ABSTRACT

Over speeding is one of the major causes of road accidents and loss of lives. This project/research presents a system for speed detection, measurement and reporting using an Arduino microcontroller/board coupled with a sensor of our choice (tentatively Radar or Infrared sensor).

Keywords: **Arduino, Infrared Sensor,**

CHAPTER 1

1.0 INTRODUCTION

In our everyday life transportation plays a vital role both as an essential service and for social connectivity by bridging the distance between people living far apart. With the increasing number of vehicles, ensuring road safety has become paramount to governments and communities around the world. A single wrong action taken by a speeding driver can have calamitous effect on both the driver, other road users, and even pedestrians.

Vehicle speed is one of the key factors that contributes to road accidents, making it imperative to develop effective systems for speed detection. This project aims to address the issue by leveraging Electronic technology to accurately measure and monitor vehicle speeds, design and implement a vehicle speed detection system that not only accurately measures vehicle speeds but also assist in enforcing speed limits and enhancing overall speed safety on highways. By analysing the speed data collected from vehicles, authorities and law enforcement agencies can make informed decisions on traffic management and enforcement strategies.

The benefits of an efficient vehicle speed detection system are far reaching. It's contributes to significantly reducing the number of road accidents caused by over speeding, preventing many ghastly and fatal collisions. Moreover, it helps in enforcing speed limits, discouraging reckless driving, promoting a safer and more disciplined traffic environment. Additionally, the collected data can be utilized for traffic planning, congestion management, and infrastructure development, leading to more efficient and optimized transportation system.

The speed detection system acts as a deterrent to reckless drivers, raising driver awareness of the speed limits and encouraging compliance. Studies have shown that the presence of automated speed detection technologies significantly influences driver behaviour, resulting in reduced speeds and increased adherence to speed limit.

1.1 STATEMENT OF PROBLEM

The speed detection system plays a vital role in promoting road safety by monitoring and enforcing speed limits. However, several challenges and issues need to be addressed to ensure the system's effectiveness and reliability. The statement of the problem in the speed detection system project can be summarized as follows:

i. **Accuracy and Precision**: One of the primary challenges is achieving accurate and precise speed measurements. Factors such as environmental conditions, varying vehicle sizes, and occlusions can affect the accuracy of speed detection. It is crucial to develop algorithms and techniques that can handle these challenges and provide reliable speed measurements in real-time.
ii. **Real-time Detection**: Speed detection systems need to operate in real-time to promptly identify speeding vehicles and enforce speed limits effectively. However, real-time processing poses computational challenges, as the system must handle a continuous stream of data from multiple sources, analyse it, and make timely decisions. Developing efficient algorithms and hardware architectures is necessary to achieve real-time speed detection.
iii. **Different Vehicle Types and Speed Ranges**: Roads accommodate various types of vehicles, including cars, trucks, motorcycles, and bicycles, each having different speed ranges. The speed detection system should be capable of accurately detecting and measuring the speeds of different vehicle types, accommodating the wide range of speeds they can attain.
iv. **Occlusion and Complex Environments**: Roadways often have complex environments with occlusions, such as intersections, curves, and obstructing objects. These factors can hinder the visibility of vehicles and affect the accuracy of speed dete ction. It is essential to develop techniques that can handle occlusions and complex environments to ensure reliable speed measurements.
v. **System Integration and** Scalability: The speed detection system needs to be integrated into existing traffic management infrastructure and scaled up to cover a larger area. Integration with existing surveillance systems, traffic signals, and data management platforms poses challenges in terms of interoperability, compatibility, and data synchronization. The system should be designed to accommodate scalability and seamless integration with other components of the traffic management ecosystem.
vi. **Privacy and Ethical Considerations**: Speed detection systems involve capturing and processing visual data, which raises concerns regarding privacy and ethics. It is crucial to develop mechanisms that protect individual privacy, adhere to legal regulations, and ensure the ethical use of the collected data.

Addressing these challenges and issues is essential for the successful implementation of a speed detection system that can accurately measure vehicle speeds, operate in real-time, accommodate different vehicle types and environments, integrate with existing infrastructure, and maintain privacy and ethical standards. By overcoming these obstacles, the speed detection system can effectively contribute to promoting road safety and reducing accidents caused by speeding vehicles

1.2 OBJECTIVE OF THE STUDY

This proposed project aims to develop a system that detects car speed, and also cars driving at speeds over specified limit and inform concerned authorities immediately. This system does not need any human interception and records car speed as well as wirelessly informs authorities of over speeding detections.

1.3 RELEVANCE AND SIGNIFICANCE OF THIS PROJECT TO THE PUBLIC

This project will help to mitigate road accidents caused by speeding drivers by enhancing road safety and preventing reckless driving

CHAPTER 2

2.0. BRIEF HISTORY OF SPEED DETECTION SYSTEMS

The history of speed detection for cars dates back to the early 20th century. Here is a brief overview of the major developments in speed detection technology:

