SMART SAFETY HELMET
INTELLIGENT WAY TO DRIVE!

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Abstract

This Paper Presents a helmet with different Smart and
Safety features all working together in order to save ones life
from any accident or mishappening. Helmet is an important
aspect in field of safety gear for two wheelers. Still due to
giving less importance towards safety and their carelessness,
a lot of accidents are occurring every year. More in countries
with high population like India these accidents have become
very common in past few years due to this ignorance. So in
order to overcome with this problem we came up with an
idea of smart intelligent helmet which is having proximity
sensor at all of its sides and back to detect any other vehicle
if the distance is reduced between them. It also consists
of alcohol sensor to cut of ignition when detected. Other
Safety features like calling after accident to nearest hospital
and police station using GPS location and many more.

Key Words: GPS; GPS; Alcohol; MQ6; accelerometer;
proximity; buzzer; Fog light; Servo motor.
1 INTRODUCTION

In this current scenario, more in the youngsters, this craze of driving two wheelers is really very high. Mostly in middle class families first preference is of buying 2-wheelers than a 4-wheelers, because of their low cost and various options available in the market, due to this high competition between 2-wheeler companies the prices are very affordable as a result bikers in our country are increasing, and similarly the road accidents, because of which many injuries, accidents deaths occurs, out of which maximum are due to the negligence of not wearing the helmets while driving sometimes in many cases it also leads to the death of the person and someone has to loose his/her near ones all due to lack of prompt medical attention required by the patient on time. This motivates us more towards innovating a system which ensures the safety of bikers, at both point of time i.e. before accident and aftermath help. Our work aims at the security and safety of the 2-wheelers against road accidents. The helmet which we have created is the only one of its kind. Here our main focus is on designing a system for the people which could assist person while driving, if accident occurs then also provide him/her with an aftermath help. Few figures by a small survey have been shown of law breaker in the table 1.

<table>
<thead>
<tr>
<th>Law Breakers</th>
<th>2-Wheelers</th>
<th>4-Wheelers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signal Jumping</td>
<td>2.36.839</td>
<td>1.45.812</td>
</tr>
<tr>
<td>Drink &amp; Driving</td>
<td>35.737</td>
<td>18.126</td>
</tr>
</tbody>
</table>

2 MODELLING OF SYSTEM

A. Microcontroller Atmel ATmega328 : -

This requires very low power, provides high performance with a cmos8 bit controlling and 7.82K bytes of Re- Programmable Read Only Memory (ROM). The chip is made by Atmel Company with a high density nonvolatile storage technology and is also compatible with the MCS51. All the algorithms and codes are written in embedded C and uploaded in the microcontroller. It controls the other components such as accelerometer, GSM-GPS, LDR, fog
light, servo motor, ultrasonic buzzers etc using its pins connected respectively.

B. **GSM-GPS Accelerometer : -**

This is one of the most efficient element present in our helmet which provides the driver in getting the aftermath help. Its working is simple, accelerometer is device which tells about the axis of the plane and gyro meter tells about the gravitational force value in our system it is calibrated in such a way that whenever the axis and gyro value changes in accelerometer at the same time it starts acting like a switch and turns on the GSM-GPS system, now this is programmed in a way that GPS scans the location in coordinates and calls the nearest hospital and the police station also an emergency no. can be saved in it on which at the time of accident call and message could be send for alert.

C. **Alcohol Sensor(MQ6), Relay RF modules : -**

All these sensors and modules are combined together to form a system such that whenever, the driver is drunk his/her vehicle wont start. Its working is very simple all these components are assembled on the microcontroller and then used. We have two sides in this first is helmet side consisting of the alcohol sensor(MQ6) and RF transmitter with a Encoder which on detection of the alcohol gas encodes a signal and sends it using RF to the receiver end. Second side is the receiver side which is there in the vehicle consisting of RF receiver, Decoder and a Relay. When receiver gets an input signal it decodes it using the IC and sends the binary signal to the Relay, Relay is connected to ignition switch of the vehicle which only works when the relay is on cuts off when alcohol is detected.

D. **LDR detector Servo motor : -**

Most of the accidents happens in India are due to the high beam lights on city roads or the highway or at high cliffs at turns to avoid this we have come up with a revolutionary simple solution implemented in our helmet. Light Dependent Resistor (LDR) is a device or a transducer which modifies its value with respect to the inten-
sity of the light with a direct relation and small servo motor is a kind of motor which can be rotated at any specific angle. By combining both of this we have made an smart anti glare system i.e. servo is connected to the glass pulling it down when intensity of light gets high and saves drivers precious life.

**E. Ultrasonic Sensors with buzzer LED :**

In our helmet we are using around three ultrasonic sensors placed on both the sides and at the back along with a small buzzer and side LEDs. Ultrasonic is a device which have two round openings one chirps the high frequency signal out and the other echo back the signal hence can be used as a scale to measure distance. In our algorithm we have hard coded in such a way that all three sensors are measuring the distances and whenever the space between the driver and other person gets reduce it starts indicating. Suppose if from back the distance is reduced the buzzer will beep and if from any side it is reduced then the respective side LED will start blinking in order to indicate driver.

**F. GSM-GPS Accelerometer :**

In this smart helmet one more crucial feature is of its Night light or indicator or dipper which is of very high range, white light controlled using an LDR, as we know the working of an LDR at night when the intensity of light gets low the indicator automatically gets on which means the person need not to manually switch it on. It is required for like if the driver forgets to switch on the headlight still there is no problem as his helmet lamp is already on so that any accident or mishap could be avoided.

**3 WORKING PRINCIPLE & PROTOTYPE**

The working of this complete system defined above at the end gets very complex and hence we have use more than one microcontroller (in this case we are using 2) each of them connected to different
components and enabling different features. First of all, a hard code program is made with custom algorithms for every sensors and actuators, then the uploading part is done after this is completed. Next comes the connection part which means integration of everything over the controller. Microcontroller consists of different analog and digital pins respectively sensor and other components are connected. Microcontroller receives an input signal from the sensor which converted into the voltage, substituted in the algorithm and final value is received. Now if that final value is equal to the stated threshold value or the stated value, respectively, the on-off functions work for anything connected. It is a pulse input-output kind of function consisting of elements like ADC conversion etc.

Figure 1 Working Prototype of the Helmet

4 SOCIAL CAUSE BENEFITS

In making of this Smart intelligent system for helmets our main aim is to reduce the increasing number of vehicle accidents mostly caused by not wearing helmets. We aim at drivers to be safe and follow the laws. And toward society, we wish to increase discipline and sense of responsibility with respect to commuting. The feature of GSM-GPS could be a revolutionary one as it provides with the aftermath help to the driver and also informs to their near and dear
5 CONCLUSION

The Complete working model of a Smart Intelligent Safety Helmet was built which only allows the rider to run power up the vehicle when he is wearing the helmet and not drunk. The system also ensures the proper aftermath help when the person has met with an accident by calling and sending a SMS to nearest police station and family members. This helmet also helps the driver while driving by indicating the distance between him and other drivers also by automatically switching on the night indicator. The was completely made and tested on the roads of Chennai. Our future Scope is to make circuit more simple, small and efficient. We are currently working on the flexible PCB so as to perfectly adjust the circuit inside the helmet and ultimately get a fully furnished complete market ready product.

6 ACKNOWLEDGEMENT

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References


