Intelligent Helmet

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Abstract**—** *Nowadays almost all countries are making the use of helmets mandatory and cracking down strictly on drunken driving. But still in many places, the rules are being violated. In order to overcome this problem, a system named "Intelligent Helmet" is proposed in this paper. A smart helmet is a special idea which makes motorcycle driving safer. The proposed system describes the interaction between modules mounted on the vehicle and helmet to ensure the vehicle can be started only when the user is wearing a helmet and is not under the influence of alcohol. Another feature of the proposed system is the ability to detect an accident and send the corresponding geographical coordinates of the accident spot to predefined numbers using a GPS and GSM system respectively. After giving an overview of the system, the paper describes the system architecture, specific components used, logic flow employed and benefits of the system. This proposed system aims at making safety the norm and not a choice.*

Keywords**—** *Intelligent helmet, alcohol sensor, safety.*

I. Introduction

Nowadays road accident is a major problem all over the world. A recent report says that in an annual average of 700,000 road accidents, 10 percentage occurs in India, which has overtaken China. The latest annual statistics revealed by the World Health organization (WHO) in its first Global status report on road safety, 80,000 people are killed on Indian roads due to speeding, drunken driving, less usage of helmets, seat belts and child restraints in vehicles. Another latest report of National Crime Records Bureau or NCRB says that 40 people under the age of 25 die in road accidents all around the world. It states that the drunken driving is a major factor for the rising of death on roads. The drunk driving fatalities in the year 2009, till the 27th November were 11,769. The numbers for 2007 and 2008 were 12,998 and 11,773 respectively. It shows that the problem of drunk driving is far from over. In the 2009 DUI national statistics released by the NHTSA (National Highway Traffic Safety Administration) 11,773 people died in alcohol-related crashes. Most of the accidents occur outside the cities are due to drunken driving and no testing methodology is adopted to avoid these fatalities in highways. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities. The Statistics of law breakers is depicted below in Table1.

TABLE I
STATISTICS OF LAW BREAKERS

Law breakers	Two Wheelers	Four wheelers
Signal jumping	220859	146945
Drunken driving	36727	17237

II. System Description

A. Block Diagram

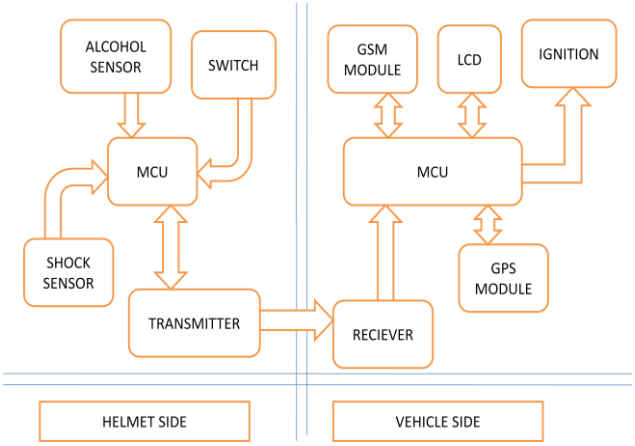

Fig.1 Block diagram of the system

1. Helmet side:

This module consists of various sensors and a transmitter circuitry. Two sensors have been used, namely alcohol sensor and shock sensor. Alcohol sensor has been used to detect the alcohol concentration. The alcohol sensor will be placed near the mouth of the rider, inside the helmet.

The shock sensor will be used for collision detection. The shock sensor will sense the change in X and Y co-ordinates and accordingly determine the impact of the accident.

A toggle switch is used to check whether the helmet is worn or not. An RF transmitter which can transmit data up to 3 KHz from any microprocessor/controller or standard Encode IC has been used. The RF transmitter transmits the data from the microcontroller on the helmet side to the receiver on the vehicle side.

2. Vehicle side:

This module consists of a LCD, GSM module, RF receiver, MCU, ignition switch and GPS module. The RF receiver receives the data and sends it to the microcontroller for further processing.

In the advent of an accident, the GPS module will acquire the co-ordinates of the accident site. These co-ordinates are sent via the GSM module to a pre saved number. The ignition status is controlled by the microcontroller depending on various conditions such as wearing of helmet, alcohol concentration level.

B. Logic Flow of the System

When a user approaches a vehicle with the proposed system installed and tries to turn on the vehicle ignition, the vehicle module communicates with the helmet module to check if the helmet has been worn by the user. The helmet module checks if the sensing switch has been activated. If activated, it means the helmet has been worn and hence sends a corresponding signal to the vehicle module. Along with the activation of the switch, the helmet module also checks if the user has consumed alcohol and sends a corresponding signal to the vehicle module.

The vehicle module, on receiving a correct combination of signals from the helmet module, proceeds to activating the electrical system of the vehicle accordingly. The combination of signals received from the helmet module and resultant action of the vehicle module are tabulated below.

