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Modern Helmet with Smart Utility Features

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Abstract: This paper proposes architecture for a Smart helmet using the IOT technology. Regular bike riding requires various parameters to be handled by human beings. These parameters change in real time while driving. Even slightly neglecting these parameters can cause accidents. The Proposed system collects the data sensed from various sensors in real time, processes that data and helps the rider to be alert about the surrounding and inform him in advance through actuators. It will reduce the manual effort required to find the routes by automating the process. This System can largely reduce the number of accidents by alerting the rider in advance.

Keywords *-Actuators, internet of things, IoT, sensors, Smart Helmet*

I. INTRODUCTION

In today's world internet of things has been implemented in various real-world devices like smart phones, smart TV, smart aquariums, smart vehicles, smart watches etc. IoT has sensors which senses different kinds of data from the environment and can transfer the sensed data using some protocol like Bluetooth, WIFI etc. to a receiving system or a device. The receiving device then processes data and gets the important information from it for analysis and to carry out necessary actions by using actuator.

Traditionally, bike riding has to face many difficulties. Main problem arises when we are traveling to a place and its route is not clear in our mind. Many a times we take a wrong turn and then we are lost totally. Again, we have to ask the local people available over there for a correct route to reach our destination. But what if no local person is available at that location or if the person, we are asking misguides us and tells us to take wrong route. This becomes a major difficulty during long drives. Another problem is that we are not aware of what weather we are going to pass by in our way. We have no idea whether the road will be foggy rainy or sunny. If we know that in advance we can be prepared for the ride. According to law wearing helmet is compulsory while riding bike. In spite of that many accidents do take place due to the bad road conditions. sometimes while riding due to the unpredicted pothole or the uneven road surface give a jerk to the rider causing a sudden unbalance which can lead to a major accident. Also, sometimes there are speed breakers / bumps on the road which are not given a zebra strip due to which they are not visible well before in advance. And when these speed breakers are visible then the rider suddenly breaks to slow down which causes the bike to skid and hence cause an accident. All the above circumstances motivated us to create a model which can make our riding comfortable and minimize all the above problems. Our Objective behind writing this paper is to build a smart helmet which will be containing various sensors and modules that sense the parameters from the surrounding environment and inform user to be prepared in advance and to perform action comfortably and enjoy the bike ride.

Section I contains the introduction of the paper. Section II contain the related work of using technology for implementing safe driving, Section III contains the system architecture of Smart Helmet and the various components used, Section IV concludes the research work and section V contains the references for the research work.

II. RELATED WORK

In this era, where the technology is continuously changing and the main reason behind it is the rapid development of a variety of sensors and actuators. Internet Of Things i.e. the IOT in our view can be thought of as thing-oriented because we have utilized sensors actuators and various other devices. IOT maintains the feature of heterogeneity between different devices and makes them work together. Like sensors sensing the environment and actuators actually performing a task. Efficiency of any model based on IOT will be directly depended on the accuracy of the data collected by the sensor and analysed by the controller. The Threshold Values must be properly defined because depending on the given threshold, the collected value will be compared and an intelligently modelled system will take the decisions appropriately.

One of the systems that is proposed by Matthew Edel, is to improve the performance, safety and comfort of automobile vehicles like cars. Their system uses Dynamic Automatic Adjusting Sensors, lasers, FPGA chips etc. which monitors various road parameters and depending on the changes in values of parameters the suspensions are adjusted in advance so that there is no sudden jerk and the driver drives comfortably improving the vehicles handling.

The road safety manual, shows various categories of drivers and their characteristics. The manual mainly states how the amount of alcohol consumed can be measured by using drivers' blood, urine and most importantly and helpful for is through analysis of exhaled breath. the unit for measuring alcohol content in blood streams is grams of alcohol per 100 millilitres of blood. There are also other appropriate measures but this is most commonly used. This amount of alcohol measurement through analysis of exhaled breath is termed as BAC i.e. Breath Alcohol concentration. Different Countries have different BAC limits for drivers. these are listed in table.

