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ALCOHOL DETECTION USING SMART HELMET SYSTEM

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***Abstract*: An accident is a specific, unexpected, unusual and unintended external action which occurs in a particular time and place, with no apparent and deliberate cause but with marked effects. Carelessness of the driver is the major factor of such accidents [1]. The traffic authorities give a lot of instructions to the vehicle operators. But many of them do not obey the rules. Nowadays most of the countries are forcing the motor riders to wear the helmet and not to use the vehicles when the person is in drunken condition. But still the rules are being violated by the users. In order to overcome this we introduces an intelligent system, Smart Helmet, which automatically checks whether the person is wearing the helmet and has non- alcoholic breath while driving. Here we have a transmitter at the helmet and the receiver at the bike. There is a switch used to sure the wearing of helmet on the head. The ON condition of the switch ensures the placing of the helmet in proper manner. An alcohol sensor is placed near to the mouth of the driver in the helmet to detect the presence of alcohol. The data to be transferred is coded with RF encoder and transmitted through radio frequency transmitter. The receiver at the bike receives the data and decodes it through RF decoder. The engine should not ON if any of the two conditions is violated. MCU controls the function of relay and thus the ignition, it control the engine through a relay and a relay interfacing circuit.**

***Index Terms*— Accident, Drunken Driving, Helmet, Intelligent system**.

I. INTRODUCTION

A traffic accident is defined as any vehicle accident occurring on a public highway (i.e. originating on, terminating on, or involving a vehicle partially on the highway). These accidents therefore include collisions between vehicles and animals, vehicles and pedestrians, or vehicles and fixed obstacles. In higher-income countries, road traffic [1] accidents are already among the top ten leading causes of disease burden in 1998 as measured in DALYs (disability-adjusted life years). In less developed countries, road traffic accidents were the most significant cause of injuries, ranking eleventh among the most important causes of lost years of healthy life. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities [2]. The problems with state drunk driving control systems can be solved in many ways. The most effective will follow several principles: They will invest authority and responsibility in people and organizations at all levels, local to national, because drunken driving control [6] requires action at all levels. They will operate in the public eye, using the media to report on problems and solutions, because ultimate decisions on priorities and resources to control drunk driving must have public support. They will not promise instant solutions based on a single action but rather will take steady steps towards long-term improvement. And they will establish mechanisms for identifying and solving problems rather than attempting to apply one-size-fits-all methods.

Application of electronics in the automobile field is very much popular now. Because of the low prices and various varieties available in the market

people prefer motorbikes to buy over 4 wheelers. Hence Road Safety becomes a major issue of concern. Therefore it becomes necessary to implement such a technique which is not easy to bypass the basic rule of wearing helmet and to avoid drunken driving. Here we designed a system which checks the two conditions before turned ON the engine of the bike. Our system includes an alcohol sensor [8] and a helmet sensing switch. A switch is used to detect whether the biker is wearing helmet. Alcohol sensor is used to detect the biker is drunk, the output is fed to the MCU. Both the switch and the alcohol sensor are fitted in the helmet. If any of the two conditions are violated the engine will not turned ON.

Alcohol sensor MQ3 is used here for detecting the alcohol concentration present in the driver's breath. Sensor provides an analog resistive output based on the alcohol concentration. MCU is the microcontroller unit, which controls all the functions of other blocks in this system. MCU takes or read data from the sensors and controls all the functions of the whole system by manipulating these data. Alcohol sensor is connected to the MCU through an interfacing circuit and the helmet sensing switch is directly connected to the MCU. MCU receives data from these sensors and it gives a digital data corresponding to the output of sensors to the encoder only if the two conditions are satisfied.

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. Motorists parking their vehicles in No-parking areas increase the rate of traffic in the metropolitan cities. In Indian road system, widening of the road is not an alternative solution to avoid traffic in such a cities.

