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Vehicle Speed Detection using Arduino and IR Sensors

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Abstract: ***There are definite rules laid out by authorities about driving cars on roads. The most common rule in any country is speed limit in certain roads i.e. you will be in violation of the law if your car speed exceeds this limit.In order to detect the speed of a moving car, the patrolling officers usually depend on a handheld gun that works on Radar Technology or Lidar Technology. This is a tedious process as the officer has to manually check for over speeding for each vehicle. Vehicle Speed Detection or Vehicle Speed Measurement using IR Sensor and Arduino UNO In this tutorial, we will measure the speed of the vehicle using IR sensor, Arduino, and 16×2 LCD. In this project, we will use two IR sensors and place it at a certain distance. As we know that to measure the speed we need distance and time. In order to find time, we will use the logic that the first IR sensor will detect whether there is some vehicle present in front of the sensor or not. Then the timer will start and will measure the duration up to the second IR sensor. The time we will get will be in milliseconds, so, in order to convert milliseconds into seconds, we will divide it by 1000. In this project, we have placed the two IR sensors at a distance of 20 centimeters which is equal to 0.2 meters. Now, we want our measured speed to be displayed in the kilometers per hour. So, in order to get the values in the kilometer per hour, we will use the following equation.***
1m/s = Km/1000 x 3600/hr = 3.6Km/ hr 1m/s = 3.6Km/hr
This logic will be used in our coding to measure the speed of the vehicle.
Keyword: Arduino, IR sensor, Buzzer, Lcd display, Speed, Vehicle

I. INTRODUCTION

Rash driving is the cause of many road accidents all over the world.More than 140,000 people were killed on roads .The traffic population has increased considerably in India as there is no means to control or monitor the speed of vehicles running on roads. This system proves highly effective in detection of over speed driving.In this project two IR sensors, IR transmitter (IR LED), one IR receiver (photo diode) are placed on the Arduino board. When any vehicle crosses the two-car sensors, both IR sensors are connected to the interrupted pin of Arduino and identify the fall wave and the time between activating the Arduino's internal timer sensor. And then they measure the speed and distance covered by any moving object, displayed on a digital monitor or on a 16×2 LCD screen. So, let us start with an arduino f rom this measurement circuit.

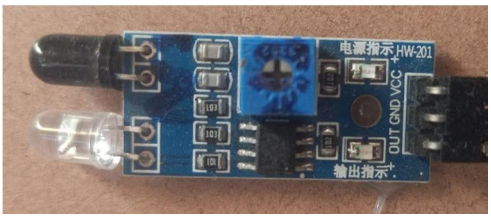
II. COMPONENTS

A. Arduino UNO

The Arduino UNO is built around the ATmega328P microcontroller. In comparison to other boards, such as the Arduino Mega, it is simple to use. The board is made up of digital and analogue I/O pins, shields, and other circuits. The Arduino UNO has six analogue input pins, fourteen digital pins, a USB connector, a power jack, and an ICSP (In- Circuit Serial Programming) header. It's written in IDE, which stands for Integrated Development Environment. It is compatible with both online and offline platforms
Input Voltage (recommended) : 7-12 V

B. IR Sensor

An infrared sensor is an electronic device that emits in order to sense some aspects of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. These types of sensors measures only infrared radiation rather than emitting it that is called as a passive IR sensor.Usually in the infrared spectrum, all the objects radiate some form of thermal radiations. These types of radiations are invisible to our eyes that can be detected by an infrared sensor. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode which is sensitive to IR light of the same wavelength as that emitted by the IR LED. When IR light falls on the photodiode, the resistances and these output voltages, change in proportion to the magnitude of the IR light received.

