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Road Safety Using IoT

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ABSTRACT: Road accident these days has become a national catastrophe for over inhabited developing countries. The most reason for accident within the sensitive public zones like faculty, college, hospitals etc. and sharp turning points is that the over speed of vehicles. This paper paves a system to alert the motive force concerning the speed limits in specific areas and scale back the speed of the vehicles in sensitive public zones with none interference of the drivers wherever controls are taken mechanically by the employment of a wireless sensor network. Any vehicle coming into the network zone cannot overcome the regulation outlined by the system. The most objective of the projected system is to work the vehicles during a safe speed at essential zones minimizing the doable risk of unwitting accidents and casualties. Additionally the system is capable of detective work the accidents and provides notification to theroom. The system operates in such means that the accident data is passed to the vehicles coming into an equivalent zone to require diversion to avoid traffic jam.

KEYWORDS: Internet of Things (IoT), Node MCU, Wireless Sensor Network, Road Side Unit, Vehicle Side Unit, GPS Modem, APR Module, Bluetooth transmitter, Arduino Code, ArduinoDriod, Blynk App

I. INTRODUCTION

Technology has brought fine changes into every portion of our life by making it smart and reliable. There are many situations in which technologies can be used to avoid accidents in roads which open a wide window for the requirement of Smart Road System [1]. Road safety, traffic congestion and efficiency of the transport sector are major global concerns [2].

This paper paves a system to alert the motive force concerning the speed limits in specific areas and scale back the speed of the vehicles in sensitive public zones with none interference of the drivers wherever controls are taken mechanically by the employment of a wireless sensor network. Any vehicle coming into the network zone cannot overcome the regulation outlined by the system. The most objective of the projected system is to work the vehicles during a safe speed at essential zones minimizing the doable risk of unwitting accidents and casualties. Additionally the system is capable of detective work the accidents and provides notification to the room. The system operates in such means that the accident data is passed to the vehicles coming into an equivalent zone to require diversion to avoid traffic jam.

Paper is organized as follows. Section II describes a brief review of related works road safety aspect of IoT. The methodology is given in Section III. Section IV presents hardware implementation and its experimental results. Finally, Section V presents conclusion.

II. RELATEDWORK

Vehicular accidents are a major global phenomenon and cause human fatalities and damage to property. It was found that up to 60% of the collisions can be avoided if the motorist receives advanced warnings 1.5 s before the occurrence of the event [3]. The road safety mechanisms currently implemented in the transport industry include sensors mounted on the body of vehicles for lane keeping, maintaining safe driving distance and blind spot assistance [4].

Traffic management and location based alerts are used to minimize congestion and are currently reliant on cellular networks, web based platforms and mobile applications such as Waze and mapping services [5, 6]. Threshold based classification and neural network based algorithms use sensor values to determine sudden braking, lane change events and presence of speed humps and potholes [7]. The use of connected vehicle based traffic management is more effective in estimating traffic condition than traditional methods due to reliability of the data. In simulations it was found with even low penetration of the connected vehicle based data collection technology of as low as 20%, the minimum traffic density estimation has accuracy of 85% and traditional methods have an estimation capability of 80%.[8].

III. METHODOLOGY

IoT is used in our system with Arduino Code and Node MCU controller with Blynk app. ArduinoDroid is an open source platform as a combination of software and hardware and Blynk server is used to control the communications between smart phone and hardware.

Road side unit transmit the speed limit in the area using bluetooth transmitter. Speed limit information from road side unit is received by Vehicle unit using bluetooth receiver and produce a voice announcement for alerting the driver using APR module. According to the zonal details the vehicle speed will be reduced automatically controlling the motors for navigation. Once accident occurs, piezoelectric sensors in vehicle unit get activated and send the information along with GPS location (When any accident occur, the system takes the location data using GPS Modem) to control room through IoT communication. Control room send the alert to the road side unit using IoT communication. Road side transmit the accident information through bluetooth to the vehicles entering the accident zone to take diversion to avoid traffic congestion. Alert message will be displayed in the LCD unit at the vehicle.

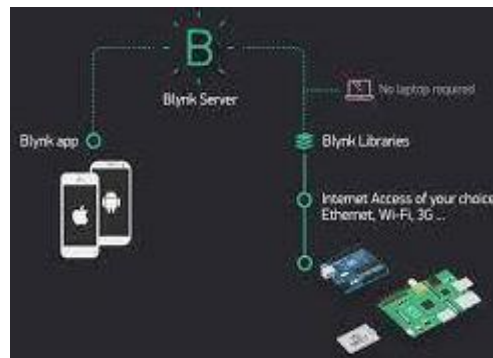
IV. EXPERIMENTAL RESULTS

Figures show the set up of system and its experimental results. Hardware components and software is mentioned.

Fig1 (a) Experimental set up of hardware components-control unit, road side unit and vehicle side unit (b) Blynk App

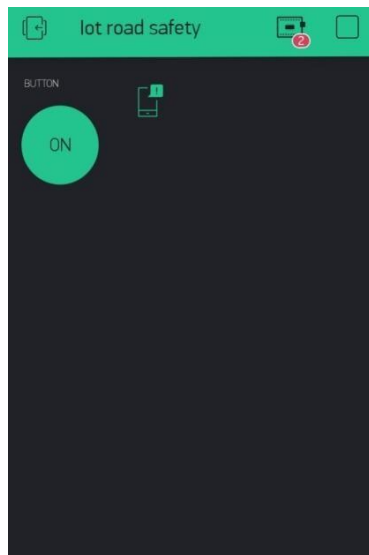


(a)

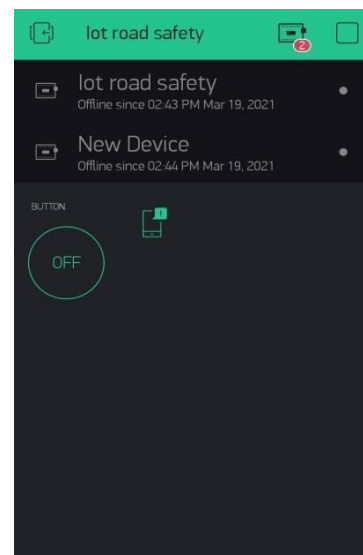


(b)

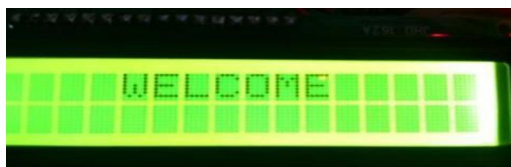
Fig 2. (a) Activation of Blynk app (b) Connection of devices with Blynk Server (c) Vehicle starts moving (d) Displaying the location of the accident occurred on the LCD screen of vehicle



(a)



(b)



(c)



(d)

V. CONCLUSION

According to the WHO, more than a million people in the world die each year because of vehicle accidents [9]. We have presented a system, to alert the driver about the speed limits in specific areas and reduce the speed of the vehicles in sensitive public zones without any interference of the drivers where controls are taken automatically by the use of a wireless local area network. In the initial phase, we designed the basic block and circuit diagram for the system. In the implementation phase, we executed the hardware with the help of IoT connecting technologies such as Blynk app. Extensive experiments conducted on IoT and other connecting technologies.

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