II. BLOCK DIAGRAM

This paper mainly focuses on avoidance of drunken driving. Hence this system will not turn on the vehicle, when the user is in drunken condition. In addition to this, it will not allow the user to park drive the vehicle in the no parking or no entry area respectively. The system will send short message service to the friends or relatives when an accident occurs. It also employs theft detection. Our system consists of two major parts. They are 1) Helmet unit and 2) Vehicle unit as shown in fig.1 & 2.

TRANSMITTER SECTION

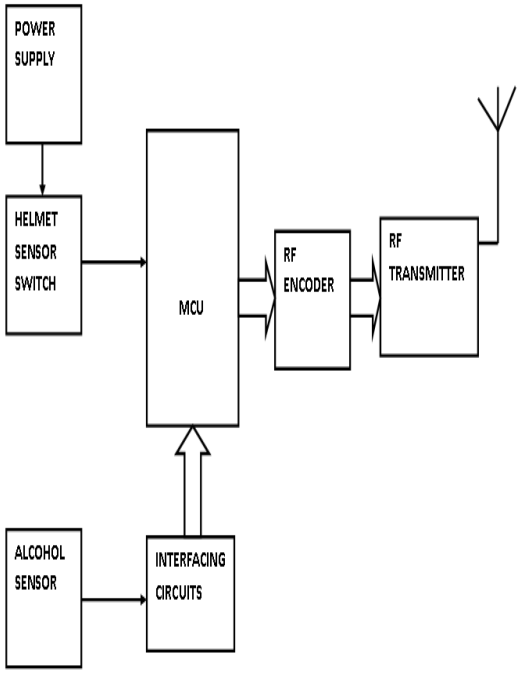

Figure 1. Helmet Unit.

This project describes the design of an effective security system for a bike, in order to avoid accidents and other malpractices. Vehicle accidents due to the use of alcohol are increased nowadays and the wearing of the helmet reduces the severity of the accidents. In our project we combine these two aims in a single embedded system.

This section consists of an alcohol sensor, helmet sensing switch, MCU, encoder and an RF transmitter. Both the switch and the alcohol sensor are fitted in the helmet. MCU reads data from the sensors, finds if the driver has non-alcoholic breath and helmet sensor switch is in closed position and gives corresponding digital output to an encoder only if the two conditions are satisfied. It encodes one of

the active inputs to a coded binary output. RF transmitter transmits this coded binary output from the encoder. Here we use the popular ASK modulation technique. In this RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK).

RECEIVER SECTION

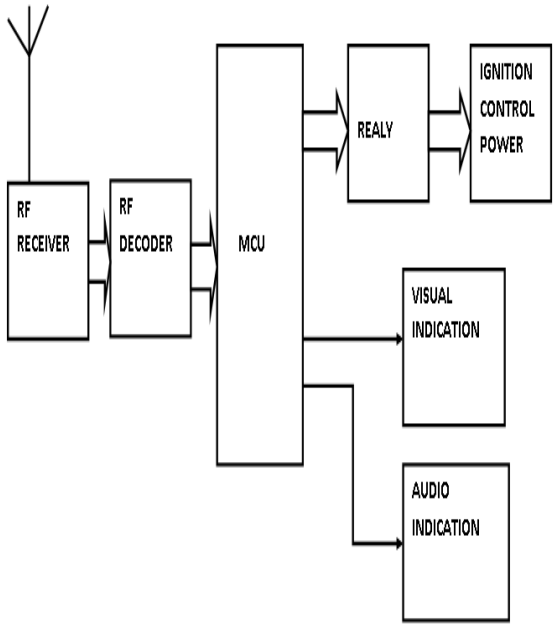

Fig 2. Vehicle Unit

The receiver section is placed on the bike; it consists of an RF receiver, RF decoder, MCU, audio and visual indications. RF receiver receives the coded binary data transmitted by the RF transmitter and given to the RF decoder. RF decoder decodes the input and gives four bit digital data to the MCU only if the address bit of encoder and decoder matches. MCU operate the engine of the vehicle when it receives digital data from the transmitter section, it operates the engine through a relay circuit but it cannot operate the relay directly, so a relay interface is also used here. The system is provided by the motor vehicle department to avoid abnormal circumstances.

