بِسْمِ اللهِ الرَّحْمٰنِ الرَّحِيْمِ

INTERNATIONAL ISLAMIC UNIVERSITY CHITTAGONG

Department of Computer Science & Engineering

A project report on

Speed Test of a Moving Object

Course Title: Electrical Drives and Instrumentation Lab

Course Code: EEE-2422

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Table of Contents

Abstract:

Our project name is “SPEED TEST OF A MOVING OBJECT”. Nowadays in a traffic system or in an object moving system, we see the speed of the object are measuring by humans, ultimately which is not the best use of modern electronics and devices. So, this system may be an automated system. The goal of our project is to measure the speed of the object without human involvement.

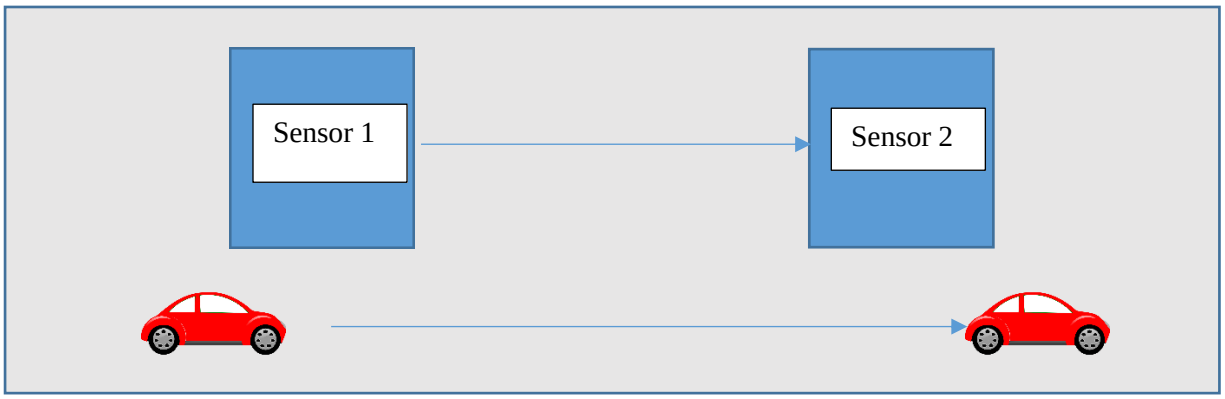
Literature Review:

1. Kishorkumar C S, Chandrashekar K.V, Nikitha A, Monisha B &Impana Appaji in "**Vehicle speed monitoring system using Arduino and speed sensor**" developed a smart vehicle speed monitoring system is proposed using arduino and speed sensor. Considering the road safety, a new technique is described to identify the speeding vehicle and charge them fine for breaking the rules or intimating the consulted authority to take action
2. G. Kirankumar, J. Samsuresh, and G. Balaji, Member, ACET in "**Vehicle Speed Monitoring System [VSM] (Using RuBee Protocol)**" in 2012, have used smart card/board for detect high speed vehicle and Global Positioning System (GPS) used for tracking vehicle location.
3. Ravi Kishore Kodali and Sairam, M. in "**Over Speed Monitoring System**" in 2016, have presented the design and implementation of a system, which provides a simple way to traffic authorities for monitoring of all the vehicles from the control room itself. This system calculates the speed and GPS coordinates continuously and these GPS coordinates help to find out the area in which the vehicle has been present and the maximum speed allowed in the respective area.
4. Sumit Deshpande, Vishant Bhole, Pradnya Dudhade, Neha Gourkar, Santosh Darade in "**Implementing a system to detect over speeding & inform authorities in case of any violations**" in 2017, Proposed the system does not need any human interception and records the car speed as well as informs the concerned authorities for the violations. This paper aims at developing a system that will detect the speed of the vehicle, if over speeding occurs, extract the license plate number and send it immediately to the nearest concerned traffic authorities. “**Vehicle License Plate Recognition System Based on Digital Image Processing**” The theme of this paper

is vehicle license plate recognition system based on image processing in intelligent transport system

