Chittagong University of Engineering and Technology

Department of Electrical and Electronic Engineering

Project Report

Car Speed Checker and Over Speed Detector

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CAR SPEED CHECKER AND OVERSPEED DETECTOR

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Abstract: Every day, we read about automobile accidents that claim the lives of numerous innocent individuals. And in the majority of these situations, the primary cause is excessive speed. Despite signs specifying the maximum speed limit for the protection of vehicles and passengers, people frequently violate these restrictions, resulting in these terrible tragedies.

"Car Speed Checker and Overspeed Detector on Highways" is the title of this project. To detect the vehicle speed and show it on an LCD display, we utilized an Arduino uno microcontroller and two infrared sensors. The display will indicate the vehicle's speed as well as alert drivers to over speeding by activating the buzzer. This system will monitor drivers by calculating the time it takes them to travel a certain distance between two places. A point is made up of an infrared transmitter and receiver. The circuit board calculates the time it takes the vehicle to drive between two distances. It calculates the velocity and displays it on the LCD display based on the time. The concept may be expanded by incorporating a security camera into the system to monitor driver conduct and identify vehicle license plates for transmission to traffic authorities.

Keywords: Sensors, IR, micro-controller

INTRODUCTION

A large amount of effort has been committed over the last decade to creating automotive speed checker systems that offer visual representations of a vehicle's speed and inform the driver if it exceeds a predefined limit. These devices are critical in increasing road safety and reducing accidents caused by excessive speed. Despite developments in this subject, there are still questions about the most effective and efficient way to create such systems. It is unknown why some microcontrollers, such as the Arduino Uno, have acquired popularity over others, such as the 8051-microcontroller family.

As a result, the goal of this research was to investigate the usage of an Arduino Uno microcontroller and two infrared sensors to address the problem of over speeding. This project sought to construct a dependable and user-friendly automobile speed checker system by sensing and displaying vehicle speeds on an LCD screen and activating a buzzer for over speeding notifications. This study seeks to contribute to the advancement of effective and practical solutions for promoting road safety and preventing accidents caused by excessive vehicle speed by establishing a territory within the field of car speed checkers, understanding the gaps in knowledge surrounding the choice of microcontroller, and occupying the niche of utilizing Arduino Uno and infrared sensors.

LITERATURE REVIEW

Numerous researchers have previously conceived and implemented micro controller-based automatic speed checker circuits. We learned of a project called "**NEVON PROJECTS**" that measures and displays the speed of a car on an LCD while also alerting the driver to over speeding. Another one we saw on Research gate.net was Mr. Prashnna Kumar Gyawali's "Final year project on vehicle over speed detection and recognition." We also discovered several research papers, essays, and other publications on the subject. The speed checker system assesses and measures a vehicle's speed, displays it on an LCD screen, and alerts the driver if they are traveling too fast.

METHODOLOGY

Automobile accidents caused by excessive speed continue to be a major source of fatalities and injuries across the world. Despite the availability of speed limit signs and laws, many drivers disobey them, resulting in fatal consequences. As a result, developing effective speed detection and monitoring technologies is critical to addressing this issue and improving road safety.

