

A Smart Speed Governor Device For Vehicle Using Iot

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Abstract - Most of the road accidents occur due to over speeding Speed has been found to be major contributory factor in around 10% of all accidents and in around 30% of the deadly accidents. Increase in speed multiplies the risk of accident and severity of injury during accident. Faster vehicles are more prone to accident than slower one. Driving over a given speed limit not only, illegal, but also dangerous. In this project a solution to increase safety with a speed limit using Global Positioning System (GPS) was proposed. The GPS system provides the information about precise location to the driver, driving speed, road allowed speed. Initially the system calculates the vehicle speed. If a vehicle with over speed is detected, the smart speed governor device automatically reduces the speed of the vehicle by changing the angle of Speed Governor pedal which is mounted on accelerator. After changing the angle of the speed governor device the driver can't able to increase the vehicle speed. In this work the usability of the proposed system was evaluated using the System Usability Scale (SUS) through the contribution of (30) participants. Result of the SUS showed a relatively high rate of user satisfaction at around 85.5%.

keywords – GPS, Speed Governor, Internet of Things.

I. INTRODUCTION

The major concern of vehicle accident is the part of continual disaster lists, which might happen anywhere anytime. In accordance with Association for Safe International Road Travel Report, around 1.24 million people die and 50 million people are getting wounded on the roads each year in the World. Statistically, they are assumed as the second important reasons for death. In order to overcome these problems, many automobile device industries and vehicle manufacturers have tried to propose speed control techniques in order to keep up a vehicle safe distance. In this direction, the effort is going on devising a security driving application for vehicles by new rising IoT-oriented technology, which is employed for devising a more effective solution [1].

The IoT (Internet of Things) is the interrelation of distinctly identifiable embedded computing appliances inside the existing infrastructure. IoT provides sophisticated connectivity of systems, services and devices, which goes beyond M2M (Machine to Machine Interactions) and covers different domains and applications. This interrelation of embedded appliances like smart objects is implemented in all automation enabling modern applications such as Smart Grid [2].

The smart vehicle over speeding detector is very essential for the human life as there are so many accidents in road every day. This study gives a general idea about a smart vehicle over speeding detector and also concentrates on the functionality of the over speeding detector by use of IoT technologies [10]. The number of accidents is rising daily along with the expanding driver and passenger safety concerns. The countries that have successfully reduced road traffic risk have embraced a 'systems approach' to road safety. Speed is at the core of the road safety problem. There is a strong relationship between speed and both the number of crashes and the severity of the consequences of a crash [11].

In this proposed a solution to increase safety with a speed limit using Global Positioning System (GPS) was proposed. The GPS system provides the information about precise location to the driver, driving speed, road allowed speed. Initially the system calculates the vehicle speed. If a vehicle with over speed is detected, the smart speed governor device automatically reduces the speed of the vehicle by changing the angle of speed Governor pedal which is mounted on accelerator. After changing the angle of the speed governor device the driver can't able to increase the vehicle speed. The notification regarding over speed is also given to driver mobile. This proposed work achieved the accuracy of 85.5% that out performances the existing.

II. RELATED WORKS

The authors have presented EBM (Eye Blink Monitoring) technique, which alerts the focus during drowsiness state. An embedded system depends on the psychological state of focus through monitoring head movements and eye movements are helpful in alerting drivers at the sleep cycle stage of drowsiness. An ordinary eye blink movements no effect on the system results [1].

In [2], researchers have designed Automated Speed Detection System that may detect the vehicle's speed and if over speeding happens, then remove the particular vehicle's license number and send it through mail to Toll Plaza in order to indict fine. Here, Doppler Effect observable fact is employed for measuring the speed. If over speeding is identified, then a camera captures the image of a vehicle automatically; and DIP (Digital Image Processing) methods are used to remove the license number. The findings have revealed that the developed system detects over speeding vehicle successfully, mines the license number, has great performance and may be used on roads to test out for over speeding vehicles.

The researchers, in [3], have designed and developed a novel system, which may efficiently identify speed violations on roads and helps driver to respect traffic rules by maintaining speed along with the prescribed speed limit. The developed system contains RFID (Radio Frequency Identification), GSM (Global System for Mobile) and PIC (18F45K22). This system has provided reliable, low cost, effective results and real-time notification.

In [4], the authors have proposed a new Vibration Sensor Device that was set on the vehicle. If any accident happens, vibration is activated and then vehicle's location has been detected with the help of GPS locator. Immediately, the incident has been intimated to Patrol and Life support in order to recuperate the

accident as well as suspect is to be tracked by means of GPS locator. The researchers have estimated the speed of vehicles by incorporating the accelerometer readings throughout the time and determine the acceleration faults. Widespread experiments were carried out so that sensor speed is precise and strong on real driving atmospheres.

The authors [5] have presented a system to identify rash driving on the highways as well as to alert the traffic authorities if there is any violation. Many approaches need human focus and engage many attempts that is complex to execute. In this article, the researchers have aimed to propose a device for the early detection and provided alert of risky vehicle during patterns linked to rash driving. The whole implementation needs IR transmitter and receiver, a buzzer and a control circuit. If the vehicle exceeds the speed limits, then a buzzer signal sounds warning the police.