5. P. SaiChaitanya, V. Vikram, B. Kalesh in "**Automatic Vehicle Speed Control System Using Wireless fidelity**", To develop a prototype vehicle speed monitoring system using accelerometer-based wireless sensor. The research focus on unifying the Global Positioning system with embedded wireless fidelity (Wi-Fi) is the new approaches in intelligent vehicle control for critical remote location application using ARM. The main objective of the proposed system is to operate the vehicle in safe speed at critical zones. That's system design and developed using accelerometer-based but authors designed and developed this proposed system using IoT. The main objective of the proposed system is to operate the vehicle speed in highway road.

Features:



- Measure the speed of the object between the sensors
- Calculate the speed by automated code in Km/h.
- Show the result in a led display
- Show a message about speed
- Give e signal by buzzer when over speed measured.

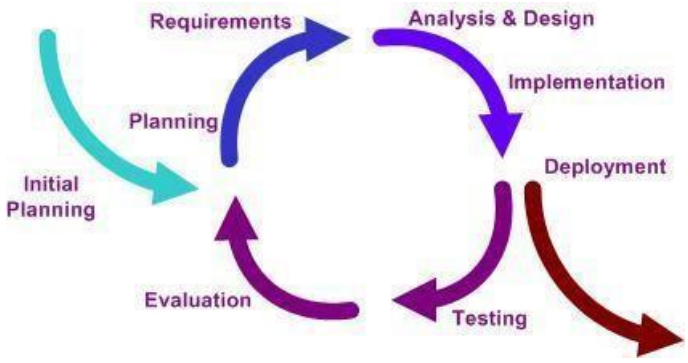
Applications:

- Road accident is a common issue in our country. Over speed of the vehicle is the prime reason for those accidents. So, speed measurement is very important for a vehicle to avoid over-speed. Before we said that the buzzer will give a signal for an over speed object. By this, a driver may be aware of his speed. Again, the traffic system would be maintained easily.

- We can measure the power as a product of speed and force.
- Our project can be used in digital fuel efficiency based on travel time and can signal about fuel.
- A Fuel level tracking system would be implemented by it.
- The water level in a water-planned project also is measured by it.
- One application of the speed test of a moving car using an IR sensor and an Arduino is traffic enforcement. The device can be mounted on the side of a road and used to measure the speed of passing vehicles. If a vehicle is found to be exceeding the speed limit, the device can trigger an alert, such as a flashing light or a message on a display screen, to alert the user. This can be used to help enforce speed limits and improve safety on roads.
- Another application is safety research. The device can be used to measure the speed of vehicles at different locations, such as intersections or school zones, and the data can be used to study the relationship between speed and accident rates. This can help inform decisions about speed limits and other safety measures in these areas.
- The device can also be used for performance testing. For example, it could be used to measure the speed of a race car on a track, or to test the acceleration and top speed of a production car. This information can be used to compare the performance of different vehicles and to optimize the design and performance of new models.
- Overall, the speed test of a moving car using an IR sensor and an Arduino has a wide range of potential applications in fields such as traffic enforcement, safety research, and performance testing.

Development Process:

We planned the project over a period of 1 month and divided it into four iterations. We planned the first iteration for analysis, the second iteration for circuit design, the third iteration for coding and equipment collection, and the final iteration for testing and execution.



In the first iteration, we focused on Project analysis determined as the first planned milestone of the project. The analysis is essential for starting of upcoming milestones and delivering a finished project on time. Successful completion of a project is heavily dependent on effective analysis.

The second iteration started by brainstorming among group members on what the project would be. Each group member denoted the attributes or properties of the project that one dreamed to implement. We gathered suggestions together and chose the ones that were possible to be implemented within 1 month of project time. As soon as the project concept became clear, we made some early decisions on the basic requirements of the project in order to reach the development goals more easily. The project design document was meant to be a living document. In other words, throughout the production process, the document was updated, if needed.

