আন্তর্জাতিক ইসলামী বিশ্ববিদ্যালয় চট্টগ্রাম

International Islamic University Chittagong

Project Proposal

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Course Title: Microprocessor, Microcontrollers & Embedded System
Course Code: CSE-3524

Submitted to-

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Proposal Project Name: Speed Test of a Moving Object

Motivation: In order to detect the speed of a moving object, the responsible authority usually depend on a handheld gun that works on Radar Technology or Lidar Technology. This is a tedious process as the responsible authority has to manually check for over speeding for each vehicle. What if the moving object Speed Detection is made automatic? A simple automatic detection of speed of a vehicle is designed in Arduino moving object Speed Detector project, where you can place the system in one place and view the results instantly without any human intervention.

Features: This project, **Speed Test of a Moving Object** has some key features are that-

- Helps in capturing speed of moving object.
- No need of human involvement.
- Can display the speed moving object.

This project can also be used as traffic logger, traffic counter and few other traffic related applications.

Limitations: Our project, **Speed Test of a Moving Object** has some limitations are that-

- It can't capture speed of all kinds of moving object, like fan.
- It has not any sound system, that tells you the speed.

Social Impact: As we said in Motivation point, with this project, one can place the system in one place and view the results (speed) instantly without any human intervention. We can take an example:

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 that case, we can use this system.

Sensors and Equipment's:

- ✓ Arduino Nano R3 x 1
- ✓ Adafruit Standard LCD - 16x2 White on Blue x 1
- ✓ **Ultrasonic Sensor - HC-SR04 (Generic) x 1**
- ✓ LED (generic) x 1
- ✓ Resistor 330-ohm x 1
- ✓ Single Turn Potentiometer- 10k ohms x 1

Future Scope: In Future, we can add sound system in this project. By adding sound system, it can tell you the speed of a moving object besides showing the speed in display.

Components (Sensor) Short Description: The **HC-SR04 Ultrasonic Distance Sensor** is a sensor used for detecting the distance to an object using sonar. It's ideal for any robotics projects you have which require you to avoid objects, by detecting how close they are you can steer away from them!

The **HC-SR04** uses non-contact ultrasound sonar to measure the distance to an object, and consists of two ultrasonic transmitters (basically speakers), a receiver, and a control circuit. The transmitters emit a high frequency ultrasonic sound, which bounce off any nearby solid objects, and the receiver listens for any return echo. That echo is then processed by the control circuit to calculate the time difference between the signal being transmitted and received. This time can subsequently be used, along with some clever math, to calculate the distance between the sensor and the reflecting object!

The HC-SR04 is great, as it's low cost, can be powered via the Raspberry Pi's 5V output, and is relatively accurate! The HC-SR04 has a 5V output (which needs to be reduced to 3.3V to work with the Raspberry Pi).

The HC-SR04 sensor works best between 2cm – 400 cm (1'' - 13ft) within a 30-degree cone, and is accurate to the nearest 0.3cm.

The HC-SR04 Ultrasonic Range Sensor Features:

- ♦ Input Voltage: 5V
- ♦ Current Draw: 20mA (Max)
- ♦ Digital Output: 5V
- ♦ Digital Output: 0V (Low)
- ♦ Working Temperature: -15°C to 70°C

- Sensing Angle: 30° Cone
- Angle of Effect: 15° Cone
- Ultrasonic Frequency: 40kHz
- Range: 2cm - 400cm
- Dimensions
  - Length: 43mm
  - Width: 20mm
- Height (with transmitters): 15mm
- Centre screw hole distance: 40mm x 15mm
- Screw hole diameter: 1mm (M1)
- Transmitter diameter: 8mm

**Work Flow:** Device is very simple and consist only a few components:

- Arduino Nano microcontroller

- LCD display

- Ultrasonic sensor

- and LED diode

For that purpose, we need to take two distance measurements in a short time apart and we have:

distance2 - distance1 = distance speed at a given time

If we make the measurements in a time period of 1 second, then we get the speed of movement of the object in cm/s. The basic code is taken from the Arduino cc forum and I just added an LCD display for a visual representation of the results.

Circuit Diagram:
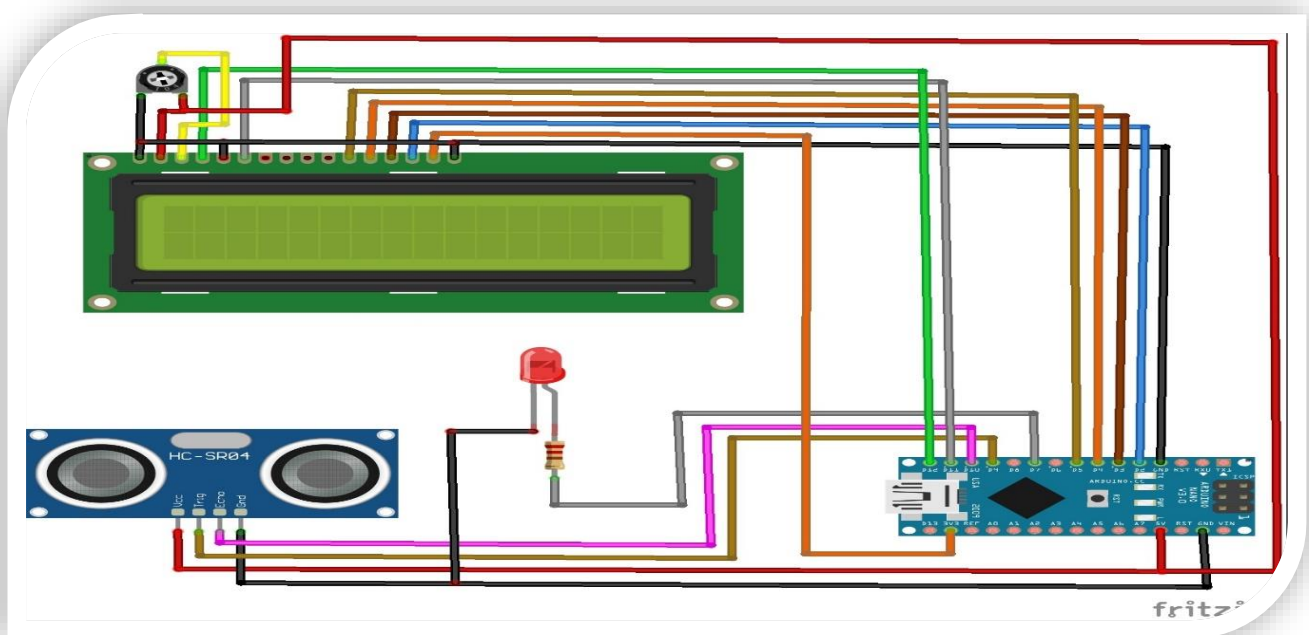
Cost Analysis:

- Arduino Nano R3 x 1   -650 TK
- Adafruit Standard LCD - 16x2 White on Blue x 1   -250 TK
- Ultrasonic Sensor - HC-SR04 (Generic) x 1   - 95 TK
- LED (generic) x 1   - 10 TK
- Resistor 330-ohm x 1   - 5 TK
- Single Turn Potentiometer- 10k ohms x 1   - 30 TK

In This Project, Our Total Estimated Cost Is 900 TK To 1200 TK.

Application: The goal of measuring speed may vary based on the application, including the safer operation of vehicles; calculation of power as a product of speed and force; evaluation of driver travel routes based on fuel efficiency and travel time; fuel level tracking to prevent fuel theft; walking speed of diseased persons.

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