Smart Helmet using IoT to Avoid Accidents

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Abstract- *In this paper, the aimof the smart helmet is to provide safety and to avoid accidents. Accidents are increasing rapidly day to day, most of the accidents are due to human faults. Over speeding not only leads to accidents but also increase the amount of poisonous Nitrogen Oxide emission polluting the air. Over 50% of these accidents are caused by alcohol related. Drinking heavily also increases ones blood pressure and can also lead to heart attack and damage. This smart helmet contains Hall-effect sensor is used detect the speed and alcohol sensor is used detect the consumption of alcohol in this project. Thus using this emerging technology (IOT), sensors, GSM Module and Google Map, this smart helmet targets to detect speeding vehicles over a specific speed limit and also detects the alcohol consumption victim, which immediately reports to driver and concerned authorities if there is a violation.*

Keywords- Over speeding detection, Alcohol detection, Google Map, GSM Module.

I. INTRODUCTION

Road accidents have been a major cause for fatal across the world. In India alone reported 151 thousand deaths due to accidents. Every year about 3-5% of the country's GDP was invested in road accidents. Around 1.24 million people die due to road accident each year in the world. Two-wheelers account for 25% of total road deaths. According to the studies have shown that wearing a helmet can reduce the risk of a serious brain injury and deaths. The smart helmet with an over speeding sensor has the capacity for detection, storing and information sharing about the vehicle's speed. IOT devices are becoming a part of human life, a study says by 2020 it is estimated there will be up to 21 billion connected devices to the internet. Google Maps has integrated with IOT devices. With one line of code, an IOT device can access to Google's geographical database. Google Maps will now display speed limits of the roads in android, applications. The alcohol sensor detects the concentration on breath just like common Breathalyzer and detects it fast. In this project the user is made to wear the helmet, the hall effect sensor used to detect the speed of the bike, and which checks the with the road speed limit if it is high-speed then it informs to the concerned authorities.The severity of accidents is more in case of over speeding. Higher the speed, greater the risk. With the help of the alcohol detecting sensor which is basically a gas sensor used to detect the alcohol consumption by the driver and immediately reports if the consumption is too high. Faster speeds increase the amount of poisonous nitrogen oxide emissions polluting the air, according to the Federal High Administration. In this analysis, highway that saw their speed limits raised to 65 mph (ca. 105 km/h) saw 14%more fatal accidents, with an average speed increase of just three to four mph. There was also a substantial increase in pollutants such as carbon monoxide, ozone, and nitrogen oxides which may have caused an increase in fatal death rates, though that result is less certain. More than 80% nitrogen oxide emission is caused by Diesel vehicle. In this paper GSM stands for Global System for mobile communication modem, this is widely used to send text message to the clients. A smart device is an electronic device, this smart devices have made human life easier nowadays. This devices are generally connected via Bluetooth, Internet. This devices can connect from small to larger area. They even helps in saving electricity, in this paper it is saving lives by protecting from accidents and even it helps concerned authorities to catch the victim easily. It offers unpredictable security to the users. Nowadays young adults account a 69 percent in road accidents. Even though government has made a rule that riders have to wear a helmet according to section 129 it is crime and that who is not wearing helmet can be arrested.

Fig. 1. Road accident

Smart devices are typically composed of a hardware layer, a network layer and an application layer. In 2012, the National Highway Traffic Safety Administration estimated 1,699 lives were saved by individual wearing helmets so wearing a helmet is must. By wearing helmet about 37% effective in avoiding road accident. The fact is that all can easily get a helmet, people are just not wearing them it may seems to be uncomfortable but in case there is an accident occurred it may cost heavily. There are rules and regulation fine is termed against one who will not wear them.

II. RELATED WORK

There are a lot of smart helmet with different techniques and approaches. Divyasudha N had proposed a smart helmet using thesupport vector, piezoelectric sensor and alcohol sensor which is designed to check two conditions before rider starts of the bike. The first condition is that whether the rider is wearing a helmet or not. Second condition is a detection of alcohol content in rider's breath [1]. Edna Elizabeth had proposed a smart helmet for detecting and reporting bike accidents. If any variation is occurs Pager Duty will receive a trigger from the microcontroller. Page Duty triggers a call to number registered. If the driver does not pick the call will be informed through text message and email [2]. Jesudoss A had proposed a Design of Smart Helmet for Accident Avoidance in this paper gas sensor is used to detect the alcohol consumption, load sensor will detect and give the value of the load limit, vibration sensor sense the bike condition and send message through GPS if accident occurs and the mems sensor detects in case of rash driving and charge the amount of the person from his bank account [3]. Manish Uniyal proposed an IOT based Smart Helmet with Data System to detect the speed and the tilt angle of the vehicle is also detected using accelerometer module. The system is also provided with a GPS module to detect the location of the vehicle. The recorded parameters are sent to the server in the text format only. As a result, people would be able to access the speed of the vehicle at any instant [4]. Shoeb Ahmed Shabbeer proposed Smart Helmet for Accident Detection and Notification with Microcontroller interfaced with accelerometer and GSM module and cloud service infrastructures are utilized to achieve the final objective of notifying and reporting. There are bump signals installed in the helmet so that it can give signal to microcontroller whether the rider has worn his helmet or not [5]. Mohammad Ahmar Khan proposed an IOT based framework for vehicle over-speed detection this system detects the speed tracking accuracy with Speed App using Radar, this data is collected and after that IoT technology wirelessly to the concerned authorities are informed. The GPS sensing module with Transmitter and Receiver and inserted in google to detect the

speed limit. The Speed App using Radar shows between 40% to 80% accuracy based factor of the factor of internet speed as well as connectivity [6]. Nimisha chaturvedi and Pallika Srivastava proposed an Automatic Vehicle Accident Detection and Messaging System Using GSM and GPS Modem. A sensor is to detect the accident occurred and gives the output to the microcontroller, The GPS locates the position of the vehicle then the microcontroller sends message to the pre-defined using GSM module here LCD screen displays the output[7].