GLOBAL POSITIONING SYSTEM

“The GPS is a space based on satellite navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites” [11].



Fig. 1. Architecture of GPS System

GPS supplies the smart phone devices with longitude and latitude coordinate which are then plotted on the map as symbols. Fig. 1 shows the architecture of GPS.

III. ORGANIZATION OF THE PROPOSED SYSTEM

Now a days there are many number of accidents is rising daily along with the expanding driver and passenger safety concerns. The countries that have successfully reduced road traffic risk have embraced a 'systems approach' to road safety. Speed is at the core of the road safety problem. There is a strong relationship between speed and both the number of crashes and the severity of the consequences of a crash. The Proposed model is intended to work in automatic mode. The prototype model vehicle is made to overcome the disadvantages of the existing method. This system consists of Microcontroller based vehicle control system with enabled service and Android application to provide the assistance. The driver has to install the Android application in his mobile. Then the driver can use the application for navigation purpose and it will provide the road allowed speed on roads. Then the driver the vehicle manually. If the road allowed speed is 40 km and the driver drives the vehicle beyond the level then it automatically controls the speed by changing the angle of speed governor pedal which is mounted on accelerator. After changing the angle of the speed governor device the drive can't able to increase the vehicle speed. The notification regarding over speed is also given to driver mobile.

A. System Architecture

The system cloud architecture includes the multiple cloud components.

- GPS built in: android devices or iOS devices
- Cloud server: cloud server is a virtual it computer server accessed by an administrator over the internet.
- Speed limit database: It contain Street allowed speed (latitude and longitude).

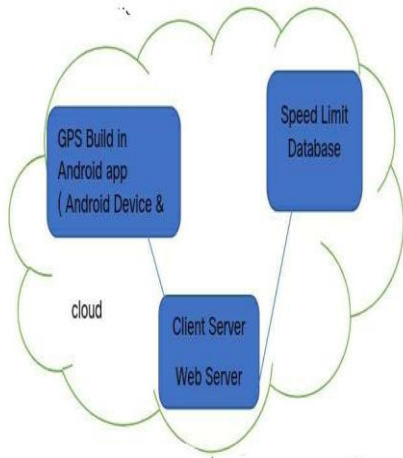


Fig.2. System Cloud Architecture

The general representation-Structure and its mechanism are shown in the flowchart shown in Fig. 3.

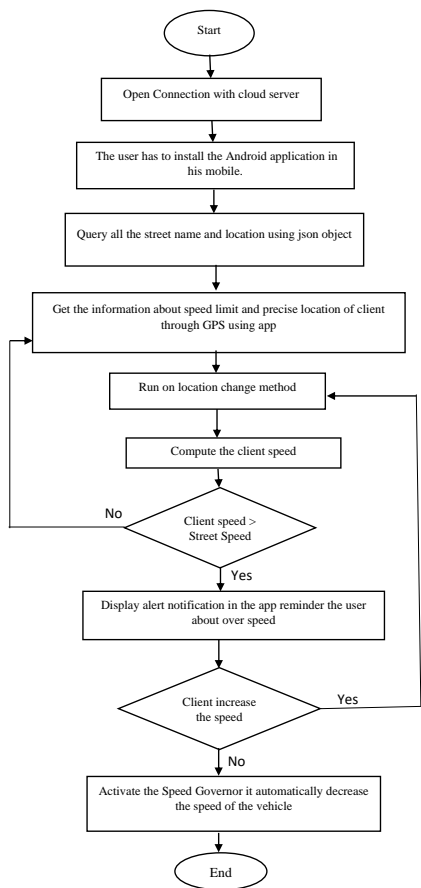


Fig. 3. Flowchart of the proposed System

User Application

After installation of SSG (smart speed governor) app in our mobile phone the source and destination address has to be given by the user to connect with the GPS. Android user Speed monitor System are shown in fig. 4



Fig. 4. Android user Speed Monitor System

B. Hardware Model

In this work we use 12V Lead Acid Battery because in our project microcontroller and GPS module require 5V and motor driver requires 12V battery. Initially the battery gives the 12V but the Esp8266 Nodemcu and GPS module requires only 5V so the regulator used to convert 12v to 5v and it maintains the constant voltage level. Microcontroller (Esp8266 Nodemcu) is used because this microcontroller only have a wi-fi inbuilt combo. Then GPS (Global Positioning System) [16] used to gather the information about road allowed speed and in user’s correct position. The Motor driver is used to control a set of two DC motors simultaneously in any directions. Then the DC motors used to both high and low power, fixed and variable speed electric drives. A Smart Speed Governor Device used to measure and regulate the speed of a machine[17]. If the road allowed speed is 40 km and the driver drives the vehicle beyond the level then it automatically controls the speed by changing the angle of speed governor pedal which is mounted on accelerator.

