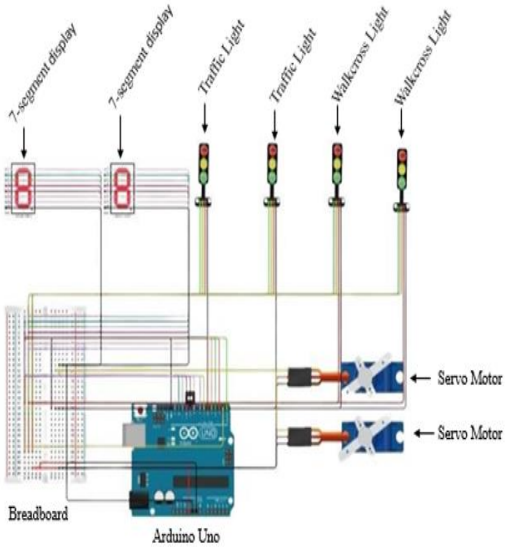

Figure 2:Circuit Diagram of Digital Traffic Light System

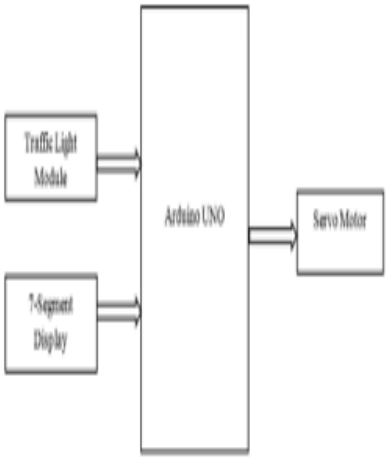

Figure 5:Block Diagram of Digital Traffic Light System

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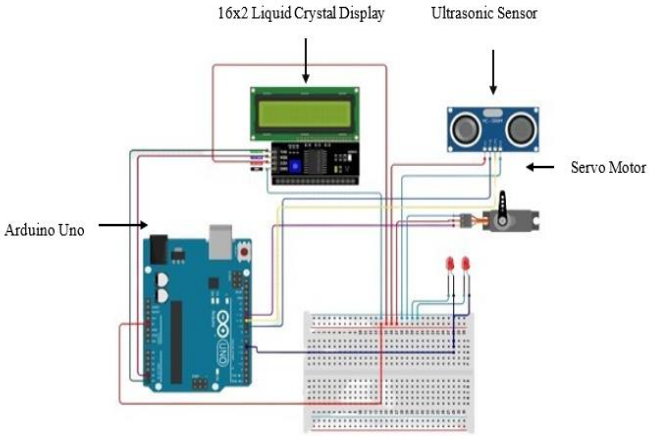