TABLE 2
IGNITION STATUS BASED ON HELMET MODULE INPUTS

Helmet Switch status	Alcohol status	Ignition status
Off	NA	Off
Activated	Present	Off
Activated	Absent	On

When the vehicle is running, on the advent of an accident, the accelerometer mounted on the helmet module, checks for a change in the x and y coordinates and thus determines the impact in terms of 'g' and displays it on an LCD mounted on the vehicle module. Simultaneously, the GPS module, that is a part of the vehicle module, acquires the geographical coordinates of the site of accident and sends these coordinates to predefined phone numbers via the GSM module, which is also a part of the vehicle module.

C. System Implementation

Figure 2, 3 and 4 shown below are pictures of the actual system implemented.

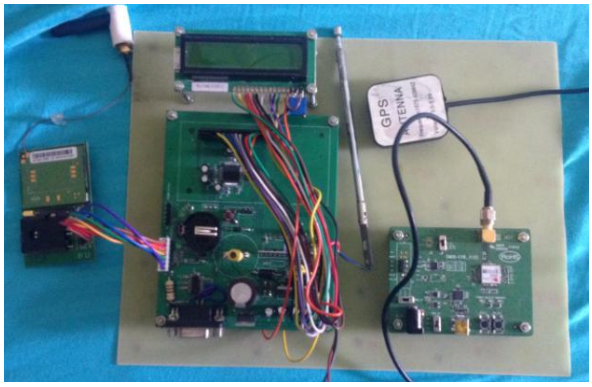

Fig. 1 Vehicle module

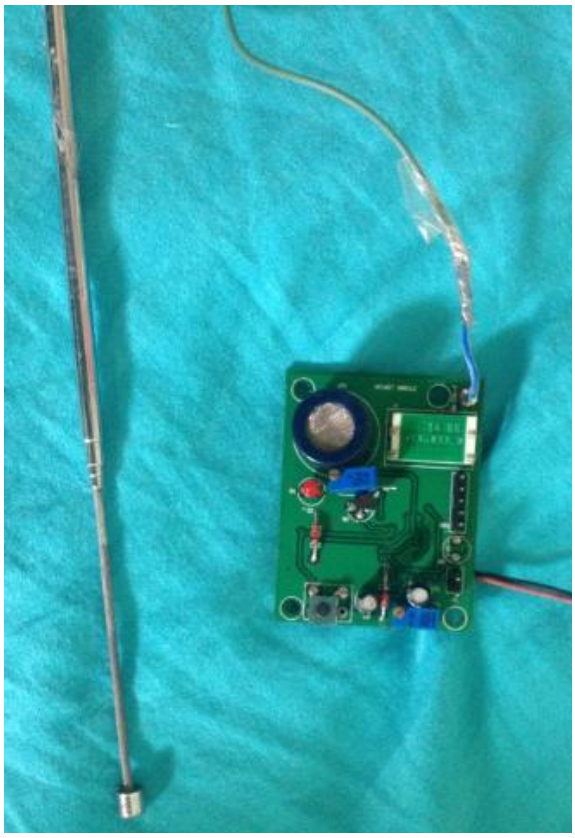

Fig.3 Top view of helmet module

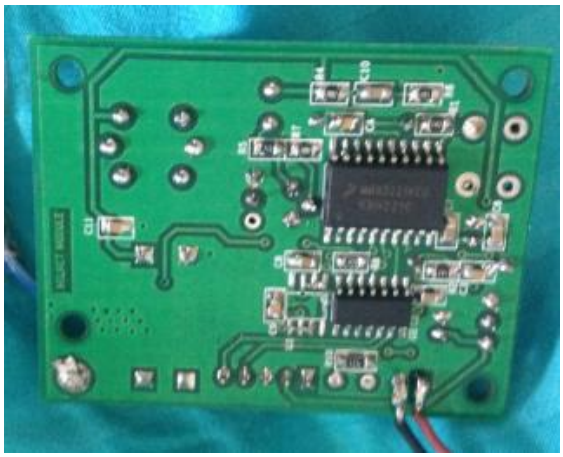

Fig.4 Bottom view of helmet module

III. Benefits of the Proposed System

- Prevents driving under the influence of alcohol and hence, accidents due to drunken driving.
- Ensures the rider always wears a helmet which provides safety.
- Makes arrangements to deploy quick emergency services.

IV. Conclusions

A system for intelligent helmet has thus been developed which, through communication between a module in the helmet and one on the vehicle ensures various safety aspects. This system also detects the occurrence of an accident and makes provisions to sound an alert through the use of a GPS and GSM system. This system ensures the pre-requisite conditions to ride safely, namely, wearing a helmet and not riding under the influence of alcohol, are fulfilled. The accident alert feature also arranges for timely help to be provided. The use of GPS system specifically benefits if an accident occurs in a secluded area or at an odd hour. The features of the proposed system can be further extended to place a call to an ambulance when an accident occurs and play a voice message indicating the location. This can reduce the time required for emergency help.

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