

Smart Helmet and Bike System

K. Vidhya, M. Kasiselvanathan

Abstract: Nowadays most of the countries are enforcing their citizen to wear helmet while riding bike and not to ride bike when the person is under the influence of alcohol, but still rules are being violated. In order to overcome this problem, "Accident Detection, Theft and Drive protection using Intelligent Wireless Safety Helmet" is developed. It consists of an intelligent system embedded into the helmet and the vehicle. Helmet unit ensures that the rider is wearing helmet and not under the influence of alcohol throughout the ride. It communicates with vehicle unit to switch off ignition system of bike if above condition is not met. Vehicle unit checks and intimates accident through geometric coordinates via Short Message Service. By using geometric coordinates, location of the injured rider can be traced using simple Global Positioning System tracking application. Also, this system provides theft protection as helmet is also essential along with key to start bike.

Keywords: ATMEL Microcontroller, Arduino, GSM, GPS.

I. INTRODUCTION

Nowadays there are many accidents occurred in our daily life. This system is mainly for the security purpose and safety for the bike riders against the accidents. The first step in this system is to check whether the helmet has been wear or not, the bike will not start unless the rider wears the helmet for this we go for FSR sensor which will sense the pressure and force. The camera in the bike will check whether the rider had wear the helmet or not. The second step is to identify whether the rider has consumed the alcohol or not. An alcohol sensor will check the alcohol in rider's breath, in order to prevent the accidents due to drunken and driving which cause a lot of accidents[1]. Alcohol sensor is use as breath analyzer which detect the presence of alcohol in rider breathe if it is exceeds permissible range ignition cannot start. It will send the message to register number. For this only go for MQ3 alcoholic sensor. These two steps are used in helmet unit. Third step is, in case of any accidents GPS system in the bike unit will globally locate the rider and immediate message will be sent to the family members or local authorities about the location of the accident. For this go for vibration sensor which will sense the pressure of the bike.

The aim of this paper is to make a protection system in a helmet for a good safety of bike rider. The smart helmet that is fixed with sensors which act as to detect wear helmet or not. There are two different microcontroller is used in this project[4]. Each unit has used a separate microcontroller, for bike unit ATMEL microcontroller is used. Signal transmission between the helmet unit and bike unit is using a RF concept.

II. RELATED WORKS

In India still most of the people prefer two wheelers compared to other form of vehicle due to simplicity and its low cost. One important problem is bike riders suffer from inadequate roads and bad driving conditions. Other important problem with bikers is that most of the time they don't like to wear helmet which could be fatal when accidents happen. Two wheelers in everyone's life play vital role, moreover the safety is considered to be primary of all. According to some statistics 50% of accident occurs due to bad conditions of road and not wearing helmet[2]. To avoid accidents and to encourage people to wear helmet is to be introduced that includes smart interactive robotic helmet with features like road hazard warning, wireless bike authentication and traffic adaptive mp3 playback. This helmet will warn the rider when road hazard is ahead, helmet will also communicate with rider if he is not wearing it and will perform wireless bike authentication that act as prevention from theft. It will also adjust the volume of the speakers automatically while rider is listening to music as a safety precaution. Since in India the usage of two wheelers is more compared to four wheelers, it requires more attention as far as safety is concerned.

Safety-along with security plays a vital role in today's society. The goal of this Anti-theft mechanism system is to design embedded safety and security system for vehicle by integrating and modifying existing modules. This system endures mainly with three modules namely Gas sensing module, Obstacle detection module and Anti-Theft alert system; these are interfaced with ATmega16 microcontroller. IR sensors transmit signal from its sensor head and again receive the signal reflected from an obstacle and instruct the microcontroller which alerts the driver with an alarm and controls the vehicle by stopping it. The gas sensor here is mounted inside the vehicle such that it senses the presence of the gases inside the vehicle cabin if there is any increase in the level of the toxic gases it informs to the microcontroller which alerts the persons inside the vehicle with an alarm and also sends a SMS to the authorized user through GSM[3] At the same time automatic ventilation will be provided to the vehicle. When an unauthorized person opens the car door, the car anti-theft system becomes active and gives indication by raising an alarm that the car is being under theft.

This design and implementation of intelligent bike system is aimed at making vehicle driving safer than before. This is implemented using Arduino. The driver's condition is derived in real time environment and the detection of alcohol is proposed using alcohol detector connected to Arduino such that when the level of alcohol crosses a permissible limit,

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the vehicle ignition system will turn off and the GPS module will capture the present location of the vehicle[5]. Also the GSM module will automatically send distress message to police or family members. Disadvantage of current technology is due to negligence of rider and difficulty of implementation of traffic rules by traffic police. Following are the main drawback of existing technology

- Rider do not wear helmet in regions where the traffic checking is not done.
- There is a tendency of the driver to wear helmet only where the anticipate checking may take place, else they do not wear helmet where no checking is done.
- The vehicle can be turned on and stolen by bypassing the ignition switch.
- Testing alcohol content present in blood in each individual rider in big countries like India is almost not possible.