2.1. FLOW CHART REPRESENTATION

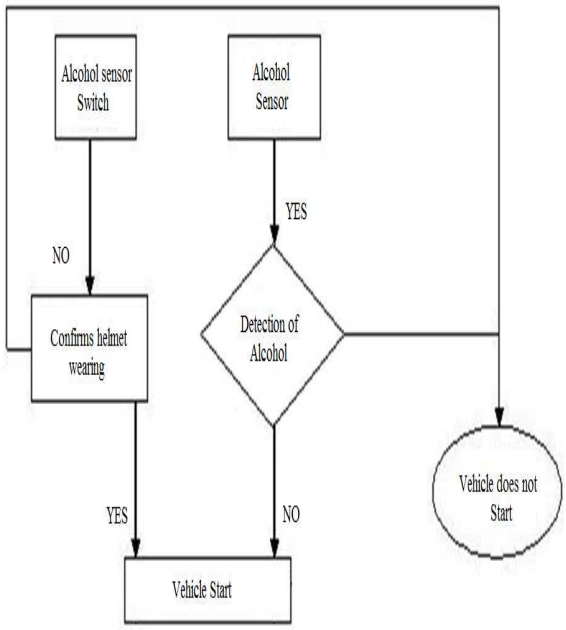

Fig 3. Flow chart of electronic smart helmet system.

2.2 WORKING PRINCIPLE

MQ-3 gas detector (alcohol sensor) is suitable for detecting alcohol content from the breath. So it can be placed just below the face defend and above the additional face protection. The surface of the sensor is sensitive to various alcoholic concentrations. It detects the alcohol from the rider's breath; the resistance value drops leads to change in voltage (Temperature variation occurs).Generally the illegal consumption of alcohol during driving is 0.08mg/L as per the government act. Except for

demonstration purpose, we have a tendency to program the drink limit as 0.04 mg/L. Threshold will be adjusted mistreatment exploitation. An ear lobe detector sense that is fitted with the helmet unit senses the blood flow within the ear lobe region. So the wearing of helmet is confirmed by our system and similarly alcohol sensor fitted in the mouth piece of the helmet detects the alcohol within the breath and sends the amount of alcohol to the controller. If both of the criteria's are met in an appropriate manner then the 2 control signals are sent from the helmet unit to the vehicle control unit. The decoded RF signal is distributed to the controller within the vehicle unit shown in fig. two to start out / stop the vehicle. If the signal from the ear lobe region and no control signal from alcohol sensor is detected then the vehicle can begin, otherwise the vehicle won't begin.

III. ANALYSIS OF SYSTEM

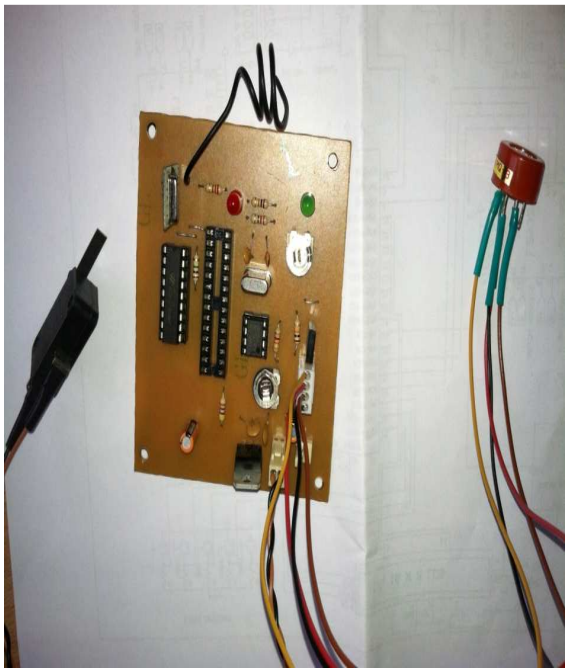

Fig 4. Hardware set up

In this hardware setup includes the transmitter and receiver sections, the transmitter sections have alcohol sensing element, microcontroller unit, encoder and transmitter, leaf switches are here. The receiver section have decoder and receiver, microcontroller unit, ignition control, electrical device, audio and visual indication, power supply etc.

