Automated Speed Control of Vehicles Integrated with Traffic Control System

Surinder Singh Arora, Pritha Roy

***Abstract---** Our research surrounds on the area of proper and automated speed controlling of cars using the traffic signal automated system by usinglight sensitive sensors. In general speed control automation they are gps integrated speed controlling or locating system or it has come up with different concepts of speed controlling to ensure the safety of the vehicles. In our research we have developed a system in which the traffic signal lights will be embedded or laded on the streets and the cars would be having the light detecting sensors at the bottom which will differentially detect the colours of the lights emitted and will accordingly signal the car to de-accelerate. In case of any emergency purposes the car will ensure its safety by manual control detecting the speed and the obstacle. It ensures the traffic controlling and the hustle and bustle of the traffic in a way smother than old township model ensuring a countable safety of the passengers.*

I. INTRODUCTION

In the recent world with the development of the large cities it has also lead to the increment of the large cities with a huge number of vehicles.The study of the recent times shows that with increment of the traveling modes the accidents are quite common as people hardly try to follow or obey the traffic rules. These lead to saviour accidents and traffic congestions on the road that may lead to extension of the time. To prioritise on the safety of the citizens the system have been created, where people cannot run from following rules. As in the newer age of smart city concept the evolution of the cars are proposed to have a gps integrated system and in ourpaper we are concerned in solving the problem of accidents and abiding the drivers with inevitable rules.

In this proposed model we are mainly concentrating on developing the safety and control of the cars over the well populated and bigger cities leaving the highways aside. In the traffic-integrated roadways there is almost a general distance of 500 m between each of the traffic signal-crossing, for which we have considered a safe distance for speed controlling assuming it to be 250meters in length from the main traffic signal crossing.

For the traffic integrated roadways we can overcome the speed controlling issue by either using the automated speed controller system or the manual speed controlling for the emergency purposes when the speed is greater equals 30 kilometres /hour& when it simultaneously detects the obstacle ranging at a distance of less equals to 20 metres. For the auto mated speed control the traffic lights are embedded or laded on the ground at an assumed safe distance and the lights are detected by the light detecting sensors which are fixed at the bottom of the cars and it detects the particular colour and sends signal to the device driver for the speed controlling by de-acceleration assuming the average speed of every vehicle to be moderate.

For the working of the traffic integrated roadways assuming the vehicle speed to be 60km/ hour working at a safe distance of 250 metres when the light to be detected to red we calculate the de-acceleration from (a = ½((V initial)^2/ distance)) [9] which is calculated to be around 1.8gs and for the yellow light the de-acceleration is calculated to be 2.01gs. Now the force to be applied by the brakes is calculated as (F=ma) [10]where the weight is detected by using the weight detector. The force is to be calculated in newton and by calculating and comparing the values of the given data to the accepted datas the o/p signals are being processed.

These output signals are operated for the controlling of the vehicle with a newer concept of safety requirement for making a better space for sustaining.

II. PROPOSED DESIGN

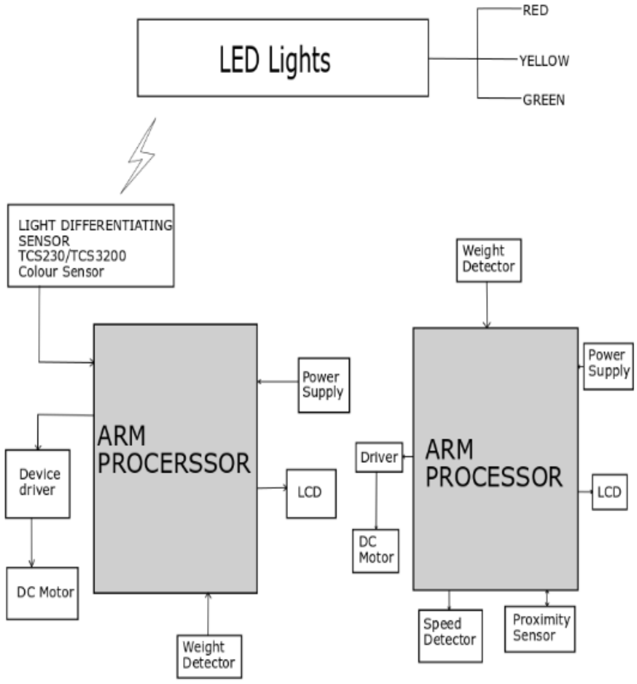

Fig 1: block diagram for the proposed system

In the above proposed diagram the lights are detected by the light differentiating sensor TCS230/TCS3200 (COLOUR SENSOR) [3] and the processor 1 will detect the signals and will give the out command to the device driver for the speed controlling and will display the above data on the LCD.

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In the arm processor 2 the proximity sensor detects the distance of the obstacle and the speed is detected by the speed detector and the processor compare the results with the given data values and produces the output accordingly.

