Smart Helmet for Accident Detection and Road Safety

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ABSTRACT: An accident is a specific, unusual, unexpected and external action which occurs in a particular place and time, with no apparent and deliberate cause but with marked effects and endangering life. Carelessness of the rider is the major factor of such accidents. The traffic authorities in India have given a lot of precautionary measures and instructions to the riders. But many of them do not obey the Rules and regulations. These days many countries are instructing the riders to wear the helmet and not to use the vehicles when the individual is in drunken condition. But still the rules are being violated by the riders. In order to overcome this situation. We have introduced a smart system, called as, Smart Helmet, which automatically checks whether the rider is wearing the helmet and is non- alcoholic while driving. In our system we have a transmitter at the helmet end and at receiver end at the bike. There is a switch used to show the wearing of helmet on the person. The ON condition of the switch makes sure the position of the helmet in perfect manner. An alcohol sensor is positioned near the mouth of the rider in the helmet to detect the alcoholic breath. The information to be transmitter is coded with RF encoder and transmitted through RF transmitter. The receiver at the vehicle receives the data and decodes it through RF decoder. The engine should not ON if any of the 2 conditions is violated. Function of relay is controlled by MCU and thus the ignition, it also controls the engine through a relay and a relay interfacing circuit. This helmet for the comfort of riders provide various functions such as Listening to the music on the go, sending SOS messages in case of accident emergency, use navigation services.

**KEY WORDS:** Drunken Driving, Accident, Helmet, Intelligent system.

I.INTRODUCTION

These we talk about IOT and how it is changing our day to day lives. The IOT is creating a new world, a quantifiable and measurable Environment where people and businesses can manage their assets in best informed ways, and can make more timely and better informed decisions about what they need or want to do. This new world brings in many practical improvements such as lifestyle, health and safety in our lives. Today in India there is one death every 4 minutes due to road accidents. Out of total road accidents, 25% accounts for 2 wheeler accidents. According to recent survey 98.8% riders who died didn't wear a helmet. Hence police department has made it mandatory to wear helmet while driving. Riders face many problems on the go such as unable to take calls, unable to see maps for navigation purposes etc. While having these helmets as a safety measure is of great help, we add more features to it to make it smart. Smart Helmet is an innovative way of building a helmet with the latest technologies. Did you ever feel the need to listen to music or maybe send a SOS message in case of Emergency? To make the riders feel more comfortable, we designed a smart helmet. This smart project is made to help people to do multiple tasks such as listen to music, navigation, receive calls and many more while they are riding. Our helmet is integrated with latest Bluetooth technology through which it will get connected to the rider's phone. This project helps rider's to even more wear helmet because of its features in addition to safety purposes.

II.ARCHITECTURE DIAGRAM

In this hardware setup it has the transmitter and receiver modules, the transmitter section have alcohol sensing element, microcontroller unit, encoder and transmitter, relay switches are here. The receiver section have decoder and receiver,