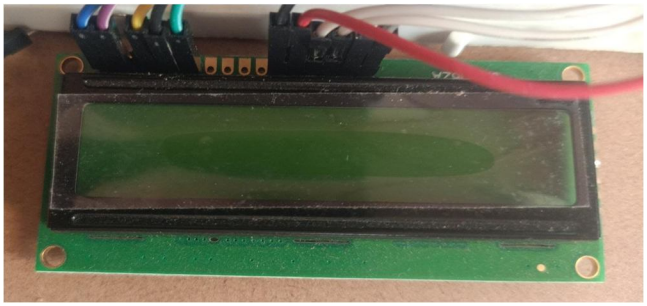


C. Buzzer

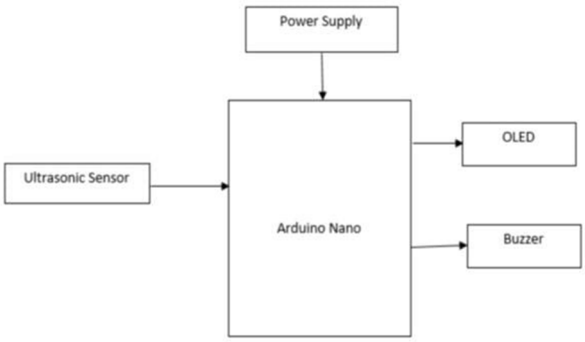
Sensor-Buzzer is a buzzer that is passive. It is like a magnetic speaker, requires voltage with different frequencies in order to produce sound. When the frequency increases, the pitch becomes louder.

D. LCD Display

To provide a user interface, we can connect a liquid crystal display (LCD) to an Arduino. LCDs are commonly used to display data in devices such as calculators, microwave ovens and a variety of other electronic devices.



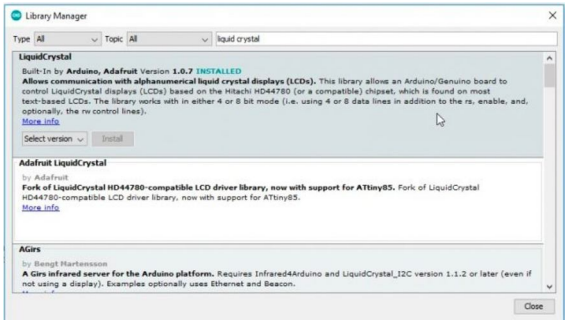
E. Block Diagram



F. Arduino IDE

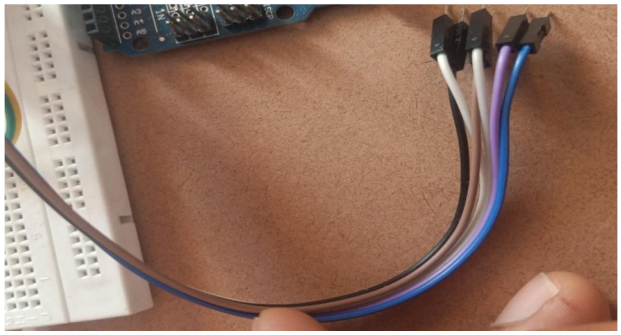
The Arduino integrated development environment (IDE) is a cross-stage application (for Windows, macOS, Linux) that is written in the programming language Java. It is utilized to compose and transfer programs to Arduino compatible boards, yet in addition, with the assistance of outsider centres, other seller advancement sheets.

The source code for the IDE is discharged under the GNU General Public License. The Arduino IDE underpins the dialects C and C++ utilizing uncommon guidelines of code organizing. The Arduino IDE supplies a product library from the Wiring venture, which gives numerous normal information and yield methodology. Client composed code just requires two essential capacities, for beginning the sketch and the principle program circle, that are aggregated and connected with a program stub fundamental () into an executable cyclic official program with theGNU toolchain, additionally included with the IDE distribution. The Arduino IDE utilizes the program avrdude to change over the executable code into a book record in hexadecimal encoding that is stacked into the Arduino board by a loader program in the board's firmware.



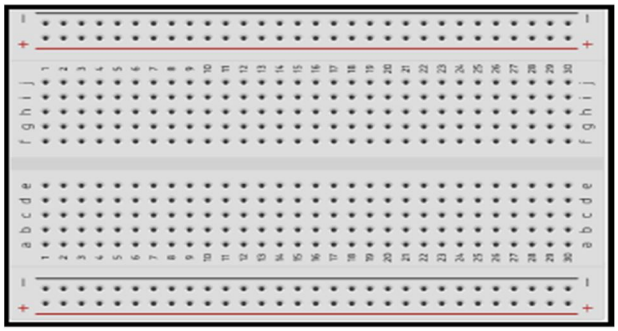
G. Connecting Wires

Wires are the conductive connections between the elements in contact in any electronic circuitry. They have zero resistance and provide perfect connections in theory. They appear on the breadboard as nicely coloured jumper wires. A jumping viral connecting wire is an electrical wire, or group of them In cable, With a connector or pin at each end, which is usually used to connect the components of a breadboard or any other prototype of a circuit without soldering.



