Smart Speed Breaker

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ABSTRACT

The purpose of this paper is to build a smart speed breaker which can adapt according to the environment. Which means if there is no requirement of a speed breaker on the road it automatically disappears, which in turns make the road flat again. Which will ensure road safety and will not cause any unnecessary harm to the vehicles. The speed breaker only comes over the road when it is absolutely necessary for the smart speed breaker. It does a great job when it comes to slowing down the vehicles without causing them any harm. This project is made keeping in mind the safety of the vehicle and the person sitting in the vehicle. For the purpose of making the smart speed breaker we are using a hemi-cylindrical speed breaker which is capable of going up and down according to the condition. Once initiated it will come on the road and stay there till the countdown becomes zero. In the embedded system, we can write code to analyze the speed of the coming vehicle if the vehicle's speed is above the threshold limit, the embedded system then sends a warning to slow down via displaying alert on the display board about 100-200 meters from the smart speed breaker. This project mainly focuses on safety on the highways.

Keywords: Speed Breaker, Raspberry Pi, IR Speed Sensor, Passive IR Sensor, IoT.

I. INTRODUCTION

In a rapidly changing world, speed has become a very important aspect of our lives, everyone wants to be fast and want to do thing faster than others.

The two major aspects of speed are, one to be in speed with control and other to be in speed with keeping in mind the safety of the itself.

For safety purpose, to keep the speed of the vehicles in control there is conventional method which is made of concrete and can also be called bumps on the road.

In the case of the conventional speed breaker, the speed of the vehicle is not taken into consideration the conventional speed breaker is the firm which can even damage a vehicle if the vehicle is at great speed.

We came up with this innovative idea to make a smart speed breaker to keep the safety of the people. This idea can be used in front of organizations, highways, etc. The conventional speed breaker is there hindering the traffic even when there is no need for them. This can be overcome by using the smart speed breaker which flattens when not required.

To develop a system for automatic identification of vehicle and moving objects on the roads and rises

the speed bumps above the road surface and giving the physical remainder to drivers to slow down the vehicle.

The system comprises of software module embedded in raspberry pie, which monitors and display the Alert Message on the display board ahead at a particular distance.

The message would be displayed on the alert board to the rider with the help of our sensors and programming in raspberry pi.

II. LITERATURE SURVEY

PAPER NO.	PAPER NAME	AUTHOR	METHOD PROPOSED	LIMITATIONS
1.	Automatic Speed Breaker on Time Demand Using Embedded Systems.	Sanchit Vashistha and Rekha Agarwal	It's a very crude model of speed breaker which is heavy on vehicles	Not smart enough
2	Eco Friendly Power Generation from Speed Breakers.	Amal Abaraham Cibin Geeevarghese Jacob, Glen martin Thomas, Jobby George, Jose Tom	Uses speed to create energy.	Can't handle traffic. Can't make decisions
3.	Road	Ch.Bha	Uses speed	Can't

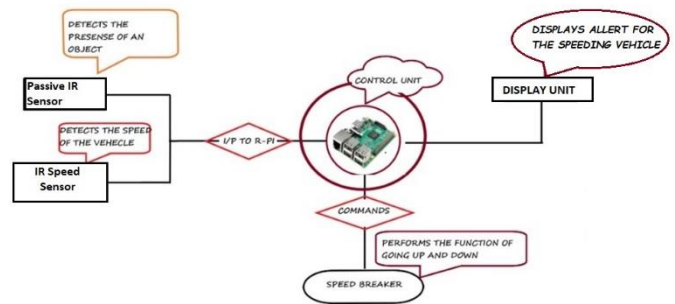| Power Generation by Speed Breaker .	nu A.V.Ramana Rao, P.Srinuvas	breaker to create energy	make smart decision

III. SYSTEM DESIGN

Fig-1:System architecture.

Module 1: Raspberry Pi

Raspberry Pi does all the computations. Takes inputs from the sensors, gives command as an output to the mechanical module.

It acts as the brain of the project.

Module 2: Sensors

Sensors contain all the data they gather from the Environment. The data gathered in sent to the Rasp Pi for computation. The sensors used are PIR and IR Speed Sensors.

PIR Sensor: A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications. PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an active IR sensor is required.

IR Speed Sensor: IR Speed Sensor be used to count

RPM or detect objects passing through. You can use it with a disc encoder to make an RPM counter. There is an on board LED that will show the trigger status of the sensor. When the sensor is blocked, digital output will become high and LED will turn ON, vice versa when the sensor is not blocked, digital output will be low and LED will turn OFF.

The Sensors are used to detect human presence and speed of the vehicle.

The Warning message is displayed on LED display board.

Module 3: Mechanical model

This model is the actuator that's work according to the commands from the Rasp Pi. It is a rack and pinon model which helps in moving the speed bump up or down.