In the third coding and equipment collection, we are using “Proteus” software and collecting the equipment. Therefore, most of the time in this iteration was dedicated to internal training sessions. In this iteration, we needed to achieve four milestones each dependent on the previous one.

The Last iteration was planned for testing and execution. The testing process is an iterative process. We performed the testing process in four iterations. The successful testing process of software requires a good plan. Therefore, after the requirements of the project are confirmed, the future testing of the system and the code were planned. The test plan provided information on how and when the testing will be executed. In the second iteration, test cases were designed for the planned tests. In iteration three, the designed test cases were executed alongside module testing and usability testing. During the last iteration, according to the result of the tests, the test reports were documented properly, and the bugs were reported and discussed among the group members after the testing is completed.

Development Equipment's:

Required equipment's are given below.

- Arduino Uno R3 x 1'
- Standard LCD Display- 16x2 White on Blue x 1
- IR Sensor x 2
- LED (Red, Green) x 2
- Resistor 100-ohm x 2
- Single Turn Potentiometer- 10k ohms x 1
- Buzzer x 1
- Some Connecting Wire

Cost Analysis of the Equipment's:

1. Arduino Uno R3 x 1 -650 TK
2. Standard LCD Display - 16x2 White on Blue x 1 -120 TK
3. Ultrasonic Sensor - HC-SR04 (Generic) x 1 – 90 TK
4. LED (Red, Green) x 2 - 10 TK
5. Resistor 100-ohm x 2 - 5 TK
6. Single Turn Potentiometer- 10k ohms x 1 - 30 TK
7. Buzzer x 1 - 30 TK
8. Connecting Wire- 30 TK

Our total estimated cost from the above calculation is BDT. 800 TK to BDT. 1000 TK. The cost also depends on the market value of the types of equipment. So, costs may be decreased or increased in the future.

Expected Requirements:

These requirements are implicit in the system and may be so fundamental that the project does not explicitly state them. Their absence will be a cause for dissatisfaction.

1. Develop a system with limited cost.

2. Maximum high definition.

3. Minimum hardware requirements which are relevant for this project.

4. Design the whole system in an efficient manner.

Working Principle:

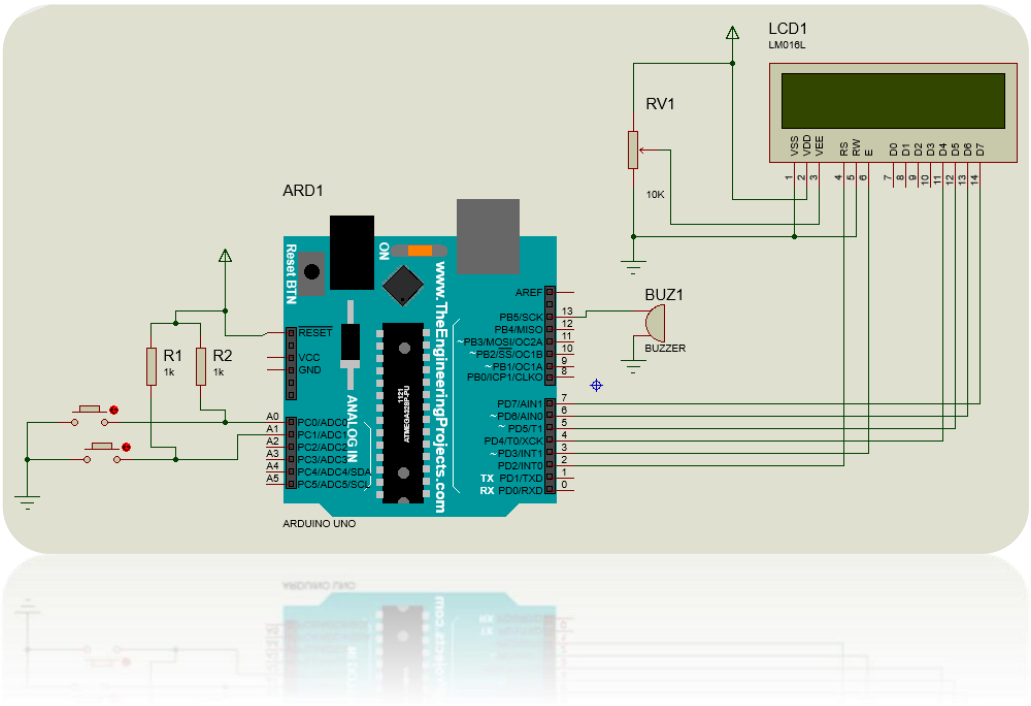
The working principle of a speed test of a moving car using an IR sensor and an Arduino involves using an infrared (IR) sensor to detect the presence and speed of a moving car, and an Arduino microcontroller to process the sensor data and display the speed on a display device.