H. Bread Board

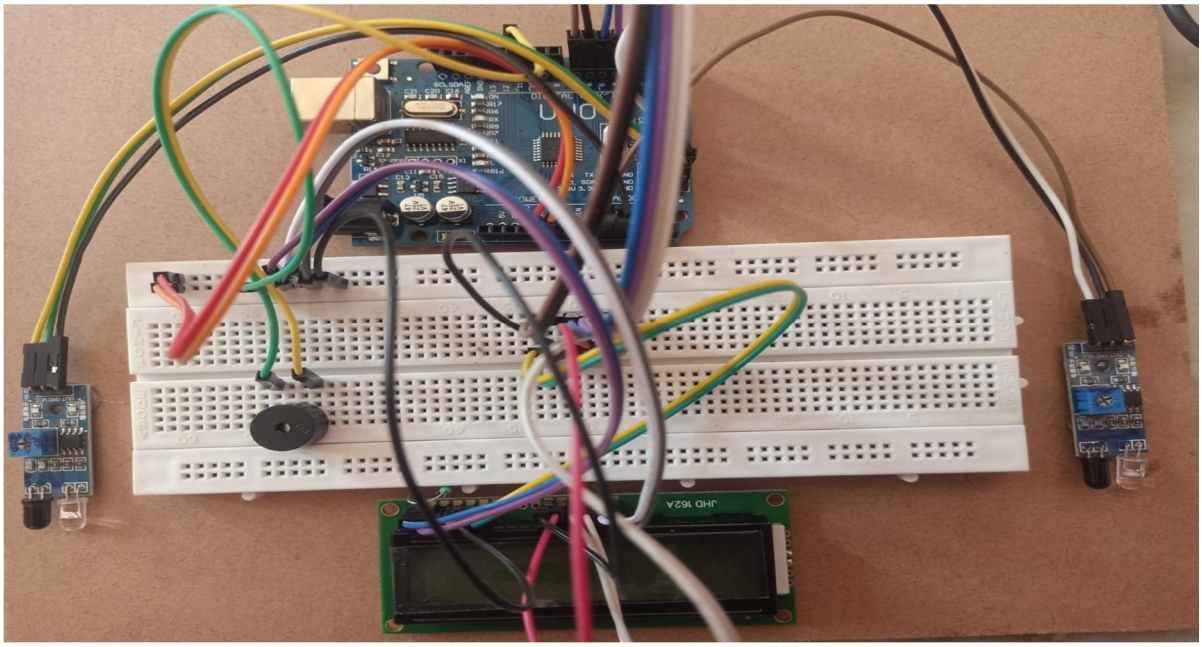
An electronics breadboard, or solderless breadboard, is great for making temporary circuits and prototyping. Because breadboards do not require any soldering to create a circuit, they are perfect for creating temporary designs or for testing out ideas quickly. They can also be reused over and over



III. RESULT

The project Vehicle speed detection using Arduino and IR sensors was designed to detect the vehicle speed with the help of IR sensors and monitor the speed on LCD display and activate the buzzer if the vehicle speed was high.

A. *Connections*



IV. ACKNOWLEDGEMENT

We would like to express our special thanks to our mentor Dr. Y. Sreenivasulu who gave us a golden opportunity to do this wonderful project on this topic which also helped us in doing a lot of research and we came to know about so many new things. We are really thankful to them. Secondly, we would also liketo thank my friends who helped us a lot in finalizing this project within the limited time frame.