microcontroller unit, ignition control, electrical devices, audio and visual indication, power supply etc. Alcoholic breath sensing element: The alcoholic sensor used here is MQ-3 gas sensor, the sensor offer to the alcohol sensing element is controlled through a NPN's power electronic transistor TIP122 by the MCU. The bottom terminal of the voltage divider is connected to microcontroller unit through 1K resistance, from RC0. The output of alcoholic sensor is connected to a voltage divider using 100K and 471 K variable. The output of the resistor is fed to op-amp's non-inverting voltage divider's supported LM357. Output of non-inverting electronic equipment is fed to RA0/AN0 of the MCU. The existence of alcohol is detected by the microcontrollers through this pin. During this system MQ3 gas sensor is employed as LPG sensing element. This LPG/ alcohol sensing element is appropriate for detection terribly small presence of LPG in its surroundings. It is highly sensitive and fast response. Sensing element provides analog resistive output which also depends on alcohol presence. The drive circuit needs a resistance alone. A straight forward interface may well be a 0-3.3V ADC. Resistance worth of MQ-3 gas sensor is distinction varied to various sorts and various concentration gases. Once exploitation of this element, sensitivity adjustment is highly necessary. Once precise activity, the correct alarm needs for the gas detector output to be determined and considering the temperature and humidity's influence. MCU: PIC16F73 is used because the MCU. MCU gets power only the helmet is worn. Which additionally checks the output of alcohol sensing element whether or not alcohol is present or not present? If the condition of alcohol is traditional then microcontroller unit communicates to the RF transmitter through the RF encoder circuit. Here the favoured MCU PIC 16F73 from semiconductor unit is used because the mainframe of the system. PIC microcontrollers are the most popular 8 bit microcontroller in the world. They are available in many variety in pin outs, memory capacities and have lots of integrated peripherals such as ADCs, SERIAL modules.
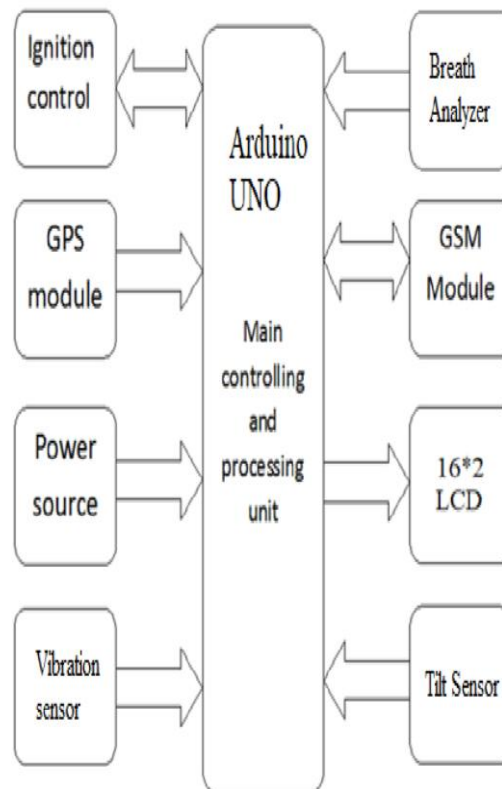
III.METHODOLOGY

A. MICRO-CONTROLLER BOARD

This is a low power, high-performance CMOS 8-bit microcomputer with 9K bytes of Flash Programmable and Erasable Read Only Memory (EROM). The device is produced using Atmel's high-density nonvolatile memory technology and is compatible with the MCS-51. Instruction set and pin out. The on chip Flash will allow the program memory to be reprogrammed in-system or by a conventional nonvolatile memory capacity program. It will mix a versatile 8-bit CPU with Flash on a monolithic chipset, it will provide a highly flexible and cost effective solutions to various embedded control applications. Here we have used an ARDUINO UNO as microcontroller board. Arduino is open source tool for producing the system's that can sense and control more physical world than your desktop system. It is an open-source physical computing platform which is based on a simple microcontroller board, and a developing environment for writing software for the board. Arduino will be used for developing a lot of interactive objects, taking inputs from a various switches or sensors, and controlling a variety of lights, motors, and other physical outputs.

B. GSM MODEM

GSM (Global System for Mobile communications) is an open, digital cellular technology which is used for transmitting mobile voice and data services. In this system we are using it only for transmitting and receiving the data and voice messages. Global system for mobile communications wireless data module which is present is used for remote wireless applications and also machine to machine or user to machine and remote data communications in various applications. Microcontroller will send AT commands to GSM modem and by which accordingly it works. Here we used LORA 1262 long range spread spectrum.

C. GLOBAL POSITIONING SYSTEM (GPS)

A Global Positioning System (GPS), originally Nav-star GPS, it is a satellite-based radio navigation system owned by the United States government and operated by the United States Air Force. This is a global navigation satellite system which will provides geolocation and time information to a GPS receiver anywhere on or near the Earth where ever there is an unobstructed line of sight to four or more GPS satellites. Obstacles like mountains and buildings and walls will block the relatively weak GPS signals. The GPS will not require the user to send any data, and this operates independently of any telephonic or internet reception, though these technologies can enhance and strengthen the usefulness of the GPS positioning information. The GPS will provide critical positioning capacities to military, civil, and commercial users around the globe. The United States government created the system, maintains it, and also makes it freely accessible to anyone and everyone with a GPS receiver.