IV. ALGORITHM

❖ IR SPEED SENSOR

```
import necessary files
import time
Set GPIO pins

while true:
        i1=time recorded at IR sensor 1
        i2=time recorded at IR sensor 2
        #distance is finite
        distance=15 #in centimetres
        speed=distance/(i2-i1)

        #set threshold as per required
        if speed > threshold:
                print "warning on display board"
        else:
                do nothing
```

❖ PIR SENSOR

```
import necessary files
import time
Set GPIO pins
while true:
        i=value from the pir sensor
        if i==0
                print "No Intruder"
        elif i==1
                print "Intruder detected"
                print "warning on display board"
```

❖ SERVO MOTOR

```
import RPi.GPIO as GPIO
import time

GPIO.setmode(GPIO.BOARD)

GPIO.setup(12, GPIO.OUT)

s= GPIO.PWM(12, 50) # pin 12 for s, pulse 50Hz

s.start(2.5)

try:
    while (speed > threshold) or (i==1):
        s.ChangeDutyCycle(12.5) # turn towards 180 degree
        time.sleep(3) # sleep 3 second
        s.ChangeDutyCycle(2.5)   # turn towards 0 degree
        time.sleep(1) # sleep 1 second
```

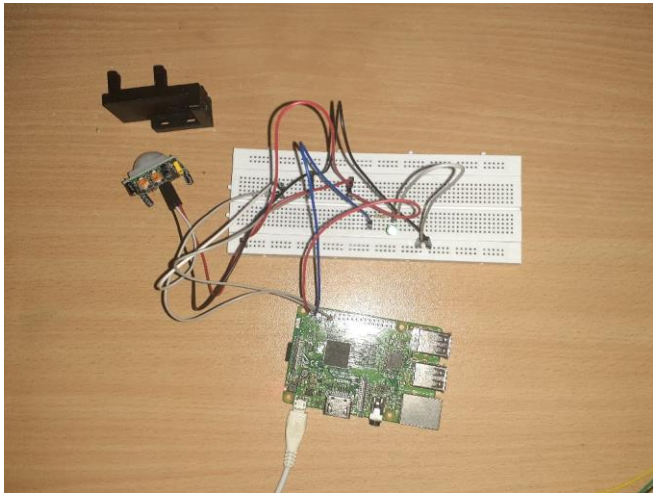finally:

   s.stop()

   GPIO.cleanup()

V. RESULTS

Fig-2:Raspberry Pi with PIR Sensor.

If the PIR Sensor detects the radiant object, the Rasp Pi gives the command to turn 'ON' the LED and display alert message on LED display board.
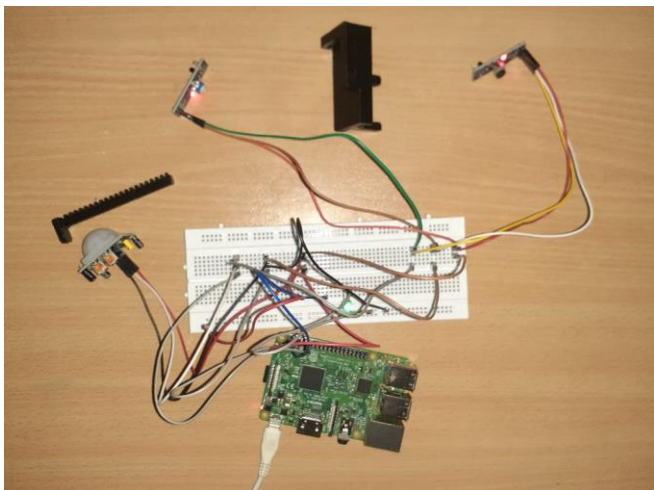

Fig-3:Raspberry Pi with PIR and IR Sensor.

If the Speedy vehicle passes by the road, the IR Sensor detects it and Rasp Pi gives command to display alert message on LED display board.
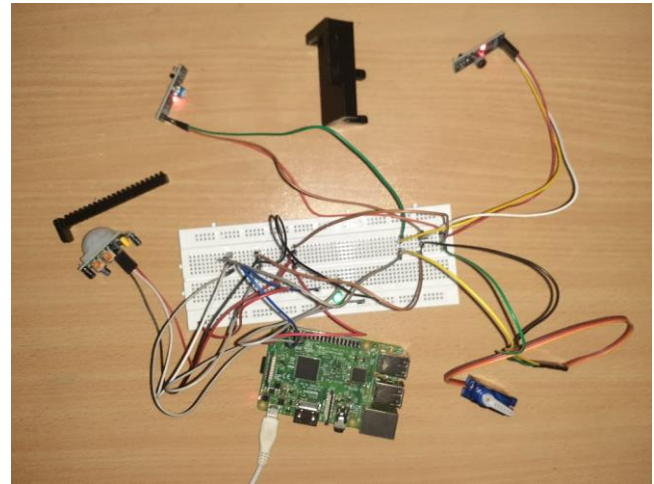

Fig-4:Raspberry Pi with PIR Sensor, IR Sensor and Servo motor.

