

Embedded Based Real Time Smart Helmet System

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Abstract- As the bikers in our country are increasing, the road mishaps are also increasing day by day. Most of them are caused due to violation of basic traffic rules laid for two-wheelers (i.e. because of not wearing the helmet and drink and drive cases). Also many deaths occur due to lack of prompt medical attention needed by the injured person met with an accident. This motivates us to think about making a system which ensures the safety of biker, by making it necessary to wear helmet (as per government guidelines) and by providing prompt medical attention after meeting with an accident. The invention is an intelligent bike comprising of a smart helmet having a module affixed in-between the outer and inner shell of the helmet. The module will sync with engine of the bike and will ensure that biker has worn the helmet and has not consumed alcohol. Additional feature of accident(using mems sensor) detection is also installed on the bike, which will be able to detect an accident and will be able to notify quickly the accident to police control room and in case if the accident is minor, rider can abort message sending by pressing the abort switch.

Keywords- Embedded. Smart Helmet, Mplab, Gsm, Ignition

I. INTRODUCTION

The thought of developing this project comes to do some good things towards the society. Day by day the two wheeler accidents are increasing and leads to loss of many lives. Accord to a survey of India there are around 698 accidents occurring due to bike crashes per year. The reasons may be many such as no proper driving knowledge, no fitness of the bike, fast riding of bike, drunken and drive etc. Some time the person injured, the accident may not be directly responsible for the accident, it may be fault of rider, but end of the day it's both the drivers involved in the accidents who is going to suffer. If accidents are one issue, lack of treatment in proper time is another reason for deaths. According to the survey India 698 accidents occur per year, nearly half the injured people die due to lack of treatment in proper time.



Figure 1 prototype smart helmet

Many reasons for this are: late arrival of ambulance, absences of pupil at the accident site to inform the family or to provide the victim with first aid. This is a situation we observe our day to day life, a thought of finding some solution to resolve this problem come up with this idea of giving the information about accident as soon as possible and in TIME....!!!!Because after all time matters a lot, if everything is done in time, at least we can save half the lives that are lost due to bike accidents. figure 1 describe the prototype modal for embedded based smart helmet system.

Considering three major factors for avoiding the accident causes such as

- Make wearing the helmet compulsory.
- Avoid drunk and drive.
- If person met with an accident, no one is there to help him. Simply leaving or ignoring the person he may die. In such situation, informing to ambulance or family members through mobile to rescue him for an extent.

The idea of this work is to give information about the rider wearing the helmet or not, whether the rider drunken or not and also, he met with an accident it gives an information about location where he is met with an accident through GSM module to mobile numbers family members, so I have chosen

GSM technology to give the information by sending SMS, using GSM module which has SIM card slot to place the SIM and send SMS. The method used to carry out this project is the principle of serial communication in collaboration with embedded systems. This is a very good project for Industries. This project has a locator, which will be used as the electronic device, and also a GSM modem, which is the latest technology used for communication between the mobile and the embedded devices. System will work like when the user wants to receive a sms at the time of accidents on the roads and the helmet sent a message through the subscriber identity module (SIM) which is inserted in the display system MODEM. In this paper we describe the system. Its general workflow of automatic system for skin lesions section 1. In Section II, we describe the image existing papers and techniques describe and using in this system flow. In Section III, we describe the embedded system design process and later used to separate between healthy and lesion areas, we explain how to describe the features according to the skin lesions criteria, where computable illustration for the lesion areas gets created. The finally explaining about the Experimental results and conclusion explained in Section IV.

II. LITERATURE REVIEW

SMART HELMET is a system which aims to make all motorcyclists in Malaysia aware and compulsory to wear helmet whether the travel distance is in 100 meter radius or long distance. The system will use *RF* technology which will connect from the transmitter at helmet to the receiver at motorcycle. Many type of switches being used such as temperature heat switch, clipped switch, and signal as a switch to make sure the motorcyclist not cheating to their self. If the system identified that the riders or user not wearing their helmet properly (clipped), the signal won't be send to the receiver at motorcycle which will cause the motorcycle cannot start and being ride by motorcyclist. There has been a sharp rise in the total number of deaths that occur due to road accidents in the past few years. Reckless driving, ignorance of traffic rules and absence of a protective shield have been some of the most important reasons for these deaths. The driver must have a line of defense in case an accident occurs. A survey performed in India concerned that there were a total of 1,34,513 deaths due to road accidents in India in the year 2011. The number increased to 1, 42,485 in the year 2014. Figure 2.1 gives a graphical analyses of the road accidents, injuries and deaths in India from 2002- 2011 [1].

