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2021-2022

A MINI PROJECT BASED ON REPORT

"CAR SPEED DETECTOR"

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Sec -C , II/IV BACHELOR OF TECHNOLOGY IN Computer Science & Engineering (SEMESTER-IV)

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CERTIFICATE

This is to certify that **SAYUJAYA SHARMA-(20BTRCS172), IJARUL HAQUE ANSARI-(20BTRCS186), SHIBU KUMAR KANU-(20BTRCS173), SARTAJ MANSURI-(20BTRCS193), ADARSH CHAURASIYA-(20BTRCS182)** of section C studying II/IV B.Tech in CSE has satisfactorily completed **CAR SPEED DETECTOR** With Arduino project in the semester IV during the academic year 2021-2022

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Signature of Course Coordinator
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Signature of HOD
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ABSTRACT

A liquid crystal display, or LCD, is a video display that utilizes the light modulating properties of liquid crystals to display pictures or text on a screen. Since their invention in 1964, LCD screens have grown to be used in a very wide variety of applications, including computer monitors, televisions, and instrument panels. One way to utilize an LCD is with an Arduino microcontroller. By wiring an Arduino microcontroller to the pins of an LCD display it is possible to program the microcontroller to display a desired text string or image on the screen.

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INTRODUCTION

Rash driving is the cause of many road accidents all over the world. More than 140,000 people were killed on India's roads last year, according to figures released by the government. 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 display on a digital monitor or on a 16x2 LCD screen.

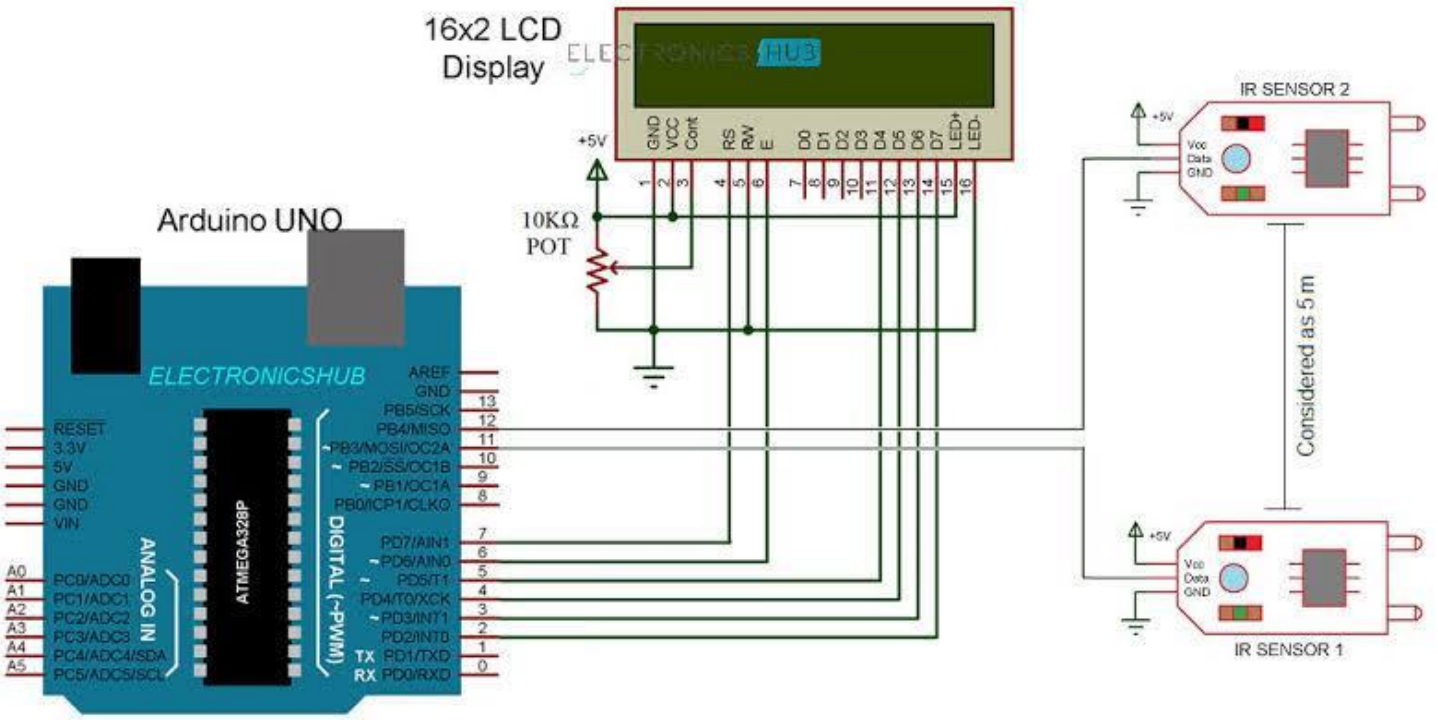
APPARATUS REQUIRED:

1) **ARDUINO UNO**
2) **BREADBOARD (Generic)**
3) **JUMPER WIRE**
4) **ALPHANUMERIC LCD, 16 x 2**
5) **UNO SOFTWARE FOR CODE RUN**
6) **CABLE WIRE CONNECTOR**

Methodology

The main controlling device of the project is an ARDUINO UNO. IR sensors, LCD display and buzzer are interfaced to the Arduino. The Arduino continuously read the data from IR sensors and display the vehicle speed on LCD module and also active the buzzer if the Arduino get high speed from sensors. To perform the task, Arduino UNO is loaded with an intelligent program written in embedded 'C' language.

Circuit diagram of Vehicle speed detection using Arduino and IR sensors



Wiring

A typical LCD display consists of 16 pins that control various features of the screen. A table that shows the pins and describes each function can be seen in Table 1 below. The Arduino microcontroller can output voltages of either 5 V or 3.3 V, so the LCD can be powered by wiring VSS and VDD to the ground and 5 V pins on the microcontroller. It is possible to adjust

the contrast of the screen by wiring a variable resistor to V0 located at pin 3 on the screen. The RS, R/W, and E pins are wired to pins 12, ground, and 11 respectively on the Arduino. The LCD screen can operate in both 8-but mode and 4-bit. For this application note only 4-bit mode will be discussed, as it requires fewer pins and is generally easier to use.

Pin No.	Symbol	Function
1	Vss	Ground
2	Vdd	Power supply
3	Vo	Power Supply for LCD
4	RS	Select Display Data("H") or Instructions("L")
5	R/W	Read or Write Select Signal
6	E	Read/Write Enable Signal
7	DB0	Display Data Signal
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	LED – (K)	Please also refer to 6.1 PCB drawing and description.
16	LED + (A)	Please also refer to 6.1 PCB drawing and description.

Table 1: Pinout of a typical LCD screen

To interface with the LCD in 4-bit mode the Arduino only needs to be connected to pins DB4-DB7, which will connected to digital output pins 5-2 respectively. Pins 15 and 16 on the LCD screen are used to power a backlight in the screen. This makes text displayed in the screen easier to read in poorly lit environments and is optional. In order to power the backlight pin 15 should be connected to ground while pin 16 should be connected to the 5 V output of the Arduino. To power the Arduino a 9 V battery can be connected to the VIn and ground pins on the Arduino. If such power source is available the Arduino can be powered by using its USB connection with a computer. Figure 3 below shows what the final wiring scheme should look like after all connections are made**.**