D. ALCOHOL SENSOR/ GAS SENSOR

Here we used MQ-3 Gas sensor. The alcoholic sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading of data. The sensor will activate at temperatures ranging from ten to fifty Celsius with a power supply with less than 160 Ma to 5V. The sensor sensing range is from 0.05 mg/L to 4 mg/L, which is suitable for breath analyzers.

E. ACCELEROMETER

The accelerometer is a device which measures proper acceleration. Perfect acceleration, being the acceleration (or rate of change of velocity) of a body in its own instantaneous rest position, it is not the same as coordinate acceleration, being the acceleration in a fixed coordinates system. For an example, the accelerometer at rest on the surface of the Earth will measure an acceleration because of Earth's gravity, straight upwards (by definition) of $g \approx 9.81$ m/s 2. By contrast, accelerometers in free fall (falling toward the centre of the Earth at a rate of about 9.81 m/s 2 will be measured 0. The Accelerometers will have multiple applications in industry and science. Accelerometers which are highly

sensitive are components of inertial navigation systems for aircraft and missiles. Accelerometers will be used to detect and oversee vibration in rotating machinery. Accelerometers are used in computers and digital cameras so that images on screens are always shown upright. Accelerometers are also used in drones for the flight stabilization. Co-ordinated accelerometers are used to measure differences in correct acceleration, specifically gravity, over their separation in space; which is the gradient of the gravitational field. This gravity is useful because absolute gravity is a weak effect and also depends on local density of the Earth which will be quite variable.

F. DC MOTOR

The DC motor belongs to a class of rotary electrical machines that will convert direct current electrical energy into mechanical energy. Most common types depends on the forces produced by magnetic fields. Many types of DC motors will be having some internal mechanism's, either electromechanical or electronic, to periodically change the direction of flow of current in parts of the motor. DC motors were the first type which are widely used, since DC motors could be powered from existing direct-current lighting power distribution systems. A DC motor speed can be controlled over a large range, using either a variable supply voltage or by changing its strength of current in its field windings. Small sized DC motors are used in toys, tools, and appliances. The universal motor can operate on direct current but is a less weighted brushed motors which is used for portable power tools and appliances. Bigger DC motors are used in propulsion of electrical vehicles, elevator and hoists, or in drives for steel rolling mills. Advent of the new power electronics has made replacement of DC motors with AC motors possible in many of the applications.

IV. CONCLUSION

In this project, we have developed a smart helmet system which is successfully able to detect whether if the user has worn the helmet or not. This system also sets an alarm if he has consumed alcohol beyond certain levels. Apart from this, the helmet system also monitors atmospheric pollution levels. The system results of this project have also proved that the motorcycle's engine will only start if the helmet is worn, and the belt has been buckled. So, this will reduce the impact from accidents and will prevent motorcycles from being stolen. Peripheral Interface Controller (PIC) 16F84a is good in controlling all sensors of the system. Implementing the wireless module which is 315 MHz Radio Frequency Module to send signal from helmet to the bike improved the capacity of sending data instead of hardwire. Therefore, a bike rider would not get disturbed by the wire while riding the bike.

REFERENCES

[1]   Nitin Agarwal, Anshul Kumar Singh, PushpendraPratap Singh, Rajesh Sahani,"SMART HELMET", International Research Journal of Engineering andTechnology, volume 2, issue 2, May 2015.
[2]   98.6% bikers who died didn't wear a helmet,timesofindia.indiatimes.com/city/Chennai
[3]   https://www.arduino.cc/en/Reference/Board
[4]   https://www.instructables.com/id/Bluetooth-Hc-05-With-Arduino
[5]   https://www.arduino.cc/en/Tutorial/HomePage
[6]   YouTube video: https://www.youtube.com/watch?v=nZrCH1Fx7Y&t=14s