If PIR and IR Sensor detects the object, the Rasp Pi gives command to the Servo Motor to move the Speed Bump up/down with the help of Rack and Pinon.
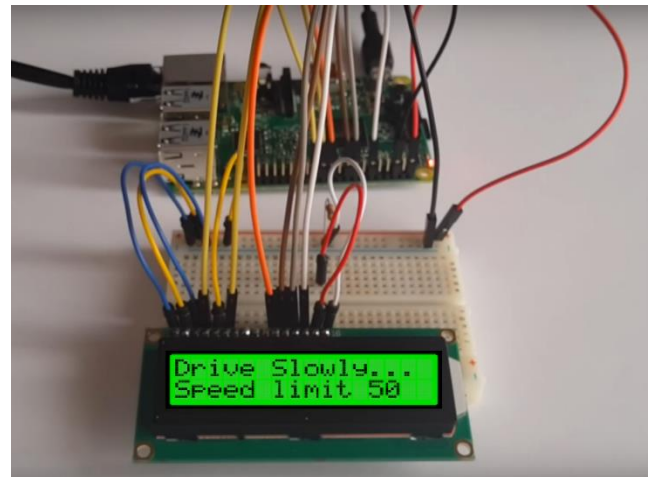

Fig-5:Raspberry Pi with LED Display board.

An Alert message will be displayed when the Sensors detect the object and the speed bump is up, with the help of Rasp Pi.

VI. ADVANTAGES

1) The smart speed breaker aims towards safe and easy accessibility of the on-going vehicle by only affecting the vehicles who's exceeding a speed limit.
2) It creates even traffic flow with less missions.
3) Easy Working.

4) Less Power Consumption.

5) Cost efficient.

VII. LIMITATION

1) Infrared frequencies are affected by hard objects like walls, smoke, dust, fog, sunlight etc.

2) PIR sensor can't detect low radiant object.

VIII. FUTURE WORK

In future modification can be also done to allows full access for emergency vehicles like police van, ambulance etc.

IX. CONCLUSION

On completion the concept of having a Smart Speed Breaker on using Embedded System tool be seen that can be seen that the idea is very innovative and useful for the requirements of today's fast life. The concept of the mentioned idea is to give the performance to vehicles as well as to make them slow.

This idea to have such a speed breaker in practical life, helps to reduce the speed of vehicles; maintaining the performance as far as possible. So, it becomes a very descriptive research work for the details of the practical one.

This project is made keeping in mind the safety of the people and the vehicle. The real working demo of the research work is very realistic and charming. This can be a very us.

X. REFERENCES

[1]. Automatic speed breaker on Time demand Using Embedded System Made by Sanchit Vashistha (M. Tech student) and Rekha Agarwal (Asst. Prf., Department of ECE School of Engineering and Technology).

[2]. Eco Friendly Power Generation from Speed Breaker This project was proposed and made by project, amal Abaraham Cibin Geeevarghese Jacob, Glen martin Thomas, Jobby George , Jose Tom.

[3]. Road power generation by Speed Generation Created by Ch.Bhanu A.V.Ramana Rao, P.Srinuvas.

[4]. Ioannou P.A., Chien C.C. Autonomous Intelligent Cruise Control. IEEE Trans. Veh. Technol. 1993;42:657–672.

[5]. Milanés V., Onieva E., Pérez J., de Pedro T., González C. Control de Velocidad Adaptativo para Entornos Urbanos Congestionados. Rev. Iberoam. Automát. Informát. Ind. 2009;6:66–73.

[6]. Lusetti B., Nouveliere L., Glaser S., Mammar S. Experimental Strategy for A System Based Curve Warning System for A Safe Governed Speed of A Vehicle. Proceedings of IEEE Intelligent Vehicles Symposium; Eindhoven, The Netherlands. June 2008; pp. 660–665.

[7]. Van Nes N., Houtenbos M., Van Schagen I. Improving Speed Behaviour: The Potential of In-Car Speed Assistance and Speed Limit Credibility. IET Intell. Transp. Syst. 2008;2:323–330.

[8]. Fan X.H., Zhang Y.L. A Design of bi-verification vehicle access intelligent control system based on RFID. Proceedings of the Ninth International Conference on Electronic Measurement & Instruments (ICEMI'2009); Beijing, China. August 16–19, 2009.

[9]. Hsieh W.H., Ho C.J., Jong G.J. Vehicle Information Communication Safety Combined with Mobile RFID. Proceedings of International Conference on Intelligent Information Hiding and Multimedia Signal Processing; Harbin, China. August 15–17, 2008.

[10]. Zhou Z.G., Li W.Y., Deng C.Y., Li T., Li Y.W. Secure Design of RFID Tags in the New Type License Plates Automatic Identification System. Proceedings of International Symposium on

Computer Sciences and Computational Technology; TBD, Shanghai, China. December 20–22, 2008; pp. 694–697.

[11]. Chon H.D., Jun S.B., Jung H.J., An S.W. Using RFID for Accurate Positioning. J. Global Positioning Syst. 2004;3:32–39 All Rights.

[12]. IJECCT Research Paper on Automatic Speed Breaker on Time Demand Using Embedded Systems ISSN:2249- 7838.

[13]. Design of Machine Element by V.B.Bhandari.