III. BLOCK DIAGRAM OF PROPOSED SYSTEM

The system mainly consists of two major units. The two units are

- Helmet unit
- Bike unit

Helmet Unit

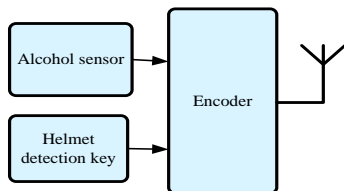


Fig. 1: Block Diagram of Helmet Unit

Microcontroller is the flash type microcontroller in which already programmed to control the ignition of bike based on the decoded value of the encoded signal from smart helmet. It consists of Helmet Detection Key, Alcohol sensor, Encoder as shown in figure 1.

Bike Unit

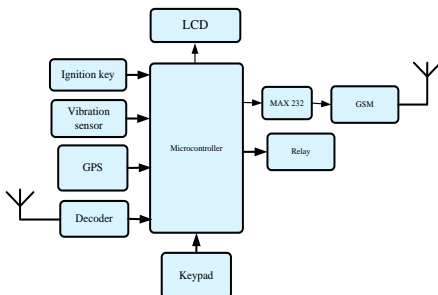


Fig. 2: Block Diagram of Bike Unit

This module helps the rider to drive with full safety by allowing the rider for ignition of bike only if rider wears the helmet and not drunken alcohol, for doing this the helmet is provided with alcohol sensor and helmet detection key. The alcohol sensor is capable of detecting the alcohol consumed by the rider and the helmet detection key is used to identify whether the rider wears the helmet or not. The key and the sensors were connected to an encoder, so the values sent by the alcohol sensor and the key were sent as encoded signal

from the smart helmet, which is decoded in the bike circuit to decide whether to allow the person for ignition or not[6]. The ignition is controlled by the microcontroller through the relay circuit. Even if the ignition key is turned on, the on signal is given only to microcontroller, the microcontroller check for the safety of the rider, if the rider found to be not wearing helmet or seems drunken they the controller not tell the relay to turn on the ignition, otherwise the controller asks for the rider to enter the password using the keypad for authenticating the rider and if the authentication is successful, relay is allowed to turn on the ignition. If the rider enters the password wrongly, then the bike alerts the user with a SMS using GSM module[7]. In any case if the rider met an accident, based on the vibration obtained from the vibration sensor the accident is identified by the controller and sends an emergency alert to the hospital by sending as SMS to hospital number with the GPS location obtained from the GPS module as shown in figure 2.

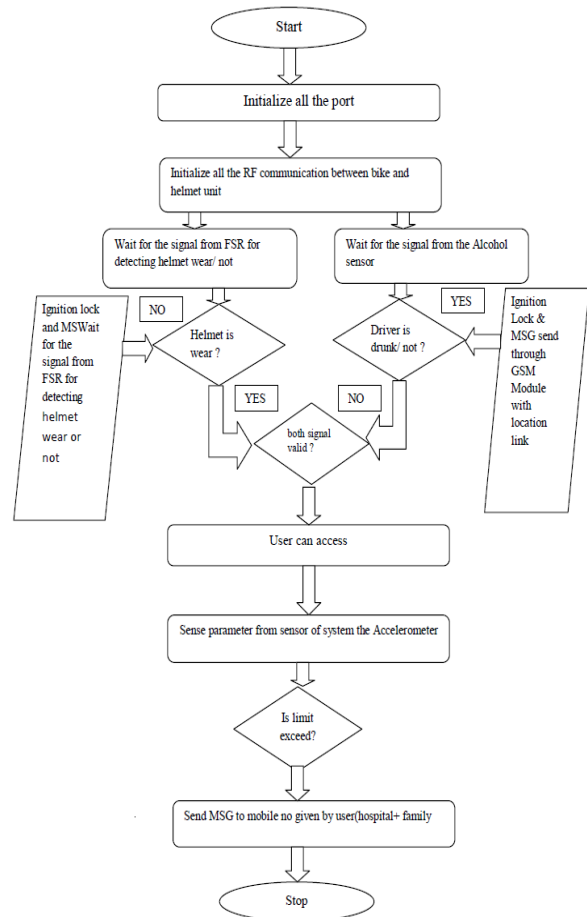


Fig. 3: Flowchart of the Proposed System

Figure 3 shows the flowchart of the proposed system. The flowchart describes the functionality of the “Accident Detection, Theft detection and drive protection using intelligent wireless safety helmet”. The helmet unit conditionally checks “Helmet Wearing” and “Alcohol Sensing”. If condition is met then helmet unit sends affirmative signal to bike unit through RF communication[8]. There after the vehicle start moving. When accident take place then GSM module sends location using GPS to saved contact list.



IV. RESULTS AND DISCUSSIONS

With the help of helmet detection key, driver without helmet can be avoided. If rider does not wear helmet then the LCD will display as "NO HELMET PLS WEAR IT" in figure 4.