Figure 3:Circuit Diagram of Bus Stop Control System

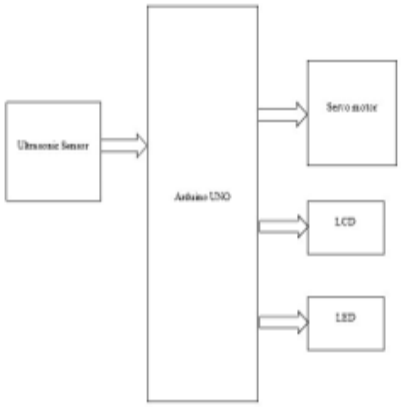

Figure 6:Block Diagram of Bus Stop Control System

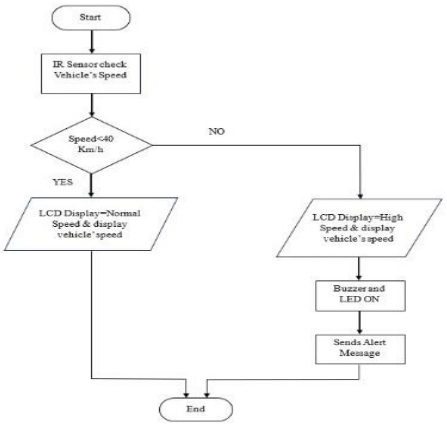

Figure 7: Flow chart of Speed Detection System

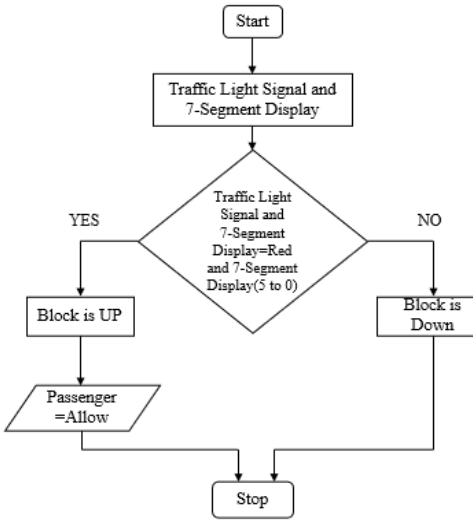

Figure 8:Flow chart of Digital Traffic Light System

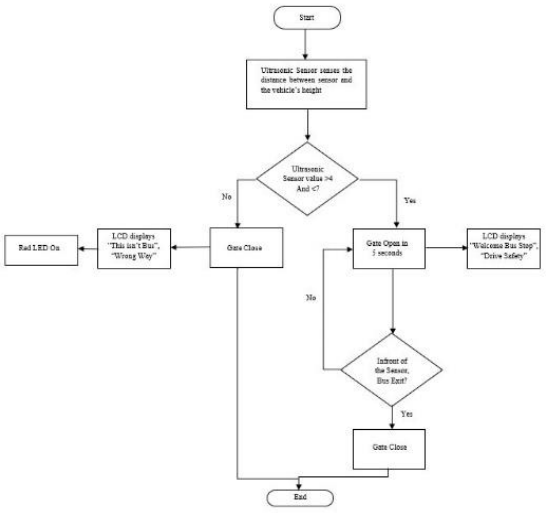

Figure 9: Flow Chart of Bus Stop Control System

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RESULTS

Pedestrian crossroad control system where a traffic light and a seven-segment countdown display determine crossing safety. If the traffic light is red and the countdown is from 5 to 0, a block is lowered, allowing pedestrians to cross safely while displaying a “Stop” signal to drivers. If these conditions are not met, the block stays up to prevent crossing, ensuring pedestrian safety at intersections.

The busway vehicle control system uses an ultrasonic sensor to measure vehicle height. If the height is between 4 and 7 meters, indicating a bus, the servo motor lifts a barrier, the LCD shows “Welcome to Bus Stop” and “Drive Safety,” and the red LED stays off. For non-buses, the barrier stays down, the LCD reads “This isn’t a Bus” and “Wrong Way,” and the red LED lights up to signal a warning.

This speed is displayed on an LCD panel, which indicates "High Speed" for velocities exceeding 40 km/h. In response, the system triggers a buzzer and an alert light to immediately warn the driver, while a GSM module sends an alert message to a designated recipient for remote notification. This integrated approach provides both immediate feedback and remote alerts to manage and address speeding incidents effectively.

Figure 12: Traffic light and 7-segment display (5 to 0) are green, and the cars

Figure 13:Sensor detects bus and gate

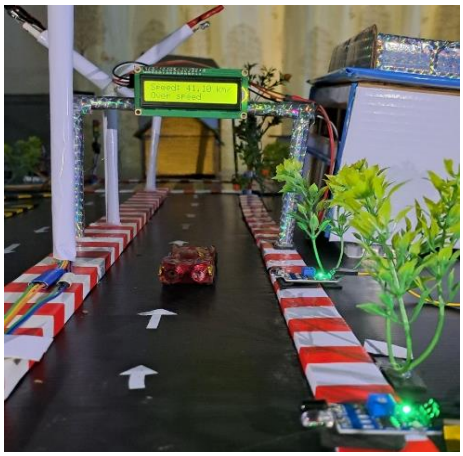

Figure 14: The car speed rate is shown on the LCD as overspeed

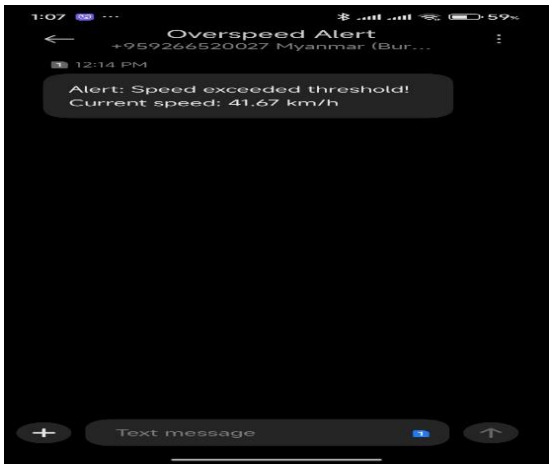

Figure 15: Sending Overspeed Alert Message

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CONCLUSION

The integrated traffic management system deals with urban congestion and safety challenges through the use of advanced technology to improve the flow of traffic and public transportation. Due to the clear definition of roles for administrators and patients, this system provides for smooth communication and, further, a convenient way of managing information relating to users and appointments. Successful integration of hardware and software parts, combined with rigorous testing, offers reliability in adaptation to a real-world environment. In all, this system is one of the big steps toward smarter and safer solutions to urban transportation and will improve the quality of life for city residents.

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