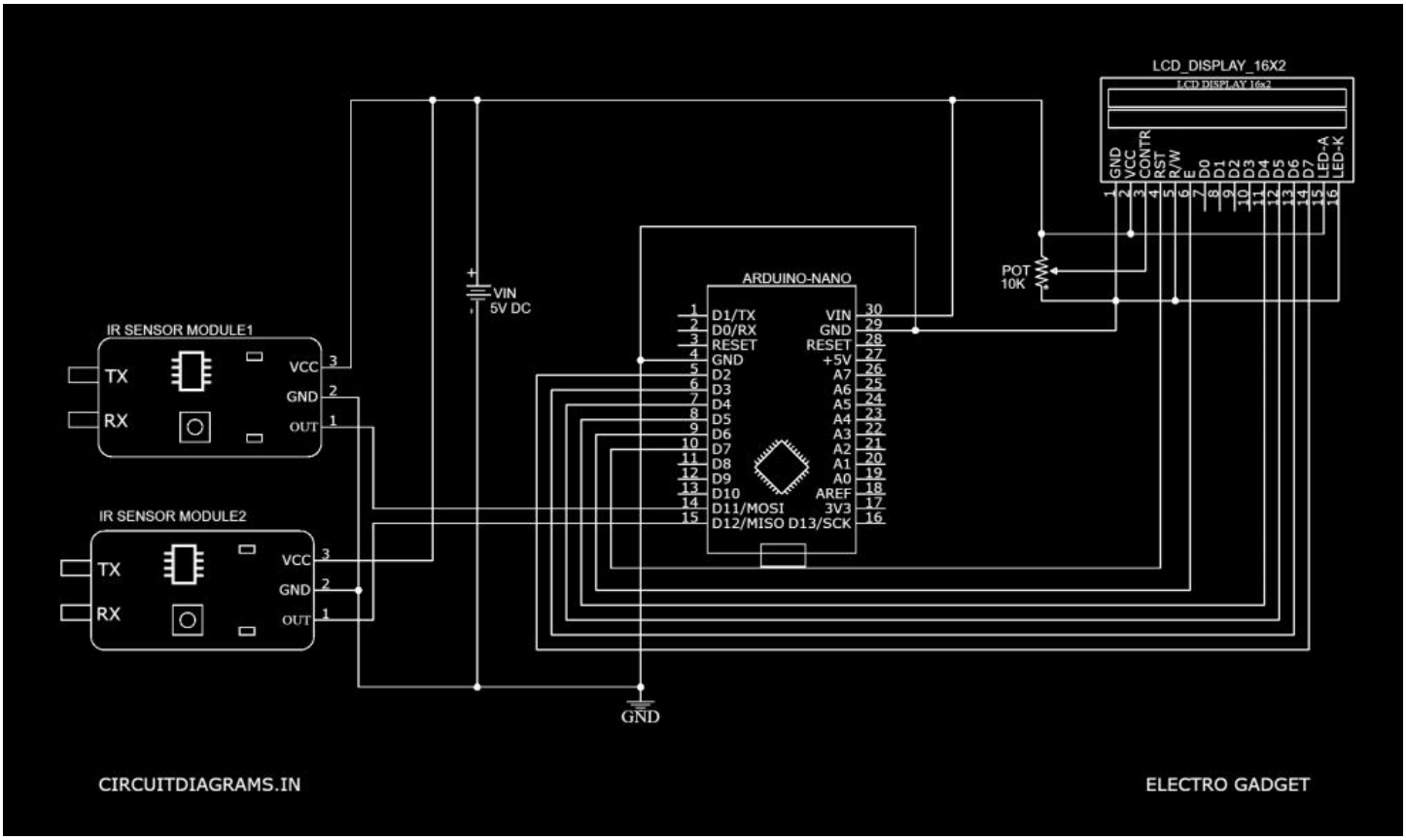


Figure : Wiring schematic for LCD-Arduino

Programming:

CODE :