1. Stopwatch Method: In the early 20th century, before the advent of automated systems, law enforcement officers would use a stopwatch and a fixed distance to manually calculate a vehicle's speed. An officer would time how long it took for a car to travel between two predetermined points, and the speed would be calculated based on the time and distance.
2. Radar-Based Speed Detection: In the 1950s, the Netherlands introduced the first automated speed camera system using radar technology. Radar-based speed detection devices were stationary units placed alongside the road. These devices emitted radar waves and measured the speed of passing vehicles based on the Doppler's effect. The recorded data could be used for enforcement purposes.
3. VASCAR: Visual Average Speed Computer and Recorder (VASCAR) is a speed detection method that was widely used in the 1960s and 1970s. It involved a law enforcement officer visually tracking a vehicle's speed using fixed landmarks and manually operating a stopwatch. The officer would calculate the average speed of the vehicle based on the time taken to pass between two points.
4. Laser-Based Speed Guns: Laser speed guns, also known as LIDAR (Light Detection and Ranging) devices, were introduced in the 1980s. These handheld devices emit a laser beam that reflects off a moving vehicle and measures the time it takes for the beam to return. By comparing the time taken to the known speed of light, the device can determine the speed of the vehicle accurately.
5. Automated Speed Cameras: The 1990s saw a significant increase in the use of automated speed cameras. These cameras use various technologies such as radar, laser, or infrared to detect speeding violations automatically. They can be fixed, installed alongside the road, or mobile, mounted on vehicles or deployed in temporary locations. Automated speed cameras capture images or videos of speeding vehicles, along with their speed readings, for enforcement purposes.
6. Advanced Systems: In recent years, speed detection technology has continued to advance. Some modern speed detection systems are equipped with sophisticated

features like automatic number plate recognition (ANPR), which allows for the identification of the vehicle's owner and registration details. Additionally, some systems can monitor multiple lanes simultaneously, capture high-resolution images, and transmit data wirelessly for immediate enforcement. It’s important to note that the specific details and dates may vary depending on the country and region as speed detection technology has evolved at different rates and been implemented differently across different jurisdictions.

2.1 TYPES OF SENSORS

There are various types of sensors that can be used for speed detection, depending on the specific application and requirements. Here are some commonly used sensors:

i. Radar Sensors: Radar sensors emit radio waves and measure the frequency shift caused by the moving object. They are widely used for speed detection in traffic enforcement and vehicle applications. Doppler radar sensors are commonly used to measure the speed of vehicles.

ii. LIDAR Sensors: LIDAR (Light Detection and Ranging) sensors use laser technology to measure the distance and speed of objects. They emit laser beams and calculate the time it takes for the light to bounce back from the moving object. LIDAR sensors are commonly used for speed detection in law enforcement, autonomous vehicles, and industrial applications.

iii. Ultrasonic Sensors: Ultrasonic sensors use sound waves to measure the distance and speed of objects. They emit ultrasonic waves and calculate the time it takes for the sound waves to bounce back from the moving object. Ultrasonic sensors are commonly used for speed detection in parking systems, robotics, and industrial applications.

iv. Magnetic Sensors: Magnetic sensors detect changes in the magnetic field caused by the movement of metallic objects. They can be used for speed detection in applications such as vehicle speedometers and bicycle speed sensors.

v. Optical Sensors: Optical sensors use light to detect motion and measure speed. They can be based on various principles such as interruption of light beams, reflection, or image analysis. Optical sensors are used in various speed detection applications, including photoelectric sensors for counting objects on conveyors and motion detection in security systems.

vi. Inductive Sensors: Inductive sensors detect changes in electrical conductivity caused by the presence or movement of conductive objects. They can be used for speed detection in industrial applications, such as monitoring the rotation speed of machinery or detecting the speed of metallic objects on a conveyor belt.

These are just a few examples of sensors commonly used for speed detection. The choice of sensor depends on factors such as the desired accuracy, range, environmental conditions, and specific application requirements

Speed detectors can be classified based on various criteria. Here are a few common classification categories for speed detection systems:

i. Technology-Based Classification:

   a. Radar-Based: Radar speed detectors use radio waves to measure the speed of vehicles. They emit radio waves and detect the reflected waves to calculate the vehicle's speed. Radar systems are widely used and can be further categorized into different types such as Doppler radar and frequency-modulated continuous wave (FMCW) radar.
   b. Laser-Based (LIDAR): LIDAR speed detectors use laser beams to measure the distance and speed of vehicles. LIDAR devices emit laser pulses and calculate the speed by measuring the time it takes for the pulse to bounce back. Laser speed detectors offer high accuracy and are often used for handheld or mobile speed detection.

ii. Application-Based Classification:

   a. Fixed Speed Cameras: These speed detectors are permanently installed at specific locations, such as highways or intersections. They continuously monitor vehicle speeds and capture images or videos of speeding vehicles for enforcement purposes.
   b. Mobile Speed Cameras: These speed detectors are portable and can be deployed in different locations as needed. They are often mounted in vehicles or handheld devices, allowing law enforcement officers to monitor speeds while on the move.
   c. Average Speed Cameras: Average speed cameras measure a vehicle's average speed over a defined distance rather than instantaneously capturing the speed at a single

point. They are commonly used in construction zones or areas where maintaining a consistent speed is important.

iii. Enforcement Approach:

   a. Automatic Speed Enforcement (ASE): ASE systems are fully automated and operate independently without the need for human intervention. These systems detect speeding vehicles, capture evidence (images or video), and issue automated citations or penalties.
   b. Manual Speed Enforcement: Manual speed enforcement involves human intervention, where law enforcement officers use handheld devices or stationary speed detection equipment to monitor and enforce speed limits. Manual enforcement allows for discretion in issuing warnings or citations based on the officer's judgment.

iv. Sensor Configuration:

   a. Single Point: Single-point speed detectors measure the speed of a vehicle at a specific location. They are often used in fixed speed cameras or handheld devices.
   b. Multi-Point: Multi-point speed detectors use multiple sensors placed at different points to calculate the average speed of a vehicle over a certain distance. These detectors are commonly used in average speed cameras or systems that measure speed over a stretch of road.It's important to note that speed detection technologies and their classifications may continue to evolve as new advancements are made in the field of traffic enforcement and road safety.