The scope of the study will be using others studies and statistics from Malaysia government agencies in term of Road Safety; fatal motorcyclist accident causes and focus on the helmet wearing attitude and behavior. The scope also will

cover on research of overview applications, behavior, characteristics as well as advantages and disadvantages of *RF* Technology. Then will cover on implementation of the system in real daily life. [1]

Intelligent Safety Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. Through the study identified, it is caused the helmets used is not in safety features such as not wearing a helmet string and not use the appropriate size. Therefore, this project is designed to introduce security systems for the motorcyclist to wear the helmet properly. With the use of *RF* transmitter and *RF* receiver circuit, the motorcycle can move if there is emission signal from the helmet, in accordance with the project title Intelligent Safety Helmet for Motorcyclist. Security system applied in this project meet the characteristics of a perfect rider and the application should be highlighted. The project is expected to improve safety and reduce accidents, especially fatal to the motorcyclist. [2]

Traffic accidents in Malaysia have increased year by year. Muhamad Nizam Mustafa who works in planning highway unit in Ministry of Works stated that, the increase of road accidents is in link with the rapid growth in population, economic development, industrialization and motorization encountered by the country [4]. In 2010, motorcyclists made up more than half the road fatalities in Malaysia. Statistics provided by the Malaysian Institute of Road Safety Research (MIROS) showed that 4,067 motorcyclists died in 2010[1]. A motorcycle's helmet is a type of protective headgear used by the motorcyclist. The main purpose is for safety, which is to protect the rider's head from the impact during an accident. It protects the rider's head as the helmet provides ventilation system. Speeding and not wearing a helmet are the main reasons of fatalities and injuries. It is proven that, as the speed of motorcycles increased, so did the number of accident and fatalities [5].

This is again due to the shock of an impact during the accident. The objective of this project is to build a safety system in a helmet and speed alert for a better safety of motorcyclists. The safety helmet that we created is embedded with sensors which act as detectors for rider's head and the safety belt itself. The engine of the motorcycle can start only if the rider has buckle up its' helmet safety belt. The second safety method that we introduced is another sensor which acts as an alarm to the rider when the motorcycle speed exceeds 100km/h. Indicator is placed and will flash to alert the rider about the speed limit. A microcontroller is used in this

project to control the system. The microcontroller used to operate the project is Peripheral Interface Controller (PIC) 16F84a.

The PIC is an 8-bit controller. Since it has a small number of inputs and output, PIC kit software is needed to write the program in basic compiler language. Other than that, Force Sensing Resistance (FSR) and the speed sensor (BLDC Fan) are used as sensors to operate this project. Therefore, the scopes of the project will be using two sensors which are Force Sensing Resistance (FSR) and a BLDC Fan. The main purpose is actually to make some research correlation on a Force Sensing Resistance (FSR) with resistance and a BLDC Fan with voltage. Signal transmission between the two circuits is using a radio frequency concept. 315 MHz Radio Frequency Module is used since the range between the circuits is short. While the microcontroller Peripheral Interface Controller (PIC) 16F84A is used to control the system.

III. SYSTEM DESIGN

This project is developed to reduce the save the humans from accidents and to send the information about the person who is wearing the helmet to the caretaker using XBee. This project contains three sensors for Helmet detector, alcohol sensor and Mems sensor to detect accident. After sensing those parameter depending on the scenario the PIC controller will take appropriate action. Proposed system consist of two parts1. Transmitter section and 2. Receiver section

Transmitter section

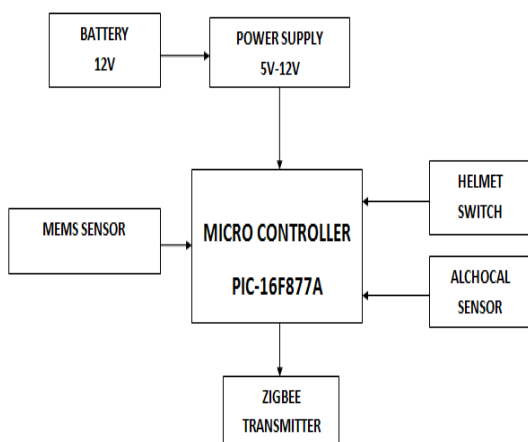


Figure 2 smart helmet transmitter section

We have designed a system which takes into account the above stated problems and provide a solution to it. It will consist of two parts:- 1st will be fit in the helmet. 2nd will be on the bike Data from the helmet will be transmitted wirelessly to the bike. According to the various sensor input the microcontroller will decide whether bike will start or not. Figure 2 and figure 3 describe the receiver and transmitter section for proposed system.

Receiver section:

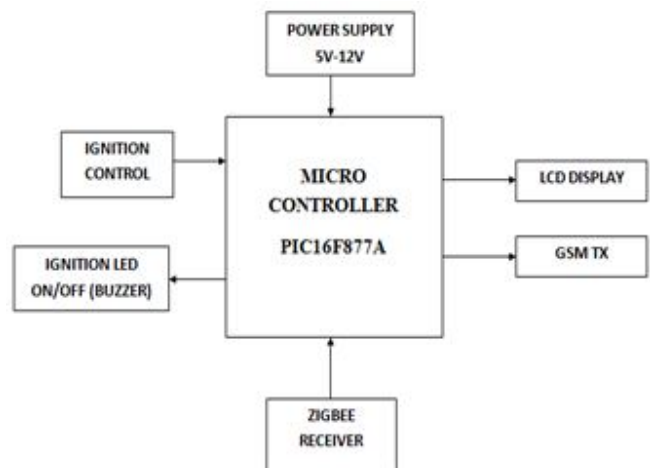


Figure 3 smart helmet receiver sections

IV. RESULT AND DISCUSSION

This helmet works only when we switch on the DPDT switch in the transmitter. The DPDT switch is connected to the LCD display of the receiver. The LCD display shows the helmet is wearied or not by the person, the alcohol is consumed by the person or not, and the other display is of the accident sensor it shows whether the accident had occurred or not. When the DPDT switch is turned on then the LCD automatically turned on. When the person will wear