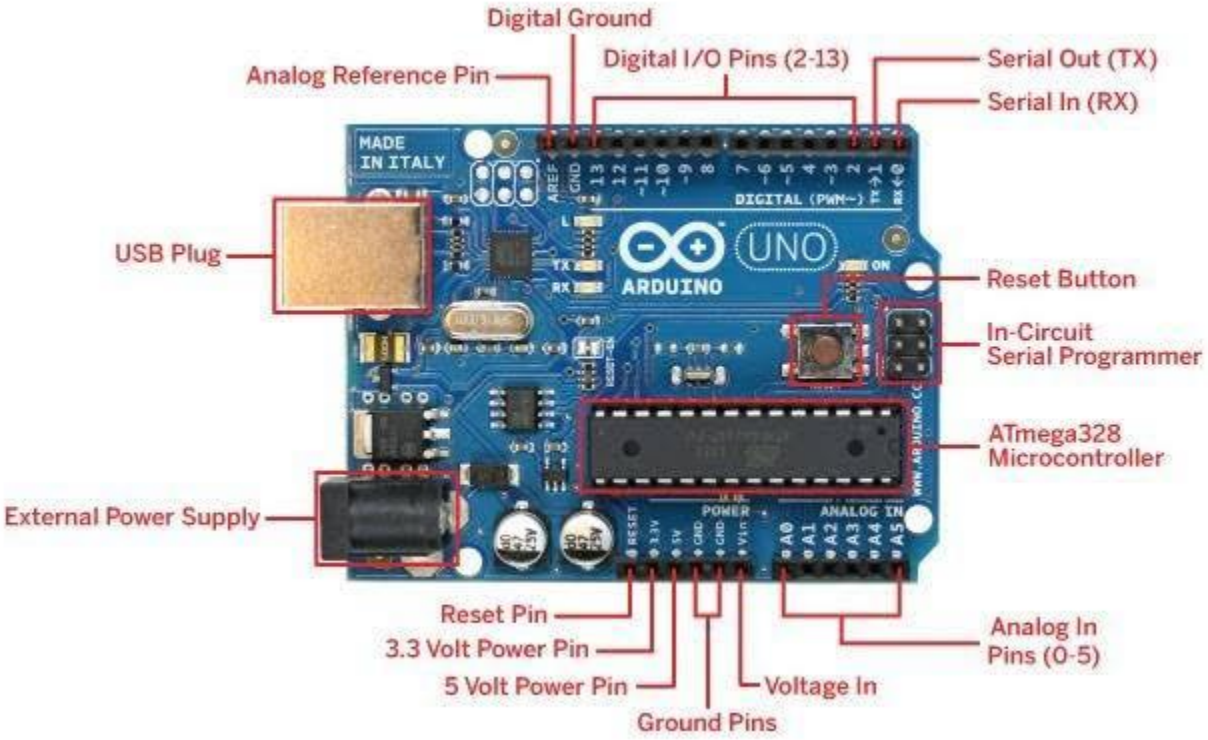
```
#include <LiquidCrystal_I2C.h>
LiquidCrystal_I2C lcd (0x27, 16, 2);

const byte PulsesPerRevolution = 2;
const unsigned long ZeroTimeout = 100000;
const byte numReadings = 2;

volatile unsigned long LastTimeWeMeasured;
volatile unsigned long PeriodBetweenPulses = ZeroTimeout + 1000;
volatile unsigned long PeriodAverage = ZeroTimeout + 1000;
unsigned long FrequencyRaw;
unsigned long FrequencyReal;
unsigned long RPM;
unsigned int PulseCounter = 1;
unsigned long PeriodSum;

unsigned long LastTimeCycleMeasure = LastTimeWeMeasured;
unsigned long CurrentMicros = micros();
unsigned int AmountOfReadings = 1;
unsigned int ZeroDebouncingExtra;
unsigned long readings[numReadings];
unsigned long readIndex;
unsigned long total;
unsigned long average;
void setup() {
  Serial.begin(9600);
  lcd.init();
  lcd.backlight();
  attachInterrupt(digitalPinToInterrupt(2), Pulse_Event, RISING);
  delay(1000);

}
void loop() {
  LastTimeCycleMeasure = LastTimeWeMeasured;
  CurrentMicros = micros();
  if (CurrentMicros < LastTimeCycleMeasure) {
    LastTimeCycleMeasure = CurrentMicros;
  }
  FrequencyRaw = 10000000000 / PeriodAverage;
  if (PeriodBetweenPulses > ZeroTimeout - ZeroDebouncingExtra || CurrentMicros - LastTimeCycleMeasure > ZeroTimeout -
ZeroDebouncingExtra) {
    FrequencyRaw = 0;  // Set frequency as 0.
    ZeroDebouncingExtra = 2000;
  } else {
    ZeroDebouncingExtra = 0;
  }
  FrequencyReal = FrequencyRaw / 10000;

  RPM = FrequencyRaw / PulsesPerRevolution * 60;
  RPM = RPM / 10000;
  total = total - readings[readIndex];
```

```
  readings[readIndex] = RPM;
  total = total + readings[readIndex];
  readIndex = readIndex + 1;

  if (readIndex >= numReadings) {
    readIndex = 0;
  }
  average = total / numReadings;



  Serial.print("Period: ");
  Serial.print(PeriodBetweenPulses);
  Serial.print("\tReadings: ");
  Serial.print(AmountOfReadings);
  Serial.print("\tFrequency: ");
  Serial.print(FrequencyReal);
  Serial.print("\tRPM: ");
  Serial.print(RPM);
  Serial.print("\tTachometer: ");
  Serial.println(average);
  lcd.setCursor(0, 0);
  lcd.print("RPM : ");
  lcd.print(RPM);
  lcd.print("   ");

}

void Pulse_Event() {
  PeriodBetweenPulses = micros() - LastTimeWeMeasured;
  LastTimeWeMeasured = micros();
  if (PulseCounter >= AmountOfReadings)  {
    PeriodAverage = PeriodSum / AmountOfReadings;
    PulseCounter = 1;
    PeriodSum = PeriodBetweenPulses;

    int RemapedAmountOfReadings = map(PeriodBetweenPulses, 40000, 5000, 1, 10);
    RemapedAmountOfReadings = constrain(RemapedAmountOfReadings, 1, 10);
    AmountOfReadings = RemapedAmountOfReadings;
  } else {
    PulseCounter++;
    PeriodSum = PeriodSum + PeriodBetweenPulses;
  }
}
```

Some Keywords

Audrino:

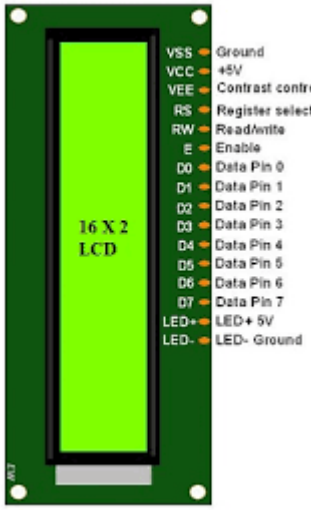
Arduino is a most commonly used physical computing platform and an interactive developing environment. It is a standalone platform that interacts with arduino software on the computer. The arduino software consist of an arduino IDE (Integerated Development Environment).Arduino IDE is used for programming. Ardunio uno is the most frequently used development board though it is not a first board in the market. Arduino uno is a microcontroller based on ATmega328p. It consists of crystal oscillator, voltage regulator, communication protocol etc. It has 14 digital input/output pins, out of which 6 can be used for PWM and 6 analog pins.



IR sensors:

The IR sensor module consists mainly of the IR Transmitter and Receiver, Opamp, Variable Resistor (Trimmer pot), output LED in brief. IR LED Transmitter. IR LED emits light, in the range of Infrared frequency. IR light is invisible to us as its wavelength (700nm – 1mm) is much higher than the visible light range.

LCD dsplay:

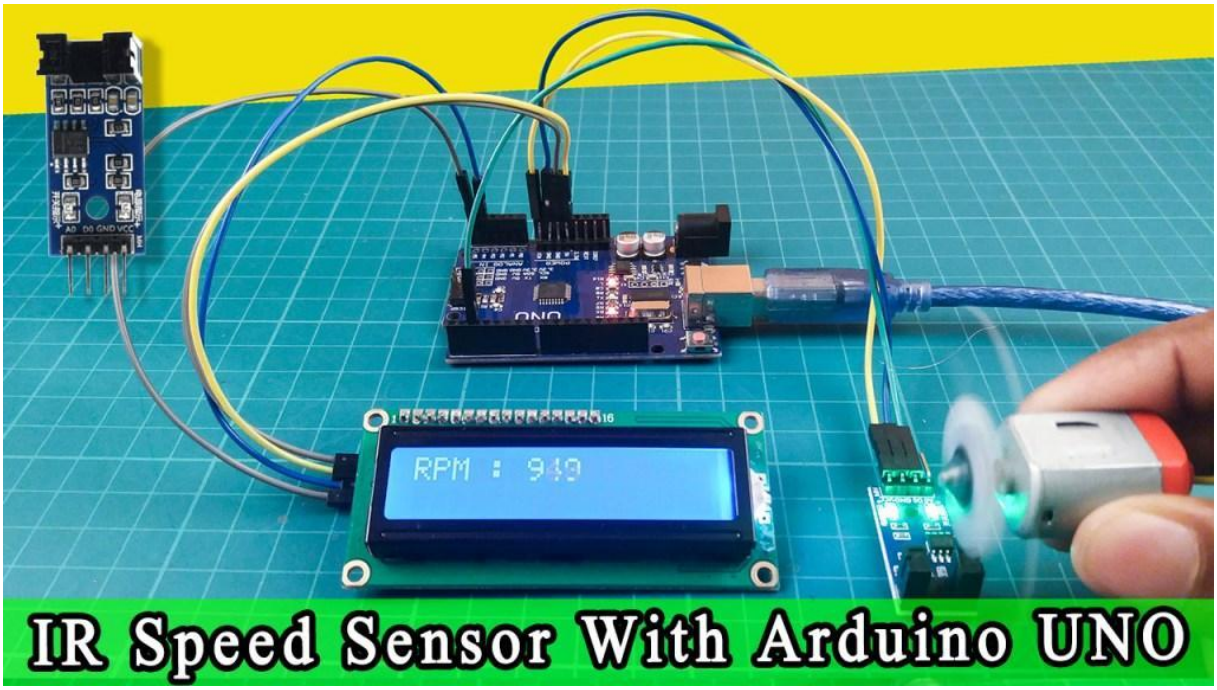


Liquid crystal display is very important device in embedded system. It offers high flexibility to user as he can display the required data on it.116*2 means 16 characters per line by 2 lines respectively. The vehicle speed will display on LCD.

CONCLUSIONS:

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 the 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 screen.

If more accuracy of the speed and time is required, more number of sensors has to be used. The over speed detection system can be further advanced by using GSM module and CCTV camera in the circuit. If any vehicle has crossed the maximum limited speed then this camera will be triggered to take a picture of the vehicle. Employing the over speed detection system offer not only several advantages for traffic but also safety to road users.



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