III. SOFTWARE DEVELOPMENT

The particular system has been developed using Arduino platform. The Arduino mega have been used for the sensor integration and calculation for obtaining the desired value. The Arduino Uno model have been used for driving the arm motor controller for the speed controlling purpose simplifying the calibration of the data obtained and for the particular real life modelling we use the arm processor.

IV. FLOWCHART

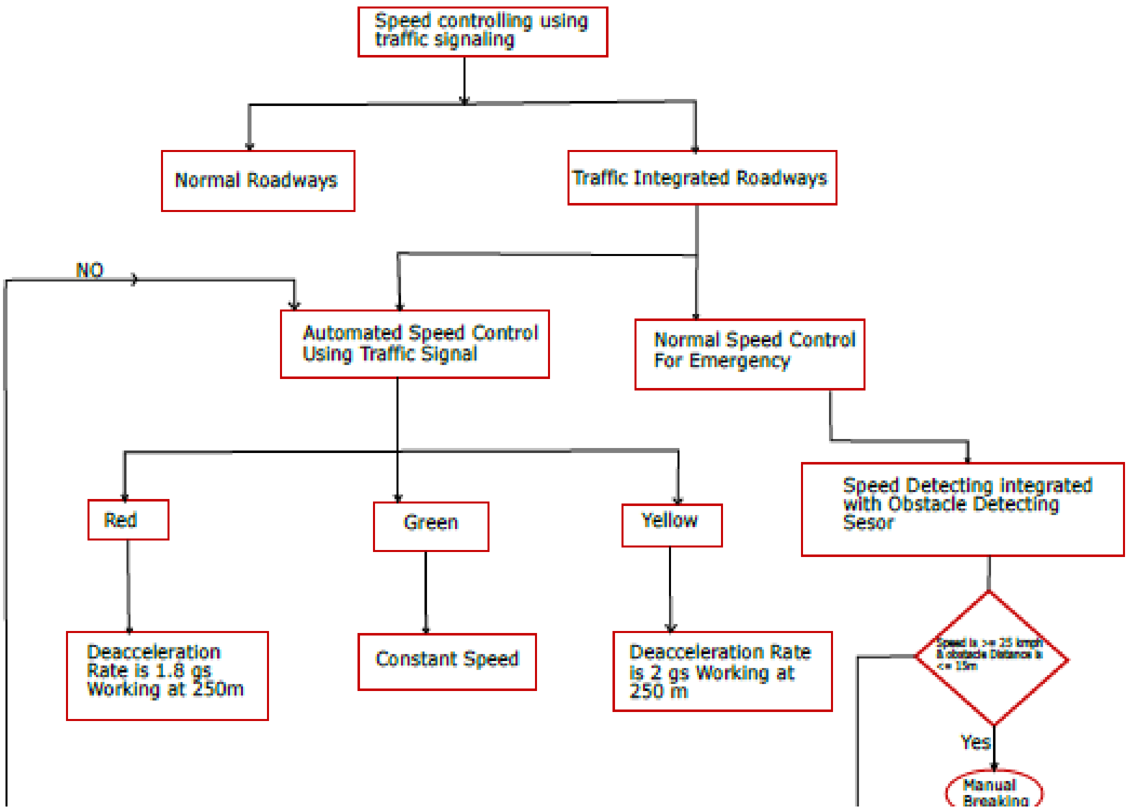

Fig. 2: Flow diagram of the proposed system

V. DESCRIPTION

The speed controlling using traffic control system is categorised in two different sections in this flow diagram, where traffic signal integrated roadways have automated speed controlling and for the emergency purposes. The traffic lights laded down in the roadways aresensed using the light differentiating sensor TCS3200 and the data sensed commands the particular segment of code to be initiated whether to stop or to slow down or to move as it is depending on the algorithm initiated. The speed iscontrolled using the sensor outputs of sensors and the motor controller initiates the braking in the particular vehicle accordinglykeeping the criteria of safe distance in consideration. The speed controlling is also done satisfying the criteria of data matching the limit of the output data of the obstacle detection sensor. The particular vehicle is controlled keeping all the parameters in consideration, for emergency purposes it also allows the manual braking of the vehicle is allowed.

VI. ALGORITHM

1. Start
2. The power is supplied to both the motor speed controller modules
3. The light differentiating sensor senses the analog data and converts to the digital data o/p to be taken as i/p by the processor1.
4. Comparing the values of the sensor input the processor compares the datas with the given value and signals the device driver to control the motor speed accordingly.
5. The processor[2]compares the incoming data coming from the sensors (proximity sensor &speed detector).
6. According to the given data input, it compare the values and performs the output signal accordingly.