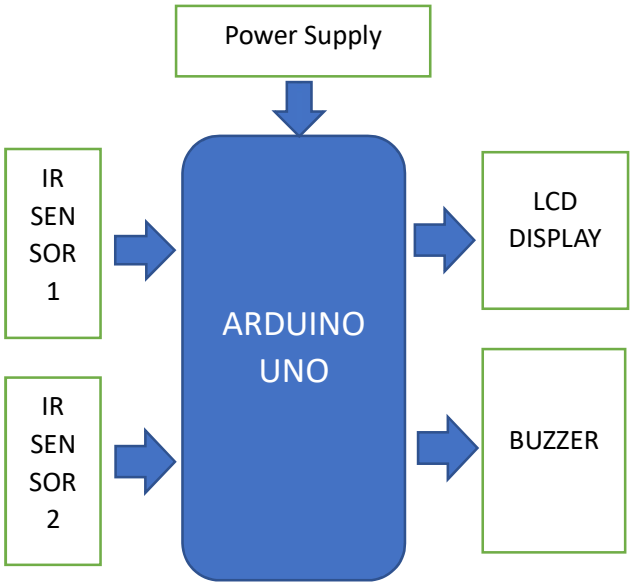

Figure 1: Block diagram of car speed checker circuit

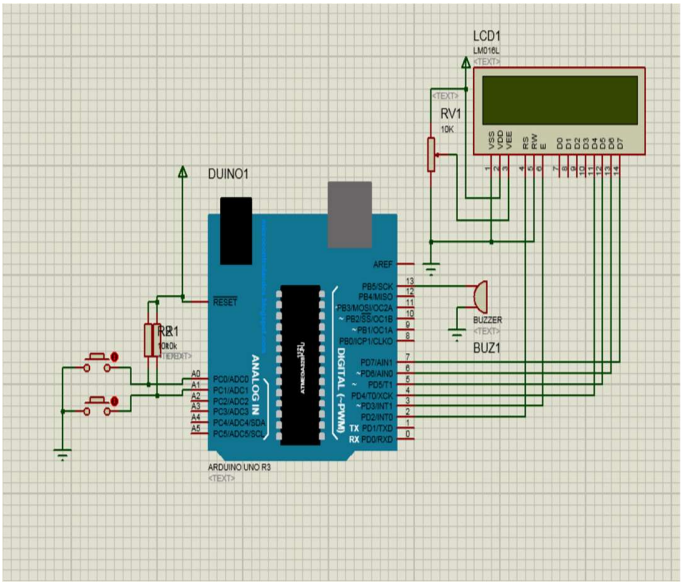

Figure 2: Schematic diagram of car speed checker circuit

HARDWARE REQUIRMENTS

THE HARDWARE COMPONENTS REQUIRED FOR THE PROJECT ARE LISTED BELOW:

1. SOLDERLESS BREADBOARD
2. ARDUINO UNO
3. IR SENSORS
4. 16*2 LCD DISPLAY
5. 4.7K RESISTOR
6. MALE TO MALE JUMPER WIRE
7. BATTERY 9V
8. BATTERY CLIP
9. IR SENSOR MODULE

Solderless Breadboard:

The solderless breadboard was critical to the success of our project. It provides an easy platform for prototyping and assembly circuit components without the need of soldering. We could quickly and easily design the circuit for the automobile speed detection system by simply inserting the electrical components and connecting wires into the connection holes of the breadboard. This enabled for greater testing and modification of the circuit design, making it an excellent alternative for quick prototyping and experimentation. The solderless breadboard sped up the assembly process and allowed us to successfully integrate the Arduino microcontroller, infrared sensors, LCD display, and buzzer into our project.

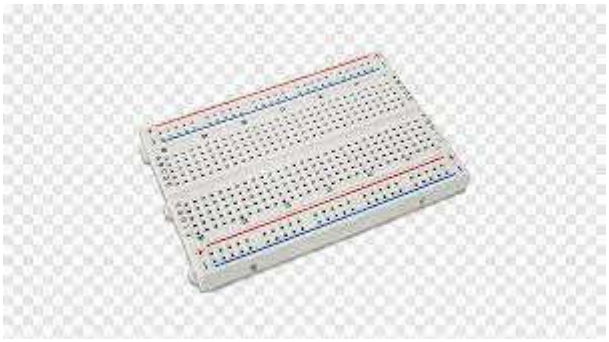

Figure 3: Breadboard

Arduino Uno:

The Arduino Uno microcontroller was a crucial component of our project, offering the processing power and control capabilities required. The Arduino Uno enabled us to create and tweak the behavior of the automobile speed detection system because to its user-

friendly interface and wide library of pre-built functions. We were able to properly interface and control the system's functionality by connecting the different components, such as the infrared sensors. LCD display, and buzzer, to the Arduino Uno's digital and analog ports. The Arduino Uno was an excellent choice for implementing our automobile speed detection system due to its versatility, ease of use, and interoperability with a large selection of sensors.

Figure 4: Arduino Uno

IR Sensors & IR Sensor Module:

Our project relied heavily on IR Sensors and the IR Sensor Module. Infrared light generated by objects is detected by these sensors, allowing for exact vehicle detection and measurement. Our system design was simplified since the IR sensor module incorporated the transmitter, receiver, and signal processing circuitry. We were able to compute vehicle speed using their great responsiveness and precision by monitoring the time it took for cars to pass between two spots. The simple data collecting and processing was made possible by the smooth interface with the Arduino Uno microcontroller. In our project, the IR Sensors and IR Sensor Module were critical in ensuring reliable and efficient automobile speed detection.

Figure 5: IR Sensor Module

16*2 LCD Display:

The 16x2 LCD panel was critical to our research since it provided visual output for the automobile speed detecting system.

The LCD panel, with its small size and clean character display, enabled us to provide consumers with real-time speed information. The display had 16 columns and 2 rows, allowing for a total of 32 characters to be shown.