The IR sensor is mounted on the side of the road facing the moving car, and it emits an IR beam towards the car. When the beam is reflected back to the sensor by the car, it measures the time it takes for the beam to return. The speed of the car can then be calculated based on the time it takes for the beam to return and the distance between the sensor and the car.

The Arduino microcontroller is programmed to receive the sensor data and calculate the speed of the car. It then displays the speed on a display device, such as an LCD screen, for the user to see.

This project can be used for a variety of purposes, including traffic enforcement, safety research, and performance testing. It is a useful tool for accurately measuring the speed of a moving car and providing real-time feedback to the user.

Circuit Design:

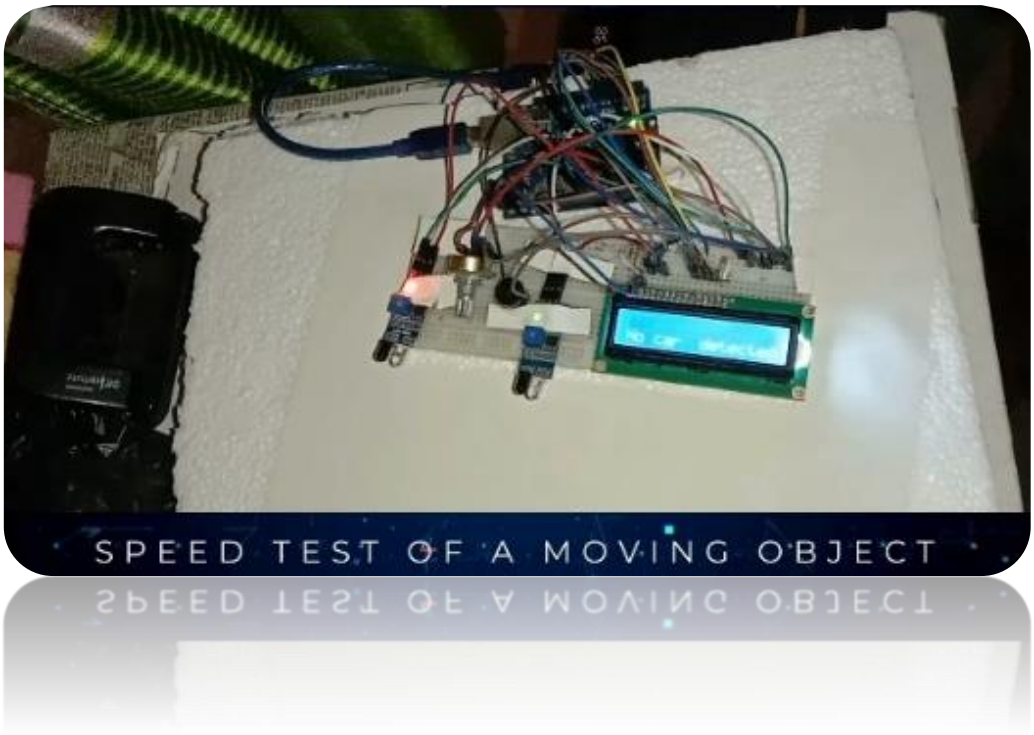


Testing and Execution:

Testing is the process of executing a program with the intent of finding an error. Testing is a crucial element of software and product quality assurance and presents an ultimate review of specification, design, and coding. System Testing is an important phase. Testing represents an interesting anomaly for the software. A good test case is one that has a high probability of finding an as undiscovered error. A video link of execution the project is given here.

https://drive.google.com/file/d/1fMSfp_q1XaE9WTA1z2DAzJ8Thl_7nIxE/view?usp=share_link

Hardware Implementation:



Limitations:

- It can't capture the speed of a rotational object like a fan, turbine, etc. Because IR sensor wouldn't find here any point of initial movement or final movement.
- It can't measure the speed of a very long vehicle.
- It has no sound system yet but, in the future, it might be implemented.

There are also some limitations to this project:

Limited range: IR sensors have a limited range, meaning they can only measure the speed of a moving car within a certain distance from the sensor.

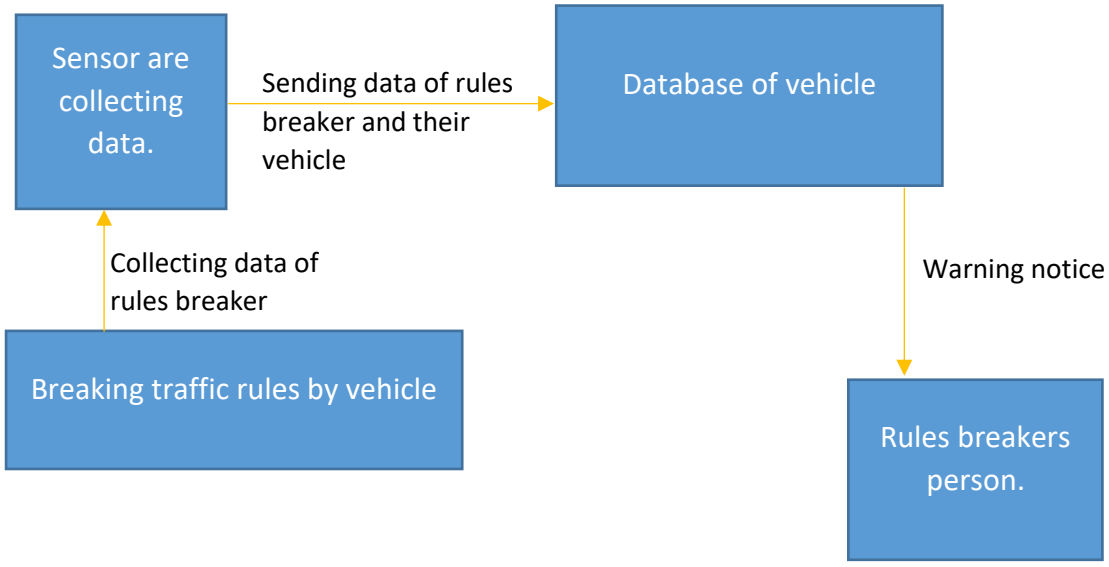
Sensitive to weather conditions: IR sensors can be affected by weather conditions such as rain, fog, or snow, which can impact their accuracy.

Requires programming: Setting up and programming the Arduino microcontroller can be a complex task that may require some technical expertise.

Limited to measuring speed: This project can only measure the speed of a moving car and cannot measure other aspects of a car's performance such as acceleration or braking.

Future Upgrade:

In near future, we can use this project in various scopes basically in the traffic management systems. Still now in our country traffic control system is a linear system, we can convert it to a dynamic system or digital system. In the digital system, it will record that vehicle that is run over speed and send the vehicle data in the database automatically saving it for the future. If the driver continuously breaks the traffic rules a warning message will be sent to the respected person. With this automated system, no one wouldn't dare to break the traffic system. Hence the accident ratio will be decreased. So there is a great scope to use this project in a future upgrade.