2.2 ADVANCEMENT IN CAR SPEED DETECTION

i. **Advanced Radar Technology**: Radar-based speed detection systems have been continuously evolving. Modern radar technology allows for more accurate and reliable speed measurements. Researchers have been working on improving radar systems to detect speeds even in adverse weather conditions and in situations where there are multiple moving vehicles.

ii. **Laser Speed Measurement**: Laser speed detectors, also known as LIDAR (Light Detection and Ranging) devices, have gained popularity in recent years. LIDAR uses laser beams to measure the distance and speed of vehicles. Researchers have been exploring ways to enhance the precision and range of LIDAR devices, making them a valuable tool for law enforcement.

iii. **Machine Learning and Artificial Intelligence**: Researchers have been applying machine learning and artificial intelligence techniques to speed detection systems. By analysing large amounts of data, these systems can learn to accurately identify and track vehicles and estimate their speeds. This approach has the potential to improve speed detection accuracy and reduce false positives.

iv. **Integration with Traffic Management systems:** Car speed detection is increasingly being integrated with intelligent transportation systems and traffic management platforms. This integration allows for real-time monitoring of traffic speeds, automated traffic enforcement, and adaptive speed limit control based on prevailing conditions. Such systems aim to improve traffic flow, reduce congestion, and enhance overall road safety.

v. **Mobile Speed Detection**: Traditional speed detection methods have primarily relied on fixed cameras or stationary radar/laser systems. However, researchers have been developing mobile speed detection systems that can be deployed in moving vehicles or handheld devices. Mobile speed detection allows for greater flexibility in monitoring speeds in various locations and situations.

vi. **Vehicle-to-Infrastructure Communication**: With the emergence of connected vehicle technology, researchers have explored the potential of vehicle-to-infrastructure (V2I) communication in speed detection. By exchanging data between vehicles and roadside infrastructure, speed limits can be dynamically communicated to drivers, and violations can be detected more effectively.

vii. **Privacy and Ethical Considerations:** Researchers have also been addressing privacy and ethical concerns associated with car speed detection. Ensuring data protection, minimizing the risk of profiling or surveillance, and maintaining transparency in the deployment and use of speed detection systems have been important areas of focus.

It's important to note that ongoing research and technological advancements continue to shape the field of car speed detection. For the latest developments, I recommend referring to academic journals, conference proceedings, and research publications in the field of transportation engineering, traffic safety, and related areas.

2.3 ADVANTAGES OF SPEED DETECTION SYSTEM

Car speed detectors, also known as speed cameras or radar guns, offer several advantages in terms of road safety and law enforcement. Here are some of the key advantages of car speed detectors:

i. Enhancing Road Safety: Speeding is a significant factor in many road accidents. Car speed detectors help in enforcing speed limits, thereby encouraging motorists to drive within safe limits and reducing the risk of accidents. By detecting and deterring speeding, these devices contribute to improving overall road safety.

ii. Preventing Reckless Driving: Speed detectors act as a deterrent to reckless driving behaviour. The presence of these devices encourages drivers to be more cautious and comply with speed limits, reducing the likelihood of aggressive driving and other unsafe behaviours on the road.

iii. Efficient Traffic Flow: When drivers adhere to speed limits, it helps maintain a smoother flow of traffic. By detecting and addressing speeding violations, speed detectors contribute to reducing congestion and promoting a more efficient and organized traffic system.

iv. Automatic Enforcement: Car speed detectors are often automated, allowing for continuous monitoring of traffic speeds without the need for manual intervention. This automation enables law enforcement agencies to cover a wider area and enforce speed limits consistently, even in high-traffic locations or during non-peak hours.

v. Cost-Effective Enforcement: Compared to deploying a large number of police officers for speed enforcement, car speed detectors provide a cost-effective solution. These devices can operate round the clock and require minimal maintenance, making them a more efficient and affordable method for enforcing speed limits.

vi. Objective and Accurate Measurements: Speed detectors use advanced technology like radar or laser to measure vehicle speeds accurately. This eliminates the subjectivity and potential biases associated with manual speed estimation by law enforcement officers. Objective speed measurements help ensure fairness in enforcing traffic regulations.

vii. Data Collection for Analysis: Car speed detectors often capture data related to vehicle speeds, which can be used for further analysis and improving road infrastructure. This data helps authorities identify areas with frequent speeding violations, evaluate the effectiveness of speed limits, and make informed decisions to enhance road safety.

viii. Educational Tool: In some cases, car speed detectors are accompanied by speed display boards that show drivers their current speed. These displays serve as a reminder to motorists, helping them self-regulate their speed and promoting greater awareness of their driving habits.

While car speed detectors offer several advantages, it's important to strike a balance between effective enforcement and public perception. Striving for transparency, clear signage, and well-implemented speed limits can help address concerns related to privacy, fairness, and public acceptance of these devices.

2.4 DISADVANTAGES OF SPEED DETECTION SYSTEMS

While speed detection systems have their advantages, there are also some potential disadvantages associated with their use. Here are a few notable considerations:

i. Privacy Concerns: Speed detection systems, particularly those that utilize cameras or other forms of surveillance, can raise privacy concerns. The use of automated systems to monitor and record vehicle speeds may be perceived as an invasion of privacy, especially if the data collected is not handled appropriately or if there is a lack of transparency regarding how the data is used and stored.

ii. Accuracy and Calibration: Speed detection systems need to be regularly calibrated and maintained to ensure accurate readings. If not properly calibrated or maintained, there is a risk of inaccurate speed measurements, which could result in incorrect enforcement actions and erode public trust in the system.

iii. Reliance on Technology: Speed detection systems heavily rely on technological infrastructure, such as radar, laser, or camera systems. These systems can be susceptible to malfunctions, interference, or errors, which may lead to inaccurate speed measurements or even false readings. Dependence on technology also means that power outages or technical failures can temporarily render the systems ineffective.