the Helmet the helmet the DPDT switch inside the Helmet will get pressed which ensured on the LCD that the person had wear the helmet and the LCD display will show Helmet "yes". The other sensor named as alcohol sensor is connected in front side of the Helmet so that if the person has consumed an alcohol it will show on the LCD that Alcohol "yes" if no then it will display alcohol "NO". The Molex is fitted in the receiver circuit which is connected to the spark plug of the bike so when the bike will start then by passing through the relay it will pass the signals

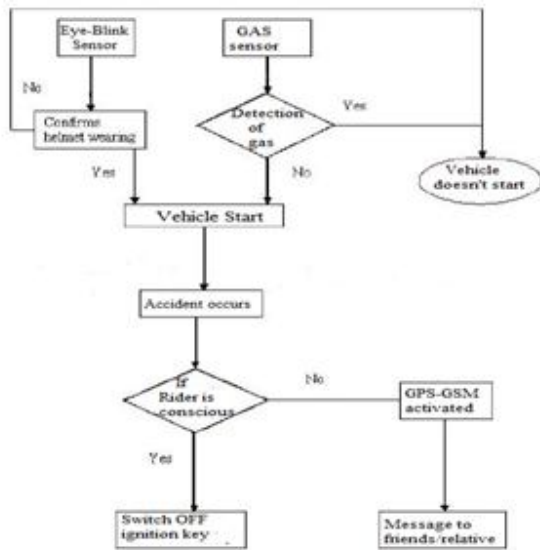


Figure 4 flow chart designs

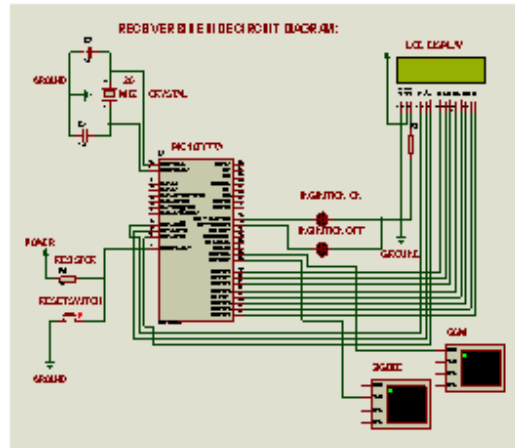
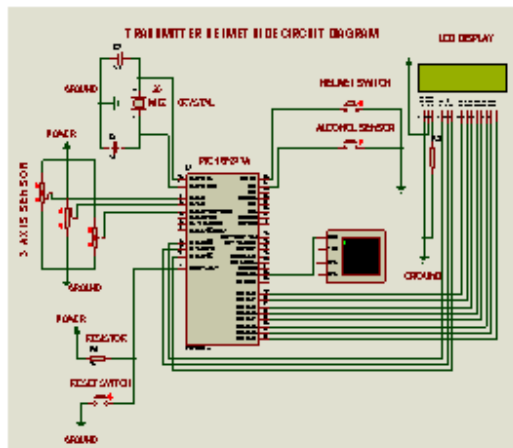


Figure 5 Proteus simulation diagram for transmitter and receiver section

The other circuit named GSM module is connected along with the receiver circuit it is accompanied with the SIM slot along with the network which helps in sending message to the five feeded contact numbers. When the accident occurs then with the help of bump sensor the switch will get pressed and automatically with the help of GSM module and coding the message will be send to the five feeded contact number. figure 4 and figure 5 describe the flow chart and simulation results real time embedded smart helmet system.

V. CONCLUSION

This project has a good real life scope, if it is implemented by the government. It can help to reduce lot of road accidents of two wheelers as it is the major cause of deaths in the whole world. It can also help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory Helmet protection and detection of alcohol content during the starting on of the bike. This project here is undertaken keeping in view of traffic ,the traffic rules and also the safety of people. Implementation of this type of project by the government saves a lot of time for the traffic police and most importantly saves the precious life of a person as one cannot run a motor vehicle once he is drunk and if the helmet is not present. Family members will be informed as well.

- This system is very effective for the safety purpose of the user.
- User has to wear helmet to ride two wheeler vehicle and hence traffic rules will follow with this.
- This system is under pocket control that is Ride two wheeler vehicle having safety in hand and in budget also.

- Easy functioning to operate this system. It provides a better security to the biker.

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