Conclusion:

By this report, we are trying to clarify the use of this project and the future scope of this project. We hardly try to less the cost and make a great scope of use in traffic management. Hopefully,

the Manufacturing of this project's commonly said product will be a great discovery for our society.

In conclusion, the "speed test of a moving object" project is a useful tool for accurately measuring the speed of a moving object. By using an IR sensor to detect the movement of a car as it passes by, and an Arduino microcontroller to process and analyze the data, it is possible to determine the speed of the car with a high degree of accuracy. The system can be easily customized and adapted to a wide range of conditions, making it a flexible and versatile tool for measuring the speed of moving vehicles. Overall, the 'speed test of a moving object' project represents a valuable contribution to the field of vehicle speed measurement and has the potential to be used in a variety of applications where accurate and reliable speed measurements are required.

Code:

We are implement our code by "Proteus" software and compile it through Arduino Uno. Source Code of our project=>

```
#include<LiquidCrystal.h>
//LiquidCrystal lcd(rs, en, d4, d5, d6, d7);
LiquidCrystal lcd(2, 3, 4, 5, 6, 7);

int timer1;
int timer2;

float Time;

int flag1 = 0;
int flag2 = 0;

float distance = 5.0;
float speed;

int ir_s1 = A0;
int ir_s2 = A1;

int buzzer = 13;

void setup() {
  pinMode(ir_s1, INPUT);
  pinMode(ir_s2, INPUT);
  pinMode(buzzer, OUTPUT);

  lcd.begin(16, 2);
  lcd.clear();
```

```
  lcd.setCursor(0, 0);

  lcd.print(" SPEED  MEASURE ");
  lcd.setCursor(0, 1);

  lcd.print("By-  Team BRATVA");
  delay(2000);
  lcd.clear();
}

void loop() {
  if (digitalRead (ir_s1) == LOW && flag1 == 0) {
    timer1 = millis();
    flag1 = 1;
  }

  if (digitalRead (ir_s2) == LOW && flag2 == 0) {
    timer2 = millis();
    flag2 = 1;
  }

  if (flag1 == 1 && flag2 == 1) {
    if (timer1 > timer2) {
      Time = timer1 - timer2;
    }
    else if (timer2 > timer1) {
      Time = timer2 - timer1;
    }
    Time = Time / 1000; //convert millisecond to second
    speed = (distance / Time); //v=d/t
    speed = speed * 3600; //multiply by seconds per hr
    speed = speed / 1000; //division by meters per Km
  }

  if (speed == 0) {
    //lcd.clear(); // NEW 1
    lcd.setCursor(0, 1);
    if (flag1 == 0 && flag2 == 0) {
      lcd.print("No car  detected");
      //delay(2000); // NEW 2
    }
    else {
      lcd.print("Searching...    ");
    }
  }
  else {
    lcd.clear();
    lcd.setCursor(0, 0);
    lcd.print("Speed:");
    lcd.print(speed, 1);
```

```
    lcd.print("Km/Hr  ");
    //delay(3000);
    lcd.setCursor(0, 1);
    if (speed > 50) {
      lcd.print("  Over Speeding  ");
      digitalWrite(buzzer, HIGH);
      //tone(buzzer, 3000, 200);
    }
    else {
      lcd.print("  Normal Speed   ");
    }
    delay(3000);
    digitalWrite(buzzer, LOW);
    //tone(buzzer, 3000, 400);
    lcd.clear();
    speed = 0;
    flag1 = 0;
    flag2 = 0;
  }
}
```

https://github.com/sorowar-cse/Microprocessor-Project/blob/main/Final/mp_eee_sketch/mp_eee_sketch.ino

Assalamu 'ala manit taba'al hudaa

Thanks