iv. Cost and Resource Intensity: Implementing and maintaining speed detection systems can be expensive. It requires significant investment in hardware, software, installation, and ongoing maintenance. Additionally, the deployment of speed detection systems may require a substantial allocation of resources, such as manpower for monitoring and data management, which can pose a burden on law enforcement agencies or transportation departments.

v. Public Perception and Acceptance: Some individuals may view speed detection systems as revenue-generating tools rather than instruments for promoting road safety. If there is a perception of over-policing or a lack of transparency in the use of speed detection systems, it can create public backlash and resistance to their implementation.

vi. Disregard for Other Traffic Violations: Speed detection systems focus primarily on speed-related offenses. While speeding is a significant concern, it is not the sole cause of all traffic accidents. Overemphasis on speed enforcement may divert attention and resources from addressing other traffic violations, such as reckless driving, distracted driving, or impaired driving.

vii. Unintended Consequences: In some cases, drivers may become overly cautious or engage in sudden braking when they spot a speed detection device, which can lead to rear-end collisions or other hazardous situations. This behaviour, known as the "phantom braking" phenomenon, can be an unintended consequence of speed detection systems.

It’s important to strike a balance between effective enforcement, privacy considerations, and public acceptance when implementing speed detection systems. Addressing these disadvantages requires clear policies, transparent communication, appropriate training of personnel, and a commitment to ensuring accuracy and respect for privacy rights.

2.5 OVERVIEW OF MAJOR COMPONENTS USED

The proposed system consists of two major components i.e. hardware and software.

i. Transmission Section

There is a transmitter and receiver depends on the direction of the vehicle that is present in particular specification on these InfraRed (IR) sensors they act as both transmitter and receiver. The main aim of this is to calculate the speed of the vehicle or human being.

ii. Power Supply

The board requires a 5 Volts power to make it work, the sensors and all other hardware devices works in this much of power.

iii. Arduino Uno

The Arduino is having 28 pins for making the input and output from the Arduino board. These pins are very much helpful for some useful work for example it can be used to take some sensor values from the sensors and make the decision based on the programming we have done on it. The board is having an ATMEGA microcontroller which is like a heart of the board.

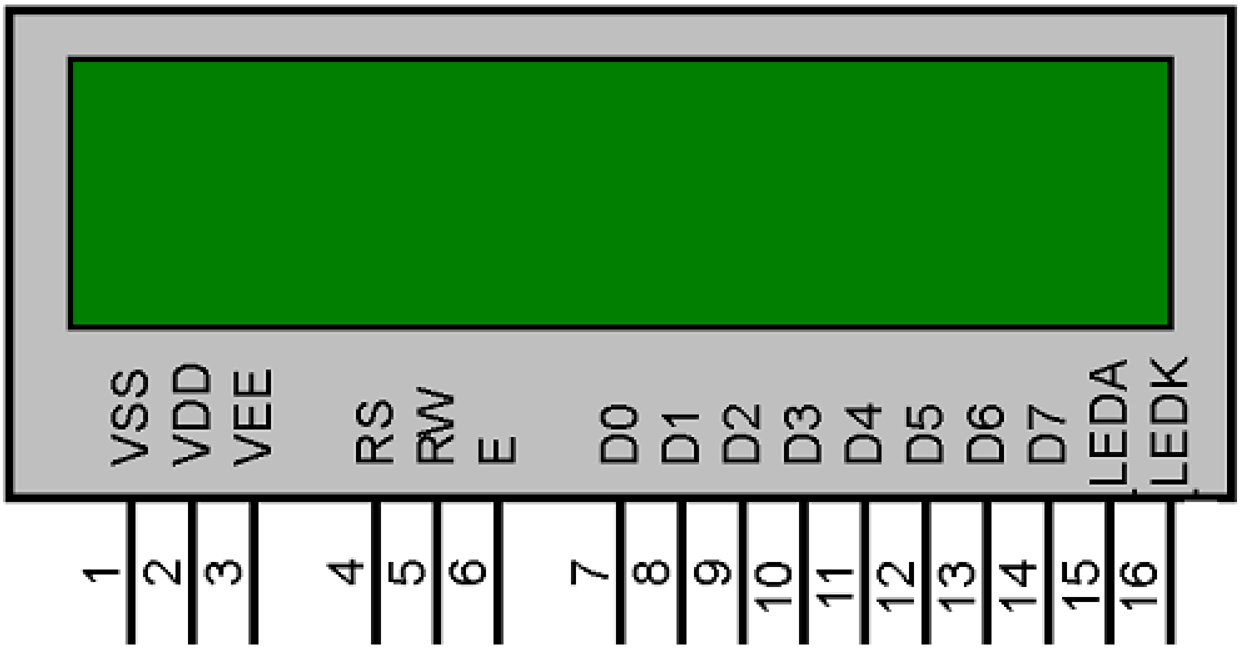
iv. LCD 16X2

The below figure is a simple LCD display device which is available in the market its 16X2 display where one can able to view the 16 characters in each line and having a maximum of 2 lines. LCD’s comes in thinner and lighter when compared to LED and cathode ray tube. It has major application in the field of science and engineering on electronic devices. LCD’s provides excellent contrasts. LCD consists of some microwatts for display in comparison to some mill watts for LEDs.

a. Consists of 5 × 8 and 5 × 10 dot matrix

b. Power operation is low: 2.7 to 5.5V

c. Greater range of LCD power: 3.0 to 11V
d. LCD operated waveform (One line frequency AC waveform)
e. Resembles to high speed Microprocessor unit bus interface with 2 MHz (when VCC = 5V)
f. MPU interface of 4-bit or 8-bit
g. 80× 8 - bits display RAM (Maximum 80 characters.)
h. Minimum power consumption.