Fig.4: Helmet Detection Result

If RF module is not in range or it has not been switched on then the output will be in figure 5.



Fig.5: Password Detection Result

Illegal consumption of alcohol during driving is 0.08 mg/L as per the government act but for demonstration purpose, it is programmed to the threshold limit 0.04 mg/L. threshold can be adjusted using potentiometer. If sensitivity of MQ-3 is more 0.04 mg/L of alcohol in breath then the helmet unit will communicate with vehicle unit and show "Driver is drunken" thereafter the ignition system get switched off as shown in figure 6.



Fig. 6: Alcohol Detection Result

Arrange of frequency generated depending upon the vibration produced due to accident or obstacle. If the frequency is greater than the threshold value then vehicle unit shows "Bike has fallen" as shown in figure 7.



Fig.7: Accident Detection Result

Once vehicle unit detected that there was an accident then GSM sends location of accident with the help of GPS. It sends latitude and longitude continuously to saved SIM number as shown in below figure 8.

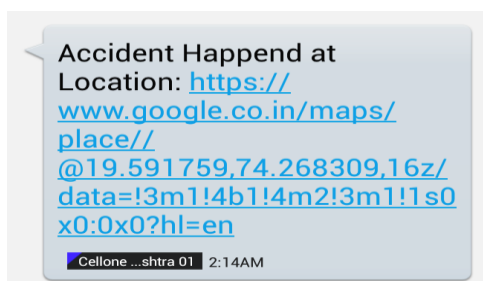


Fig. 8: Accident Intimation Result

The helmet unit shows in figure 9 receives the supply from internal source. The first stage of helmet unit checks whether the head is touch with helmet or not. If it touches with head, it enables the alcoholic sensor to check the alcohol consumption of a person. Based on the Ethane content in the breathe, the alcoholic sensor detects the drunken person. If a person is drunken, the encoder will not send signal to the decoder. It will automatically lock the ignition system.

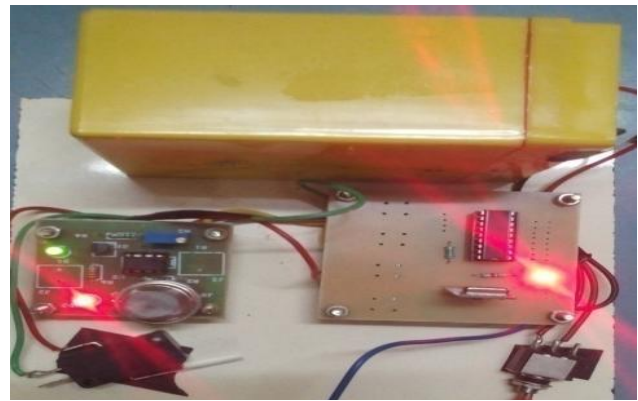


Fig. 9: Helmet Unit

Figure 10 shows the bike unit construction. If the decoder receives the signal from helmet unit, it will move on to a security system. If rider enter an encrypted password, it enables the ignition system through relay. Otherwise, it locks the ignition system. If any accidents occurs, the vibration sensor senses the vibration value [9]. If it reaches the threshold value, it will send a signal to microcontroller and GSM. The SMS will send to a registered mobile number through GSM [10]. The accident location will send to a registered mobile number through GPS based on latitude and longitude value.

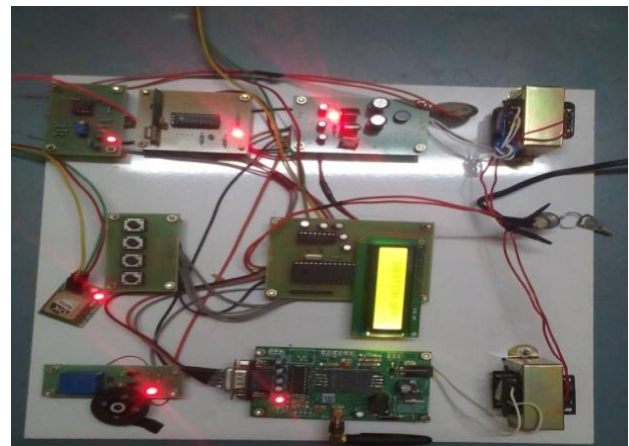


Fig. 10: Bike Unit

V. CONCLUSION

The developed system efficiently ensures. Rider is wearing helmet throughout the rider. Rider should not be under influence of alcohol, Accident detection & theft protection. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate due to driving bike after consuming alcohol. A helmet is not be 100% foolproof but it definitely the first line of defence for the rider in case of an accident to prevent fatal brain injuries. The proposed approach makes it mandatory for the rider to use this protective guard in order to drive a two wheeler vehicle and ensures the safety of human brain and therefore reduces the risk of brain injuries and deaths in case of an accidents. Besides the developed system prevents the theft of two wheeler.



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