Alcohol sensing element: The alcohol sensing element used here is MQ-3 kind sensor, the facility offer to the alcohol sensing element is controlled through a NPN power electronic transistor TIP122 by the microcontroller unit. The bottom terminal of the voltage divider is connected to MCU through 1K resistance, from RC_0 . The output of alcohol sensing element is connected to a voltage divider using 100K and 470 K variable. The output of the resistor is fed to op-amp's non-inverting voltage divider supported LM358. Output of non-inverting electronic equipment is fed to RA_0/AN_0 of the microcontroller. The presence of alcohol is detected by the microcontroller through this pin. During this system MQ3 is employed as LPG sensing element. This LPG/ alcohol sensing element is appropriate for detection terribly tiny presents of LPG in its surroundings. It's a high sensitivity and fast response. Sensing element provides analog resistive output depends on alcohol concentration. The drive circuit wants a resistance solely. a straight forward interface may well be a 0-3.3V ADC. Resistance worth of MQ-3 is distinction varied to numerous sorts and various concentration gases. Once exploitation of this element, sensitivity adjustment is extremely necessary. once accurately activity, the correct alarm purpose for the gas detector output to be determined and considering the temperature and humidness influence.

Microcontroller unit: PIC16F73 is employed because the MCU. MCU gets power only the helmet is weared. That additionally checks the output of alcohol sensing element whether or not alcohol is present or not. If the condition of alcohol is traditional then MCU communicate to the RF transmitter through the RF encoder circuit. Here the favored microcontroller PIC 16F73 from semiconductor unit Corporation is used because the mainframe of the system. PIC microcontrollers are the most popular eight bit microcontroller in the world. They are available in wide variety in pin outs, memory capacity and have lots of integrated peripherals like ADCs, SERIAL modules.

The PIC16F73 is accessible in twenty eight pin DIP package and have program memory capability of 4Kb and ram of 368 bytes. They're operating in clock speed vary of zero rate to twenty megahertz and therefore the additional operation is totally static also. They have three I/O ports named as passage, PORTB and PORTC. Among these PORT A is half-dozen bit wide and every one alternative port is eight bit wide. Most of the peripheral I/O functions are multiplexed with PORTC pins. The ADC inputs are available in PORT A. The PIC controllers have fourteen bit wide program memory area by that instruction occupies just one memory area. This allows additional program capacity. These are addressed with a 13 bit wide program counter throughout execution.

The program memory is addressed from 0000h to 1fffh and also the reset vector is at 0000h and interrupt vector is at 0004h. The program counter points the address of the memory location to be executed next and increments in every machine cycles. One machine cycle consists of four clock cycles.