We could simply transfer speed information to the screen by wiring the LCD display with the Arduino Uno microcontroller. The 16x2 LCD display provided a simple and effective way for drivers to communicate vehicle speed in a user-friendly format. Its Arduino Uno compatibility and ease of integration make it a great choice for our automobile speed detection system. o impedes current flow and regulate voltage levels inside a circuit.

Figure 6: 16*20 LCD Display

Resistors

Resistors are basic components found in electrical circuits such as our automobile speed detecting system. Resistors were used in our project for a variety of applications, including current limiting, voltage division, and signal conditioning. Resistors, for example, were employed to regulate the current flowing through LEDs or the buzzer, ensuring that they operated within their defined range. Resistors were also employed in voltage dividers to produce reference voltages for sensor readings or to alter signal levels for component compatibility.

Figure 7: Resistor

Wires:

Wires are required in every electrical or electronic project, including our automobile speed detecting

system. They act as a conduit for electrical messages and power to be transferred between circuit components. Wires were utilized in our project to link various parts such as the Arduino Uno microcontroller, sensors, LCD display, buzzer, and power supply. Wire lines allowed data, control signals, and power to move throughout the system.

We constructed an orderly and effective circuit for our automobile speed detection system by meticulously routing and connecting wires, allowing for accurate and efficient functioning.

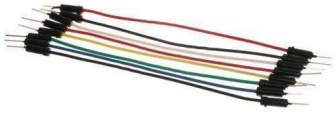

Figure 8: Male to male jumping wires

Battery:

A battery is an important component in our automobile speed detecting system since it provides the required power for the circuit to operate independently. It functions as a portable and self-contained energy source, allowing the system to run without the need for other power sources. In our project, we first utilized a 9V battery source to power the device, but we subsequently discovered that an Arduino Uno can only handle 5V. As a result, we chose to use the power of our laptop to power the circuit.

Figure 9: 9V battery

Application

This project's application sector has the potential to be enormous. We may use it on roads to measure the speed of various cars. If the cars are going too fast, this gadget can be quite useful. This gadget is capable of measuring velocity. This system is intended to measure the time it takes a vehicle to go from one IR sensor to another and then use that information to compute speed. The buzzer sounds if the car is traveling faster than 50 km/h. We may also utilize this device's camera to collect the license plate number of the speeding car.

COST ANALYSIS:

Component list	Unit purchased	Total cost (in BDT)
Arduino Uno	1	1050
breadboard	1	120
16*2 LCD display	1	190
9V battery	1	70
Battery clip	1	10
buzzer	1	15
IR-LED	4	20
Clip	2	10
Jumper wires	12	36
Wire	1	10
Resistor	5	12
IR sensor module	2	200
	Total:	1743

RESULT & ANALYSIS

The overall circuit and hardware implementation are shown below:

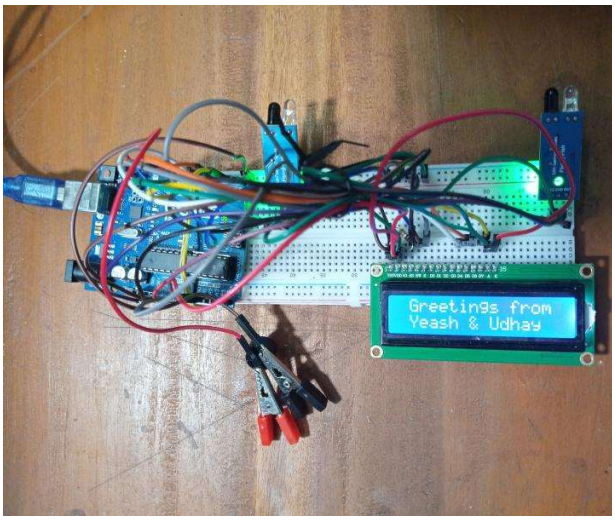

Figure 10: Initial Circuit Configuration

When the vehicle passes over one IR sensor and returns to the other, the total duration is computed and the velocity is displayed on the LCD display.

The car is moving at a regular pace of less than 50km/hr, hence the panel displays normal speed. Here the vehicles is moved at a normal speed which is less than 50km/hr. So, the screen shows normal speed.