VII. SOURCE CODE& COMPILATION & RESULTS

The code for the following algorithm is developed considering the prototype of the proposed model, which can be implemented through arm processor and its coding platform for higher implementation and accuracy.

speed_control_using_light_sensor | Arduino 1.8.7

File Edit Sketch Tools Help

speed_control_using_light_sensor §

```
#define S0 4
#define S1 5
#define S2 6
#define S3 7
#define n A2
#define sensorOut 9
#define weight A0
#define vel A1

int frequency = 0;
int b=0;
int f=0;

void fastb()
{
  int a=((250*2)/((vel)*(vel)));
  f= (weight)*a;
  n=(f)*(3/10);
  Serial.print(n);
  delay(4500);
   n=(f)*(65/100);
  Serial.print(n);
  delay(4500);
   n=(f);
  Serial.print(n);
  delay(4500);

  }
```

```
Done compiling.

Sketch uses 3388 bytes (1%) of program storage space. Maximum is 253952 b
```

Fig 3.1

speed_control_using_light_sensor | Arduino 1.8.7

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speed_control_using_light_sensor §

```
void slow()
{
  int a=((250*2)/((vel)*(vel)));
  f= (weight)*a;
  n=(f)*(15/100);
  Serial.print(n);
  delay(4500);
  n=(f)*(45/100);
  Serial.print(n);
  delay(4500);
  }

void setup() {
  pinMode(S0, OUTPUT);
  pinMode(S1, OUTPUT);
  pinMode(S2, OUTPUT);
  pinMode(S3, OUTPUT);
  pinMode(n,OUTPUT);
  pinMode(sensorOut, INPUT);
  pinMode(weight, INPUT);
  pinMode(vel, INPUT);

  // Setting frequency-scaling to 20%
  digitalWrite(S0,HIGH);
  digitalWrite(S1,LOW);

  Serial.begin(9600);
}
```

```
Done compiling.

Sketch uses 3388 bytes (1%) of program storage space. Maximum is 253952 bytes.
Global variables use 204 bytes (2%) of dynamic memory, leaving 7988 bytes for local
```

Fig 3.2

speed_control_using_light_sensor | Arduino 1.8.7

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Save

speed_control_using_light_sensor §

```
void loop() {
  // Setting red filtered photodiodes to be read
  digitalWrite(S2,LOW);
  digitalWrite(S3,LOW);
  // Reading the output frequency
  frequency = pulseIn(sensorOut, LOW);
  // Printing the value on the serial monitor
  Serial.print("R= ");//printing name
  b = frequency;
  Serial.print("  ");
  delay(100);

  // Setting Green filtered photodiodes to be read
  digitalWrite(S2,HIGH);
  digitalWrite(S3,HIGH);
  // Reading the output frequency
  frequency = pulseIn(sensorOut, LOW);
  // Printing the value on the serial monitor
  Serial.print("G= ");//printing name
  b= frequency;
  Serial.print("  ");
  delay(100);

  // Setting Blue filtered photodiodes to be read
  digitalWrite(S2,LOW);
  digitalWrite(S3,HIGH);
  // Reading the output frequency
  frequency = pulseIn(sensorOut, LOW);
```

```
Done compiling.

Sketch uses 3388 bytes (1%) of program storage space. Maximum is 253952 bytes.
Global variables use 204 bytes (2%) of dynamic memory, leaving 7988 bytes for local var
```

Fig 3.3

```
 // Setting Blue filtered photodiodes to be read
 digitalWrite(S2,LOW);
 digitalWrite(S3,HIGH);
 // Reading the output frequency
 frequency = pulseIn(sensorOut, LOW);
 // Printing the value on the serial monitor
 Serial.print("B= ");//printing name
 b = frequncy;
 Serial.println("  ");
 delay(100);

 if((b==76)||(b==77))
 {
   fastb();
 }
  if((b==79)||(b==80))
 {
   slow();
 }

}
```

```
Done compiling.

Sketch uses 3388 bytes (1%) of program storage space. Maximum is 253952 bytes.
Global variables use 204 bytes (2%) of dynamic memory, leaving 7988 bytes for local
```

Fig 3.4

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VIII. CODE DETAIL

The proposed code is formulated in Arduino platform and have been compiled. The particular code explains about the control of the de-acceleration procedure of the vehicle which is controlled by the constraints such as weight of the vehicle, light sensor input and its calibrated values which are taken as input for the particular calibration. The proximity sensor values are taken in consideration for the front and back obstacle detection and computing the brake force depending on the recorded parameters the controlling of the vehicle is initiated.

IX. ADVANTAGES

- The proposed model of the particular system helps to control the speed of the vehicle with the help of the traffic system.
- The braking would be accurate to avoid the accidents.
- It does not allows the people to rash drive braking the traffic rules.

X. CONCLUSION

The proposed design is made for avoiding the further unwanted accidents and proper systematic traffic management, this will result in lesser number of accidents, it will provide a controlled route for the hospitality and the ambulances, It will ensure the passengers safety and will reduce unwanted traffic jams. It will work as a future scope for the people smart-city development and with proper safety measures.

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