Here is a description of each pin:

VSS - Ground

VDD - +5V Power Supply

VO - Contrast Adjustment

RS - Register Select (0 for Instruction register, 1 for Data register)

RW - Read/Write Select (0 for Write, 1 for Read)

E - Enable Pin (activates data read/write)

D0 - Data Bit 0 (Not used in 4-bit mode)

D1 - Data Bit 1 (Not used in 4-bit mode)

D2 - Data Bit 2 (Not used in 4-bit mode)

D3 - Data Bit 3 (Not used in 4-bit mode)

D4 - Data Bit 4 (Used in both 4-bit and 8-bit modes)

D5 - Data Bit 5 (Used in both 4-bit and 8-bit modes)

D6 - Data Bit 6 (Used in both 4-bit and 8-bit modes)

D7 - Data Bit 7 (Used in both 4-bit and 8-bit modes)

A - Anode of Backlight LED (+5V)

K - Cathode of Backlight LED (Ground)

v. IR Sensor

Infrared Obstacle Sensor Module has built in IR transmitter and IR receiver that sends out IR energy and looks for reflected IR energy to detect the presence of any obstacle in front of the sensor module. Whenever an object passes between the sensors, light reflects from the object and falls on the phototransistor. An operational amplifier IC is used and the phototransistor is connected to it. When object come in front of sensor, it sends a logical HIGH signal to Arduino. Some IR Sensors has option to produce both Analog and Digital Outputs but the module which is used in this system has only digital output i.e. if object is detected the output is HIGH and if no object found the output will be LOW.

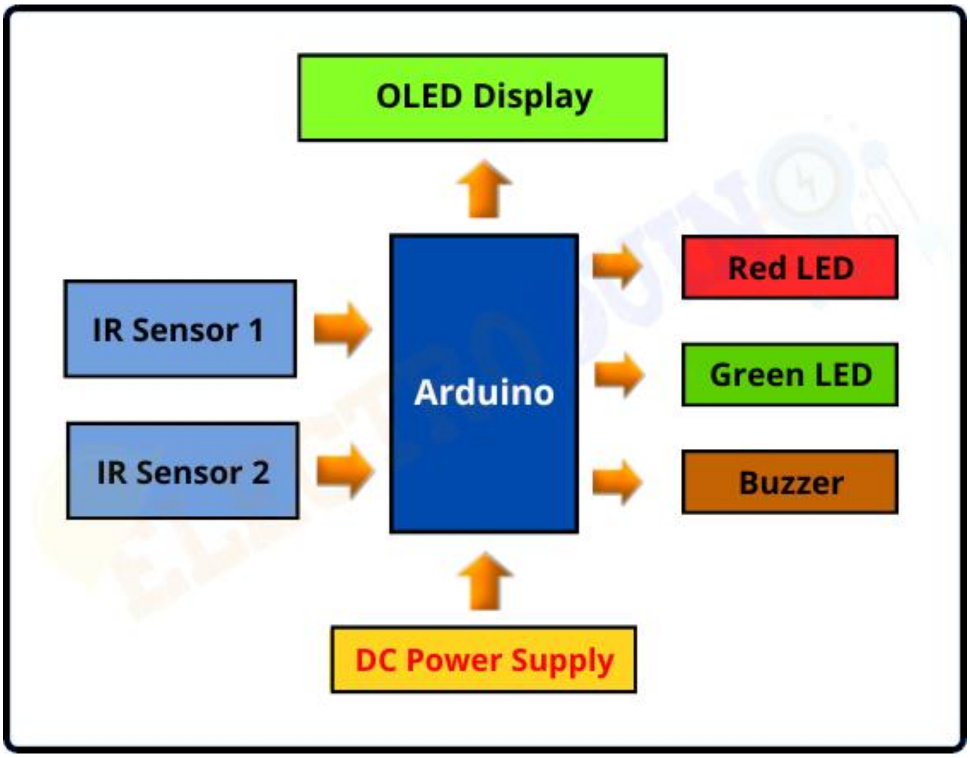

MH-B
OUT GND VCC

CHAPTER THREE

3.0 METHODOLOGY

3.1 SYSTEM BLOCK DIAGRAM

The block diagram of the system is as below:



I have used two IR Sensors and placed them 10cm apart. When a vehicle traveling reaches the first sensor, the IR Sensor gets activated. A timer is initiated and will continue to keep time until the vehicle reaches the second IR Sensor. By simulating the distance between the two sensors to be 5 meters, you can calculate the speed at which the vehicle travelled from IR Sensor 1 to IR Sensor 2 as you already know the time of travel.

All the calculations and data gathering are done by Arduino and the final result is displayed on a 16X2 LCD Module.

Figure 3 shows the overall circuit diagram of speed detection system using IR sensor. When a vehicle passes through the first sensor, the infrared rays cross the vehicle that the sensor has detected. The LED 1 for sensor 1 is connected to the pin 13 of the Arduino and the output of IR sensor 1 is connected to the pin 8 of the Arduino. In similar manner, 2nd sensor’s infrared ray touches the object and reflects to the sensor which the sensor has sensed the object. The