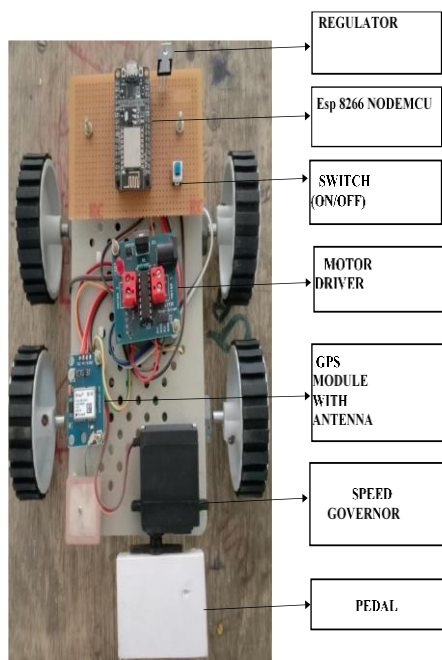


Fig.5. Prototype Model

IV. RESULT AND UNIQUENESS

In this work the usability of the proposed system was evaluated using the System Usability Scale (SUS) through the contribution of (30) participants. The questionnaires are given below:

#P	SUS SCORE	#P	SUS SCORE	#P	SUS SCORE
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P1	87.5	P11	80	P21	75.5
P2	80	P12	75.5	P22	65
P3	80	P13	69.5	P23	89.5
P4	75.5	P14	70	P24	80.5
P5	82.5	P15	97	P25	80
P6	90.5	P16	80.5	P26	83.5
P7	89.5	P17	75.5	P27	69
P8	78.5	P18	75	P28	80
P9	80.5	P19	80	P29	95.5
P10	70	P20	98	P30	74.5
AVERAGE SCORE			85.5		

The recorded analysis is given in table as follow.

TABLE 1

CASES	PROPOSED SYSTEM (PARTICIPATIONS RESULT)	EXISTING SYSTEM (PARTICIPATIONS RESULT)
CASE 1	7	2
CASE 2	18	26
CASE 3	5	2
CASE 4	0	0
AVERAGES	85.51	75.58

Chennai highway road produced a scale for an acceptable sus score. A sus score between 85 and 100 indicates that the system is highly usable [11]. The usability of the system is good when the sus score is between 70 to about 85. With a SUS score from 50 to about 70, the acceptability is good, however the system users experience usability issues. Finally, the usability of the system is not acceptable when the SUS score below 50.

The analysis for each case is given for testcases:

CASE 1: STRONGLY AGREE (85-100)

CASE 2: GOOD (70-85)

CASE 3: AVERAGE (50-70)

CASE 4: STRONGLY DISAGREE (0-50)

CASE 1: STRONGLY AGREE (85 - 100)

#P	SUS SCORE
P1	87.5
P6	90.5
P7	89.5
P15	97
P23	85.5
P29	95.5
P20	98

CASE 2: GOOD (70– 85)

#P	SUS SCORE	#P	SUS SCORE
P2	80	P17	75.5
P3	80	P18	75
P4	75.5	P19	80
P5	82.5	P21	76.5
P8	78.5	P24	80.5
P9	80.5	P25	80
P11	80	P26	83.5
P12	75.5	P28	80
P16	80.5	P30	74.5

CASE 3: AVERAGE (50-70)

#P	P10	P13	P14	P22	P27
SUS SCORE	70	69.5	70	65	69

CASE 4: STRONGLY DISAGREE (0-50)

No one gives the strongly disagree feedback.

Results show that the Average score of SUS is 85.5% indicating that the proposed system is generally acceptable under the rules of the SUS tool as a 75% acceptable ratio. The comparison result of proposed one with previous (Existing) [11] paper is as follows.

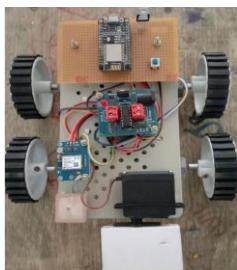
In our proposed system Average is higher than existing system the averages of proposed system is 85.5%.

UNIQUENESS

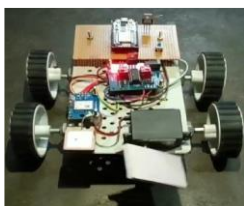
In this model is working to automatic speed governor device for vehicle and also sends the notification to the device about the over speed before activator of speed governor [18]. This automatic speed governor is helps to reduce the road accidents due to over speeding. And our device having automatically controls the speed by changing the angle of speed governor pedal which is mounted on accelerator. After changing the angle of the speed governor device the drive can't able to increase the vehicle speed this features are not available to the other project. We have also attached the screen short of our trials.

SCREEN SHOTS

NORMAL SPEED



OVER SPEED



Angle of pedal changed as it exceeds the speed limit of road

CONCLUSION

In this work, the problems of vehicle over speed in urban atmosphere are addressed by using IoT technologies to develop various vehicular applications. Smart Speed Governor for vehicle is used to sense the driving conditions to attain great detection accuracy. Especially, the proposed system is used to detect over speeding vehicles and reports to concerned authorities to avoid road accidents. This proposed work concerned authorities to avoid road accidents. This proposed work achieved the accuracy of 85.5% that out performances the existing. The following are the future enhancement that may be done into the proposed

system through developing hardware implantations, interfacing sensors and software algorithms solution for identifying accidents with the help of Impact Detector.

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