V. CONCLUSION

From this project we can conclude that the existing model presents an integrating feature of all the hardware components which has been used and developed in it with Arduino. The presence of each and every module has been reasoned out and placed very carefully. Hence contributing to the best working unit for "Vehicle speed detection using Arduino and IR Sensors" has been designed perfectly. The device provides an automated solution to continuously monitor the vehicle speed and display the vehicle speed on LCD module and the system able to give the over speed alerts through buzzer thus the project has been successfully designed and tested

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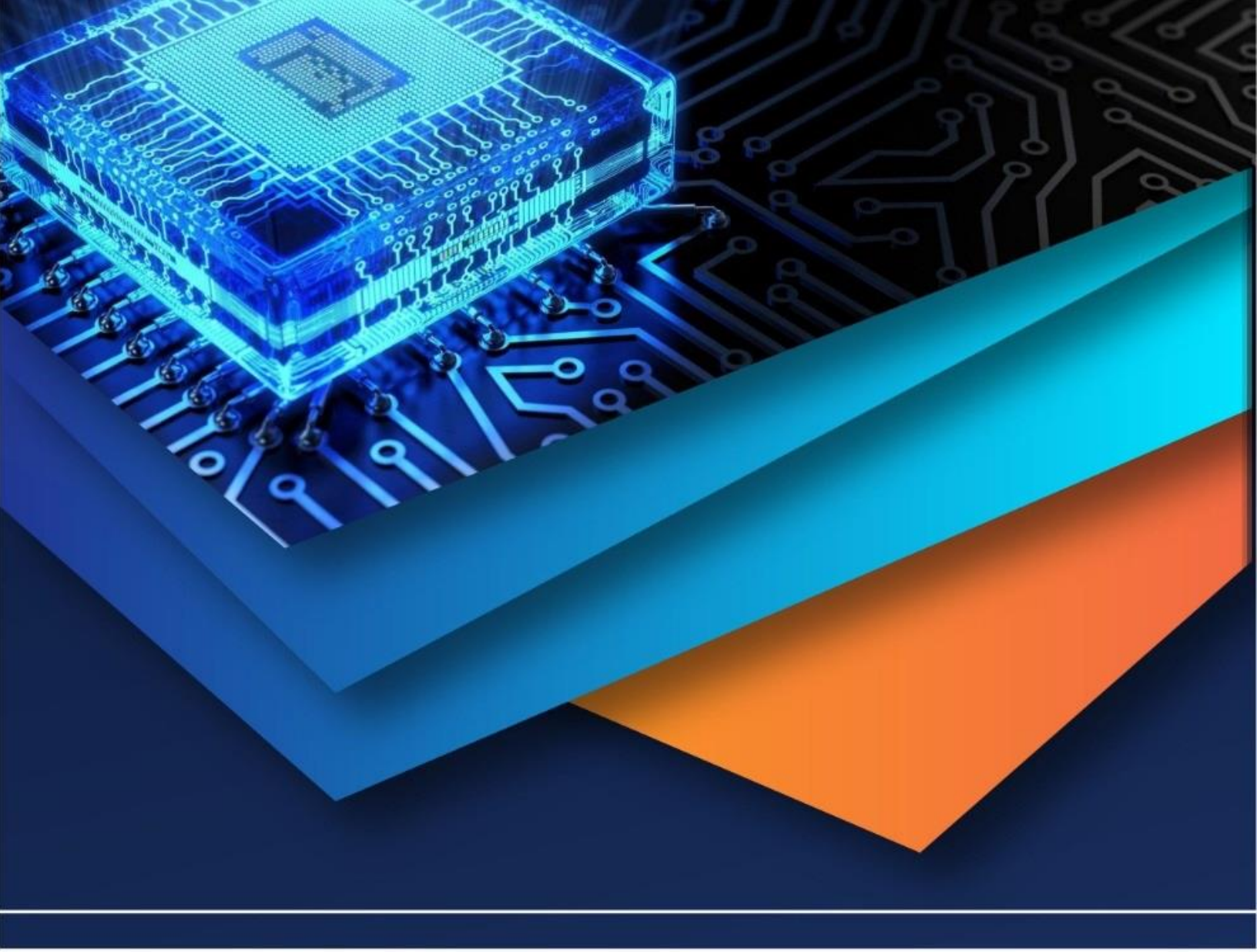

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