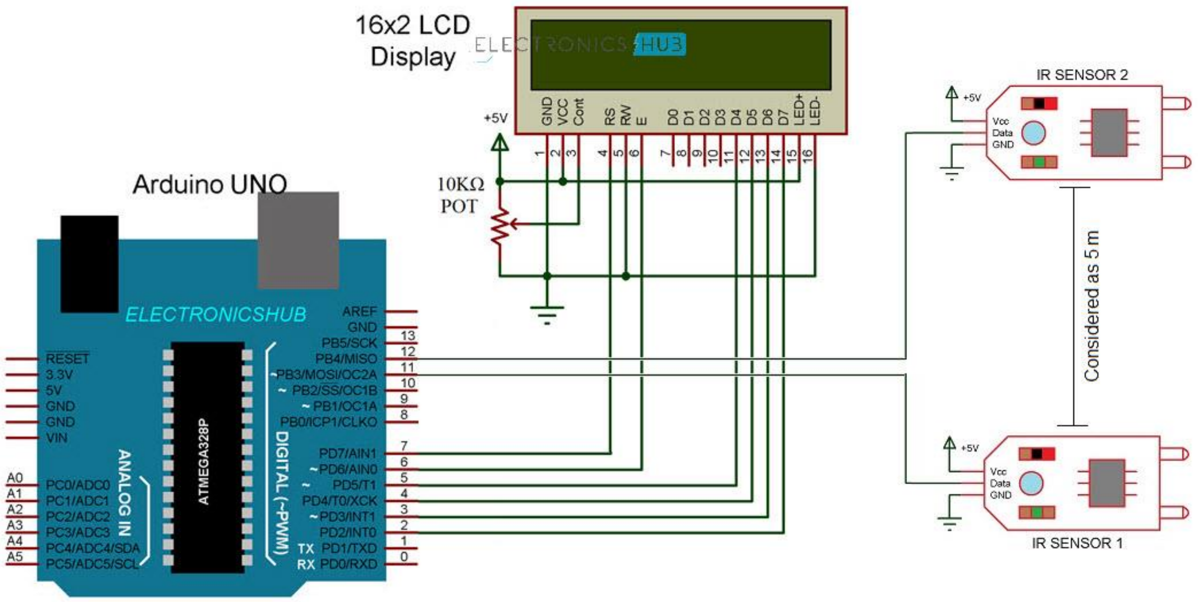
LED 2 for sensor 2 is connected to the pin 12 of the Arduino and the output of IR Sensor 2 is connected to the pin 9 of the Arduino. 16x2 LCD is used to display the speed of the vehicle. DB 7 to DB 4 of the LCD Pin are connected to the I/O pin 2 to 5 of the Arduino. The RS and E pins of LCD are connected to pins 7 and 6 of Arduino respectively. LCD indicates “no vehicle detected” before and after the vehicle passes. If the speed is over 50 km/hour, the buzzer will be alarmed and LED will start blinking and LCD displays “Over Speed!!”. Microcontroller calculates the vehicle’s speed in km/hr. The Vehicle’s speed is calculated by this equation:

Speed = Distance/Time

This equation is used to calculate the time taken between the two sensors:

Time = (t2-t1) milliseconds

In this part, the power supply circuit used 12V step down transformer. Regulator LM 7805 is used to convert 12V to DC 5V. The ground pin of the power supply is connected to the GND pin of the Arduino and the power supply DC 5V is connected to the VIN pin of the Arduino.



