Arduino Car Speed Detector

This project entails the method of designing and building a simple Car Speed detector circuit using Arduino UNO and IR Sensors.

Introduction

In the past many problems and accidents have arisen due to the violation of car speed limitations. therefore we decided to find an efficient method of detecting the speed of the cars that break these rules in order to decrease the number of accidents that occur. This is done on 2 levels, in the first level the patrolling officers usually depend on a handheld gun that works on RADAR technology or LIDAR technology. This is an exhausting process as the officer has to manually check for over speeding for each vehicle in addition to the fact that it is prone to human error thus making it not the most efficient method. So what if the car speed detection is made automatically? Our project detects the speed of the vehicle automatically, where you can place the system in one place and view the results remotely without any human intervention.

Project's components

The suitable components for our project are:

1. Arduino Uno

The Arduino Uno is an open source microcontroller board developed by arduino.cc. The board is equipped with sets of digital and analog (I/O) pins. To be more specific it contains14 digital I/O pins, 6 analog I/O pins.

This is the smart component in the project that handles all the inputs/outputs using logical code implementations that we have burned on it.

2. Infrared sensors

An IR sensor is an electronic instrument that is used to sense certain characteristics of its surroundings. These sensors are also capable of measuring the heat being emitted by an object and detecting motion. There are two types of IR sensors: active and passive. The one we are using in our project is the active sensor which both emits and detects infrared radiation. The active sensors have two parts: a light emitting diode (LED) and a receiver. When an object comes close to the sensor, the infrared light from the LED reflects off of the object and is detected by the receiver.

3. 16x2 LCD display module

An LCD is an electronic display module which uses liquid crystal to produce a visible image.”16×2 LCD” is named so because it has 16 Columns and 2 Rows. This will display the speed of the passing vehicles.

4. Breadboard

The breadboard is used in prototyping the electronic circuits. It is reusable, so this makes it easy to use for creating temporary prototypes. A modern breadboard consists of a perforated block of plastic with numerous tin plated phosphor bronze or nickel silver alloy spring clips under the perforations.

5. Buzzer

A buzzer or beeper is an audio signaling device, which may be mechanical, electromechanical, or piezoelectric. Typical uses of buzzers and beepers include alarm devices and timers.

6. Connecting wires

Software

1. Code

```
#include<LiquidCrystal.h>
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(" This is the ");
  lcd.setCursor(0,1);
  lcd.print("speed detector");
  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.setCursor(0, 1);
if(flag1==0 && flag2==0){lcd.print("No car
detected");}
                  else{lcd.print("Searching...    ");}
}
else{
   lcd.clear();
   lcd.setCursor(0, 0);
   lcd.print("Speed:");
   lcd.print(speed,1);
   lcd.print("Km/Hr  ");
   lcd.setCursor(0, 1);
  if(speed > 50){lcd.print("  Over Speeding  ");
digitalWrite(buzzer, HIGH);}
          else{lcd.print("  Normal Speed   "); }
   delay(3000);
   digitalWrite(buzzer, LOW);
   speed = 0;
   flag1 = 0;
   flag2 = 0;
 }
}
```

2. Simulation Software

For our simulation, among the plenty of softwares out there we decided to use Proteus because we were already familiar with its interface in previous projects and it has a sundry of utilities that could be useful in our future work. This includes modules such as Schematic capture, PCB, Microcontroller simulation, 3D verification and many others

Project's Mechanism

IR Sensors detect the speed of a car. We place 2 IR sensors with a known distance apart (which is 10cm in our project). When a car passes in front of the first sensor, the IR rays reflect to the sensor and a timer starts counting, then it stops when the car passes in front of the second sensor as the same reflection happens. Using the distance and time values, we can calculate the speed of the car. And it will be displayed on a 16x2 LCD screen. Arduino uses the calculated speed value to determine if a car exceeded the speed limit.