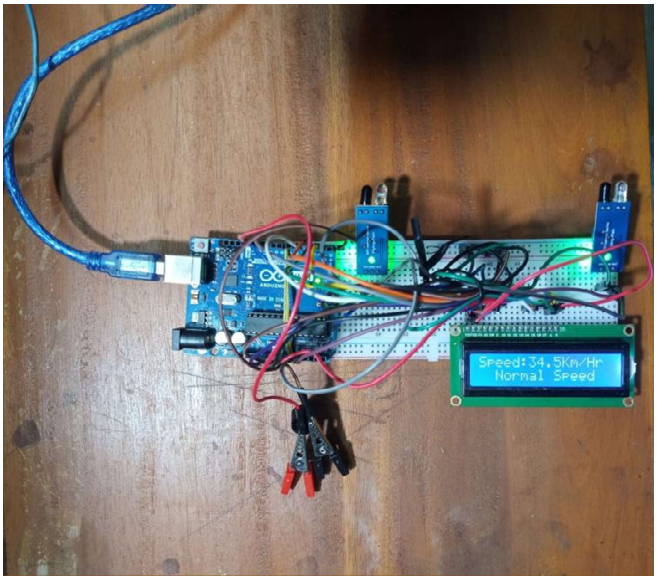

Figure 11: Circuit when the vehicle is moving at a normal speed

The vehicles are moving faster than previously, and the LCD monitor displays a velocity of more than 50km/hr. As a result, an overspeed warning will appear on the screen, and the buzzer will sound.

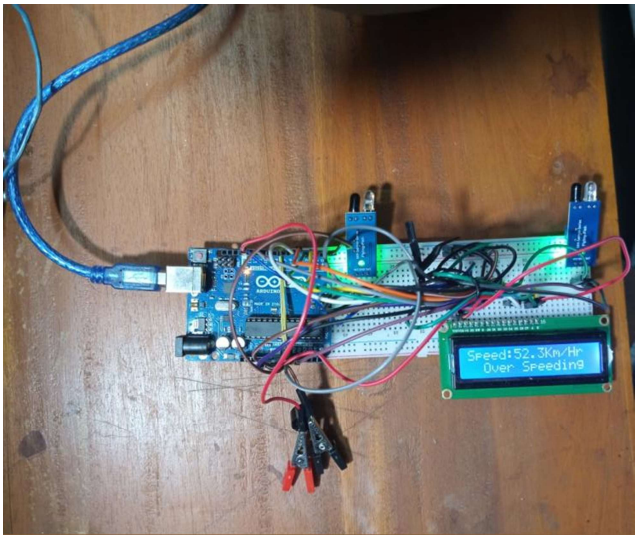

Figure 12: Circuit when the vehicle is moving at a excessive speed

LIMITATIONS

Despite the fact that this project has previously been implemented, it has limitations. First and foremost, this entire project makes use of the Arduino Uno microcontroller, which is a highly expensive gadget, raising the overall cost of the project. We can use an 8051 microcontroller instead of the Arduino uno, but it will be more expensive. As a result, there is no way to save money. Furthermore, the IR sensor modules cannot detect automobiles that are more than m away. As a result, large-scale implementation will require a more powerful and long-range IR sensor module. In order to acquire an accurate result, we need to employ a lot more IR sensor modules when implementing it on a broad scale.

FUTURE SCOPE

When executing this project on a wider scale, we may connect a GSM or CCTV camera to the breadboard. As a result, anytime an automobile passes at excessive speed, the camera is triggered and a photo of the license plate is taken. It will be easy for traffic control to recognize this manner. By using this system, we provide various benefits to the traffic control department and commuter safety.

CONCLUSION

Finally, by utilizing an Arduino Uno microcontroller, infrared sensors, an LCD display, and other components, the "Car Speed Checker and Overspeed Detector On Highways" system effectively handled the issue of over speeding. We have shown the system's accuracy and efficacy in tracking vehicle speeds and sending timely notifications to drivers via rigorous testing. Finally, by utilizing an Arduino Uno microcontroller, infrared sensors, an LCD display, and other components, the "Car Speed Checker and Overspeed Detector On Highways" system effectively handled the issue of over speeding. We have shown the system's accuracy and efficacy in tracking vehicle speeds and sending timely notifications to drivers via rigorous testing.

The use of the 16x2 LCD display enabled real-time speed visualization, which improved driver awareness. The use of a solderless breadboard simplified the circuit building process and increased design freedom.

The fundamental control unit was the Arduino Uno microcontroller, which enabled smooth integration and efficient data processing.

The developed system has the potential for wider highway deployment, leading to improved road safety and a reduction in accidents caused by excessive speed. Future developments might include the incorporation of technologies such as a security camera for monitoring driver behavior and license plate recognition.

In conclusion, the "Car Speed Checker and Overspeed Detector on Highways" system is a dependable, cost-effective, and practical answer to the problem of over speeding. It encourages safer driving behaviors and has potential for improving road safety conditions by harnessing technology.

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