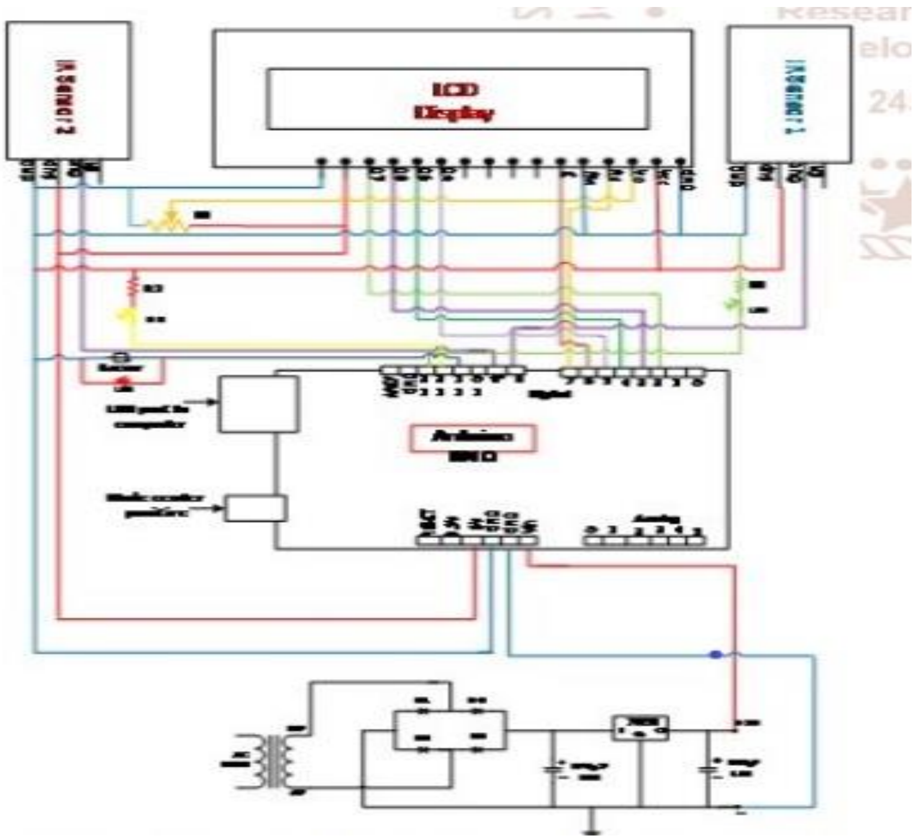
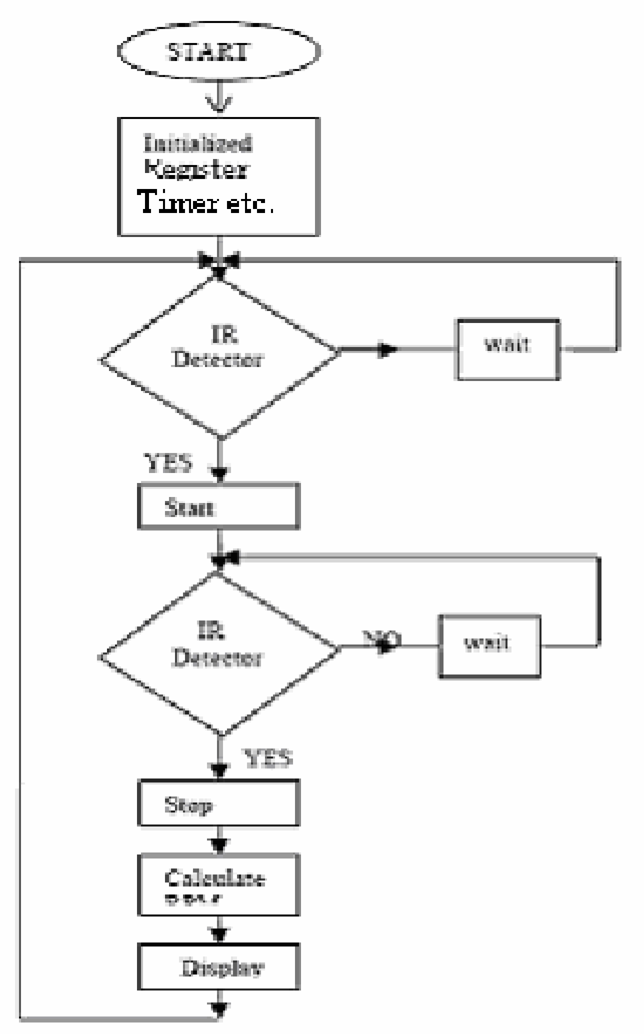
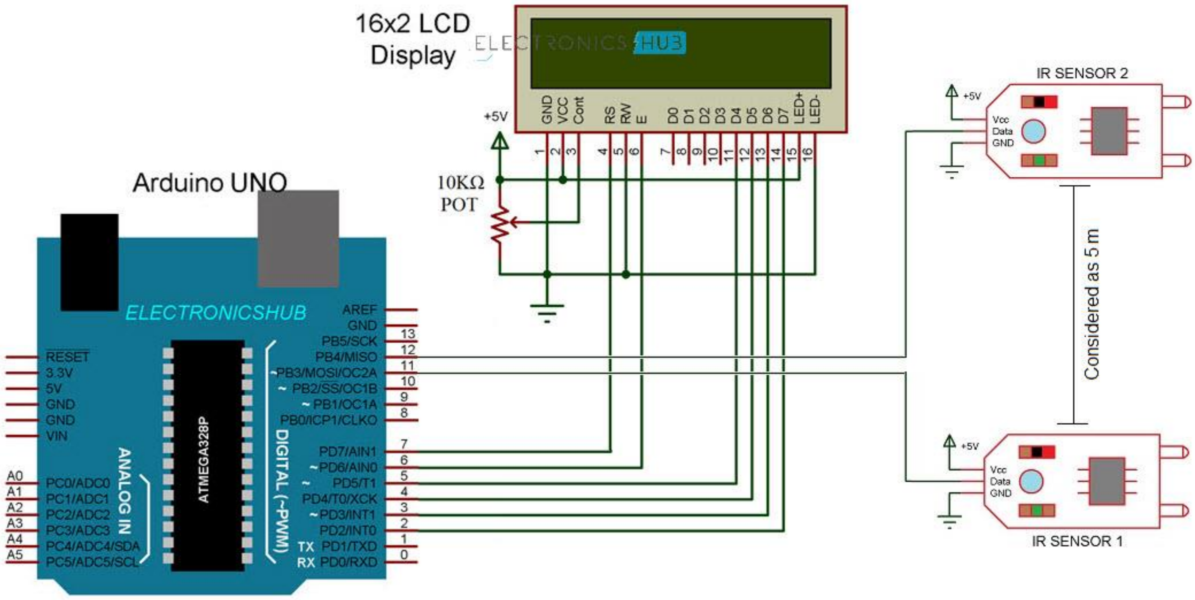
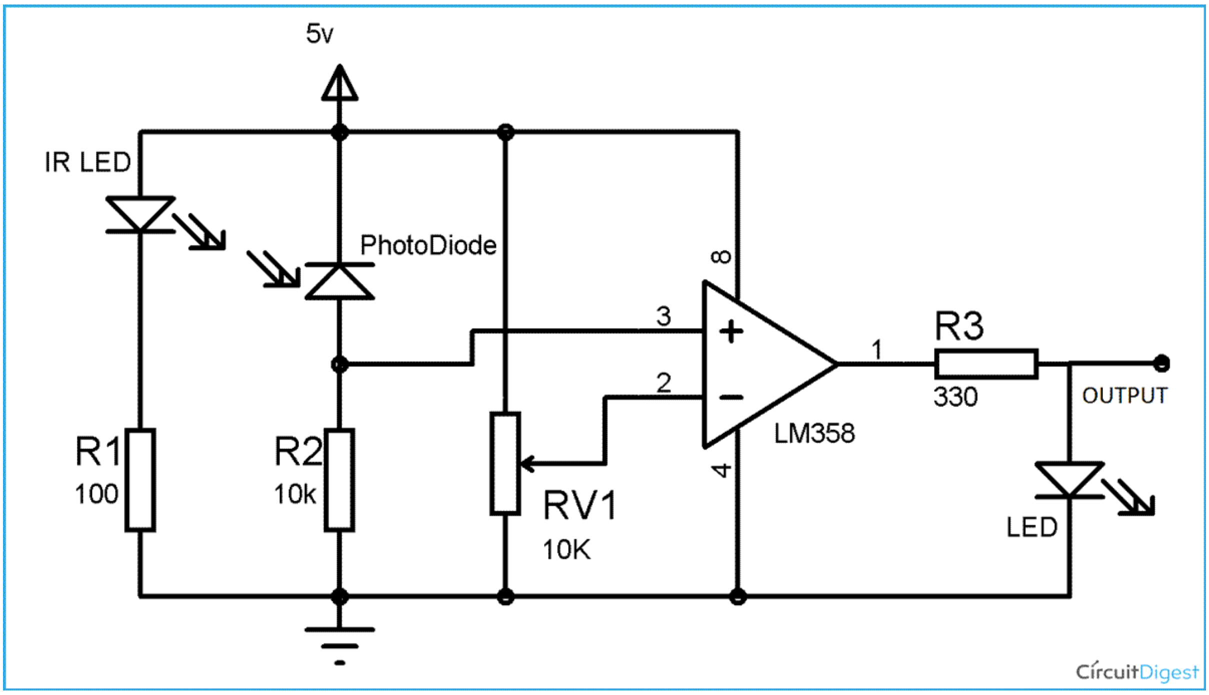