III. TECHNOLOGIES USED

A. Alcohol Sensor

This is basically a Gas Sensor which is called as breath analyser. This device is composed of a photocell indicator and a series of chemicals that work together to detect alcohol concentration.

Fig. 2.Gas Sensor

B. Hall-effect Sensor

A Hall-effect sensors are used for speed detection using the measure of magnitude of a magnetic field.

Fig. 3. Hall-effect Sensor

C. GSM

The GSM is a digital cellular technology used for transmitting data services. It is used to transformer load from anywhere by sending a message.

Fig. 4.GSM Module

D. Google Map

The road recognition accuracy based on the road names inserted in google maps gives that respective speed limit of the roads.

Fig. 5. Google Map

E. Micro controller

The microcontroller are abled take inputs from the device attached to it and is enabled with internal Wi-Fi connectivity, Ports registered and the program to control the pins.
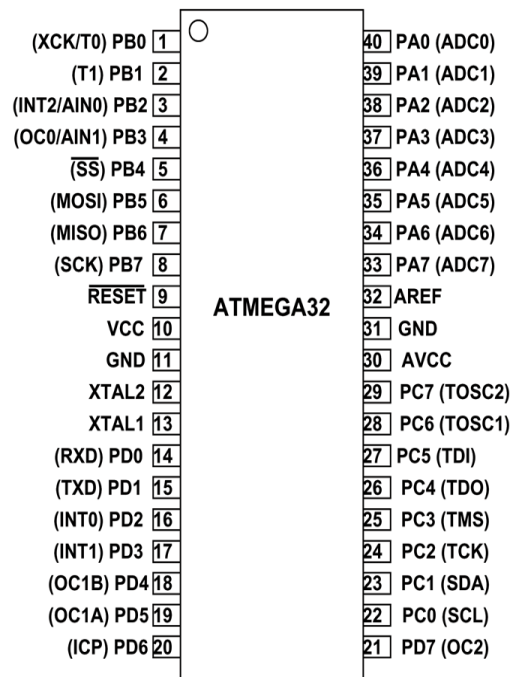

Fig 6. Micro controller pin diagram

F. Unit Of Smart Helmet

The below figure shows the photo copy of the helmet. The Microcontroller unit is been placed on the helmet and rest sensor including speed detector are connected to the MCU board. The helmet will be light weighted.

Fig. 7. Smart Helmet

IV. PROPOSED SYSTEM

A. Proposed scheme

In this IOT based proposed smart helmet detects the over speeding and alcohol consumption, sends an alert message immediately to register numbers. The system consists

of Micro controller, Alcohol sensor, hall-effect sensor, GSM module and associated with Google Map.

Hall-effect sensor is placed on the wheel of the vehicle. The sensor detects the speed of the vehicle and sends it to the micro controller, the coded micro controller compares sensed speed with the specific speed limit of the particular road which is received from the Google map. If sensed speed exceed the speed limit then an alert message is send to the pre-defined numbers by using GSM module only if it exceeds. Alcohol sensor basically a gas sensor detects the alcohol content in the breath of a person wearing helmet. If a person has consumed alcohol then it immediately sends message to the pre-defined numbers using GSM module
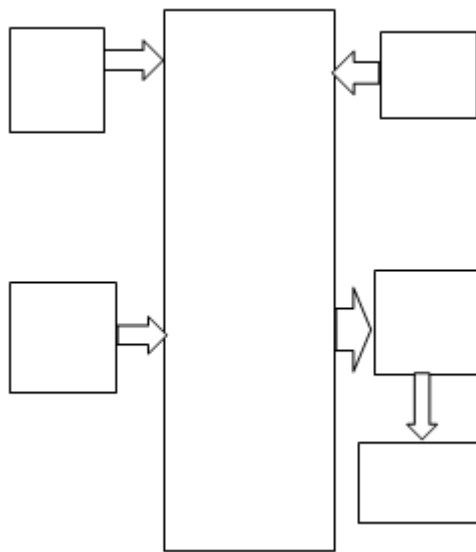

Fig. 1.Block Diagram

B. Challenges

1) The Model of the helmet to be fit for the design.
2) There is no device to check if the rider is wearing the helmet or not.

V. FURTURE SCOPE

It can further be designed in such a way that it informs which road istraffic free to the victim and also detect the nearby police station and hospital.

VI. CONCLUSION

The smart helmet developed in this project is reliable piece of technology. It adds with over speeding and alcohol detection and notifying it to respective authorities. In this project, the exactness and accuracy are high. So everyone should wear a helmet be safe, because safety comes first.

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