Generally they are low power devices and works in voltage range of 2v to5V. They have 13 interrupt sources like external pulse interrupt and serial receive interrupt etc. These chips area unit are in circuit serial programming facility and are flash technology also. The non-volatile storage is re written a thousand times. Speed of operation of MCU depends on the clock provided. In this project 4MHz clock is used with 232 pF capacitors. First pin (master clear) of the IC is connected to +5V through 47K Electrical relay: A relay is under controller that opens and closes underneath the control of another electrical circuit. In the original form, the switch is operated by an electromagnet to open or shut one or many sets of contacts. Because a relay is able to control an output circuit of upper power than the input circuit, it is thought of to be, in a broad sense, a form of an electrical amplifier. A simple electromagnetic relay is an adaptation of an electromagnet. It consists of a coil of wire surrounding a soft iron core, an iron yoke, which provides a low reluctance path for magnetic flux, a movable iron coil, and a set, or sets, of contacts. The coil is hinged to the yoke and automatically linked to a moving contact or contacts. It's control in place by a spring so that when the relay is de-energized there is an air gap in the magnetic circuit. In this condition, one of the 2 sets of contacts in the relay pictured is closed, and the other set is open. different relays may have a lot of or fewer sets of contacts depending on their operate when an electrical current is passed through the coil, the resulting magnetic field attracts the armature and the consequent movement of the movable contact or contacts either makes or breaks a connection with a fixed contact. If the set of contacts was closed when the relay was de-energized, then the movement opens the contacts and breaks the connection, and vice versa if the contacts were open, when the current to the coil is reduced to zero, the armature is returned by a force, approximately as strong as the magnetic force, to its relaxed position. Usually this force is provided by a spring, but gravity is also used commonly in industrial motor starters. Most relays are manufactured to operate quickly. In a low voltage application, this is to reduce noise.

IV. RESULT

Nowadays, most cases of accidents area unit by motor bikes. The severities of those accidents are increased because of the absence of helmet or by the usage of alcoholic drinks. In our project we have a tendency to develop an electronic smart helmet system that efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe 2 wheeler journey is possible which would decrease the head injuries throughout accidents caused from the absence of helmet and additionally reduce the accident rate due to drunken driving. we have a tendency to introduce advanced sensors techniques and radio frequency wireless communications are included in this project to make it a good one. Our system efficiently checks the wearing of helmet and drunken driving. By implementing this system a safe 2 wheeler journey is possible which would decrease the head injuries during accidents and also reduce the accident rate because of drunken driving.

V. FUTURE SCOPE

In future we have a tendency to planned to construct our intelligent system during a compact size

and additionally as globally acceptable to notify the No entry and No parking areas. Government should enforce laws to install such system in each 2 wheeler. By implementing such mechanism in 2 wheelers, the deaths attributable to due to driving and alternative road fatalities are often brought to zero p.c. And also indicates No parking area which would reduce the crowd of the vehicle in those areas. No entry area is mainly allocated during the development or repairing of the road, if the rider enters in such area this system would immediately intimate as No entry area and vehicle can stop automatically. in case of any accident it might send the messages to the friends continuously about the location of the accident happened until the first aid reaches the rider. Our system helps to know the location of the vehicle for rescuing in the case of theft incidents.

REFERENCE

[1] Road accidents in India [online] 2007 June 25. Available from: URL: http://www.easydriveforum.com/f44-share-your-road-experience/road-accidents-in-india-834.html

[2] Articles base directory [online] 2011 Feb. 16 Available from: URL: http://www.dw-world.de/dw/article/0,,5519345,00.html

[3] Article from The Hindu [online] 2011 Feb. 10 Available from: URL:http://www.hindu.com/2011/02/10/stories/2011021063740500.htm

[4] Yue –Cheng Wu, Yun-qing Xia &, Zhegiang, ―Multichannel reflective PPG earpiece sensor with passive motion cancellation Biomedical Circuits &System, IEEE, 2007, PP 235-241.

[5] Drunk Drivers Beware Of Saab De-vice,[http://www.buzzle.com/articles/drunk-drivers-beware-saab-device.html]

[6] Nissan to drink drive–proof its vehicles, September 2006,[http://www.nissanglobal.com/EN/NEWS/2007/_STORY/070723-01]

[7] Drunken driving protection system International Journal of Scientific & Engineering Research Volume 2, Issue 12, December-2011 1 ISSN 2229-5518

[8] Alcohol sensor and Automatic control system for bike, Volume 2, Issue ICRAET12, May 2012, ISSN Online: 2277-2677.

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