Figure 4 shows the flow chart of the system. First, initialize the input/output pins of the device which activate IR sensor 1 and the vehicle is detected. If the sensor senses the vehicle, the program starts to count and LED 1 (from the first IR sensor) is turned ON. If the vehicle is not sensed, LCD displays “No Vehicle Detected” and LED is turn off. After that, IR sensor 2 senses the vehicle and stops the program counting and starts to calculate the speed of the vehicle. Microcontroller counts start time and stop time, and time interval will get from start time and stop time and vehicle speed. And then, the calculated speed is compared with the limited speed i.e. 50km/hr. When the calculated speed is greater than limited speed, alarm is triggered, turning the buzzer which displays over-speed condition. If the vehicle is not sensed, LCD displays “No Vehicles detected” and LEDs turns off.


START
Initialized
Register
Timer etc.
IR
Detector
wait
YES
Start
IR
Detector
NO
wait
YES
Stop
Calculate
Display



H?



3.2 **WORKING PRINCIPLE OF CAR SPEED DETECTION | CAR SPEED MEASUREMENT DEVICE USING ARDUINO AND IR SENSOR**

After connecting all comments according to the circuit diagram and uploading the Arduino Code now our Car Speed Detection | Car Speed Measurement Device is ready for work. First of all, we need to Place the IR Sensor Module on one side of the road at some distance apart.

Here we have kept a distance of 30 cm between the Sensors. Now Connect the 9v Power supply to the circuit and turns on the Slide Switch, At the same time the IR Sensor 1 and IR Sensor starts detecting obstacles (vehicle) and generate Output from the data pin. IR Sensor 1 and IR Sensor 2 are connected to the Digital Pin D8 and D7 respectively. Arduino continuously reads the output values as the inputs from IR Sensors. In my case, the IR Sensor gives a High (+5V) Output when it doesn’t detect any obstacles and Gives a Low (0V) Output when it detects an obstacle.

When a vehicle/car moves infront of the IR Sensor 1, then it generates Low (0v) output signal from the data Pin and gives it to the Arduino. Now the Arduino captures a time stamp at the moment the car leaves the IR Sensor 1. Then the Arduino recorded another time stamp when the vehicle/car reaches infront of the IR Sensor 2. We have used Millis() function in Arduino code for capturing the time stamps by Arduino.

Then the Arduino calculates the time between the two stamps in milliseconds and converts this time into Seconds by dividing 1000. Here we have assumed the distance as 0.3 meters (30cm = 0.3m) between the two IR sensors and displays. So, the Arduino gets the Distance and Time which is covered by the car/vehicle. Now Arduino Calculates the speed of the car/vehicle using the Speed=Distance/Time (S=D/T) formula.

In this project, we set the speed limit at 60 Kmph. So, Whenever the Arduino detects the car/vehicle Speed over 60Kmph, the Arduino print an “Over Speed Detected and Go Slow” message on LCD Display and gives High input to the Red LED to turn on. The Red LED is used for Indication Over Speeding. When the Speed is under 60Kmph, this time Arduino gives High input voltage to the Green LED to turn on, which indicates the speed is normal.

Arduino Code

```
#include <LiquidCrystal.h>
const int rs = 7, en = 6, d4 = 5, d5 = 4, d6 = 3, d7 = 2;
LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
int sen1=11;
int sen2=12;
unsigned long t1=0;
unsigned long t2=0;
float velocity;
void setup()
{
  lcd.begin(16, 2);
  pinMode(sen1,INPUT);
  pinMode(sen2,INPUT);
  Serial.begin(9600);
  lcd.setCursor(0,0);
  lcd.print(" Speed Detector ");
}

void loop()
{
  while(digitalRead(sen1));
  while(digitalRead(sen1)==0);
  t1=millis();
  while(digitalRead(sen2));
  t2=millis();
  velocity=t2-t1;
  velocity=velocity/1000;//convert millisecond to second
  velocity=(5.0/velocity);//v=d/t
  velocity=velocity*3600;//multiply by seconds per hr
  velocity=velocity/1000;//division by meters per Km
  for(int i=5;i>0;i
  {
   lcd.setCursor(3,1);
   lcd.print(velocity);
   lcd.print(" Km/hr   ");
   delay(500);
   lcd.setCursor(3,1);
   lcd.print("             ");
   delay(500);
  }

}
```