Table 1: Country Wise BAC Limits

Country	BAC limits (in %)	Country	BAC limits (in %)
Australia	0.05	Denmark	0.05
Brazil	0.08	France	0.05
Canada	0.08	India	0.03

This BAC should be used as a parameter in our smart helmet to analyse whether the alcohol levels in the driver's breath are under the limits. The controller should strictly monitor this parameter specified in condition. If the threshold value is crossed necessary actions must be taken immediately.

The author has described that due to the placement of mirrors in particular angle, it creates some areas which the rider is not able to see. these areas are called blind spots. These spots are the cause of so many accidents during lane crossing and has caused fatal accidents. So, if a rider gets a clear and all-around view during his ride then the chances of accidents are greatly reduced.

III. SYSTEM ARCHITECTURE

The architecture of Modern Helmet with smart utility is explained in detail in this following section with Fig. 1. There are different modules and sensors used on the helmet to perceive various parameters values from the environment. The logic is stored in the controller which is used to process and perform various tasks and notify the rider depending on the processed information.

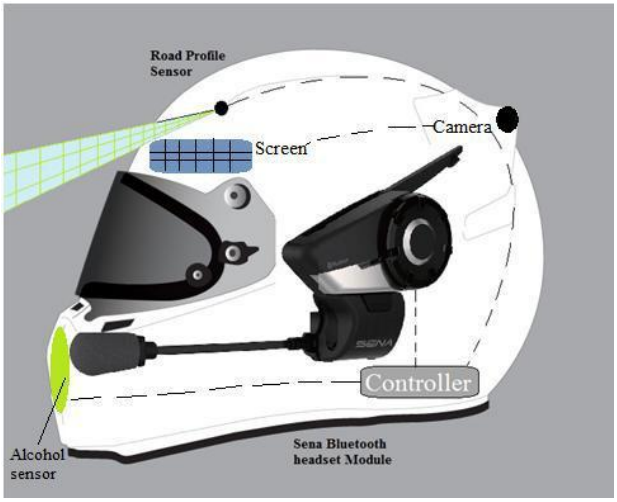

Fig. 1 System Architecture

The proposed system captures the video from the rear point of the helmet at real-time and also covers an entire view without leaving the blind spots using the rear camera and displays the video continuously on the screen. so instead of looking at the mirrors the user can just turn his eyes upwards look at the screen and then choose to change the lane or not. this screen will ease the view and help the rider to a very great extent.

The alcohol sensor will constantly monitor the rider's breath and view BAC and compare this against BAC limits. If the limit exceeds the threshold then the Helmet will constantly notify the user with the speakers so that the user does not drive anymore. This can be very helpful for the rider to recognize and prevent the further damage.

The road profile sensor will continuously scan the road and if there are pot holes and bumpers in the road ahead about 10meters of distance and if there are changes in the parameters which exceeds the threshold level it indicates the user to slow down. if the threshold shows a increase in value then the sensor notifies the rider about the bumpers otherwise alerts him for a pit hole. this will help the user to get an advance notification and even if the user is not able to see the obstacles the sensor will help him to get ready for the sudden change in the roads profile. This will be very useful in night rides or an unclear weather because the road profile sensor will use the laser technology to ensure that there is a change in the road profiles input readings.

The sena Bluetooth headset module helps the user in many ways. this is a smart module which helps user to get connected to his smart phone. The user can attend calls using this module only when the bike is stationary. The user will be able to use this module to help him in navigating the entire route. it can be used by groups for group communication and share the route details to the group in

real time. This can help a group member to come back to the right route, if he/she has taken a wrong route. this can help user to assist him with the smart phones feature by commanding the mobile phone using the microphone attached to this module, the user can use the Google assistant and locate for the nearest hotel in their route. Similarly, it can use all the other features provided by the Google Assistant. not only Google assistant but it can command any application which uses sound received from the connected microphone. It can also be used to play music or FM using the Bluetooth speaker (only when the bike is stationary).

The components used the in the system are given in detail:

- The First component is the Road Profile Sensor (RPS) which uses optical and laser sensor that is used practically by car companies with supplementary feature of activation of suspensions system that help the vehicles to gear up for uneven and uncertain road profile also to adjust its suspensions dynamically during the runtime so that the driver and other also don't feel the unevenness.
- The Second component is the Sena's 20s Bluetooth Headsets which are latest in market, they are the devices used for a range of 1.5 miles for communication. It is built in with 4.1 version of Bluetooth. It also has a built in FM and a radio tuner. Call anyone hands-free and stay in contact using a Bluetooth enabled phone, listen to your favourite rocking music (only when the bike is stationary), you can also listen to voice instructions given by GPS navigator wirelessly using Bluetooth. This device can be used to carry out a conversation in full duplex mode with passengers.
- The third component is MQ3 highly sensitive Alcohol Detector Sensor Module. It has the four pins and it is extremely easy to use. This device has an additional unique output pin which performs an analog to digital conversion. The output is generally high.
- The last component is Cerevellums rear view video camera which has all the base features in-built such as speed monitor, max or average speed recorder, non-stop ride time, odometer, time, and distance covered meter.

IV. CONCLUSION

The main goal for this paper is to ease the riding process of the riders and to reduce all the major causes of accidents causing fatal injuries or deaths by providing solutions over the problems with the normal helmet. The concept of wireless was kept in vision and also the best efficient combination from the existing world technologies where brought together to make the best out of it. Also, with the help of these features, the emergencies can be handled very effectively and in a efficient way.

Future enhancement of proposed model can be architecture and to connect it with the working of the motorbikes so that the bike won't start if the BAC level crosses the limit. or the steering will be stabilized and the speed will be controlled in occurrence of an uneven road profile.

REFERENCES

[1]. Mohammad Abdur Razzaque, Marija Milojevic-Jevric, Andrei Palade, and Siobhán Clarke, Middleware for Internet of Things: A Survey,*IEEE INTERNET OF THINGS JOURNAL, VOL. 3, NO. 1*, FEBRUARY 2016,70-95.

[2]. Jianli Pan, Raj Jain, Subharthi Paul, TamVu, Abusayeed Saifullah, andMo Sha, An Internet of Things Framework for Smart Energy in Buildings: Designs, Prototype and Experiments, *IEEE INTERNET OF THINGS JOURNAL, VOL. 2, NO. 6*, DECEMBER 2015,527-537.

[3]. Matthew Edel, Road Profile Sensor: A Detection Method for Active Suspension Systems, SEATTLE PACIFIC UNIVERISTY HONORS PROJECT, MAY 2014,1-17.

[4]. Drinking and Driving: a road safety manual for decision-makers and practitioners. Geneva, Global Road Safety Partnership, 2007,22-23.

[5]. Gamini Bulumulle and Ladislau Boloni, Reducing Side-Sweep Accidents with Vehicle-to-Vehicle Communication,Journal of Sensor and Actuator Networks,NOVEMBER 20,6.

[6]. Edel, Matthew, "Road Profile Sensor: A Detection Method for Active Suspension Systems" (2014). *Honors Projects* OCTOBER 2017, 1-18.

[7]. P. Manickam, V. Muthu Ganeshan , M. Girija "Comprehensive Approach in Studying the Behaviour of Contiki RPL Protocol in Diverse Data Transmission Ranges" ,International Journal of Scientific Research in Network ,Volume-6, Issue-3, June 2018

[8]. Mantripatjit Kaur , Anjum Mohd Aslam "Big Data Analytics on IOT: Challenges, Open Research Issues and Tools" International Journal of Scientific Research in Computer Science and Engineering Vol.6, Issue.3, pp.81-85 , June (2018)

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