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Smart Helmet using IoT

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***Abstract*: In India bikes are more prevalent, many people die due to carelessness caused in wearing motorcycle helmets. Even though they have been continuous awareness from the government authorities regarding helmets. But majority of drivers do not follow them. In order to put an end to this misery we have developed the smart helmet for motorcycle, a way to stop starting of vehicles without wearing helmet. This smart bike helmet system has two modules, one on the helmet and another on the bike. These two modules are communicated wirelessly using wifi module, ATmega328p is used as CPU. We place sensors in helmet which is connected to Arduino board. So when the biker crashes sensors sense and the Arduino extract and send SMS of location data using the ADXL335 which is interfaced with Arduino. The first motive of this smart helmet is to provide rider safety and assistance. This project is developed by integrating alcohol sensor with Arduino board. The alcohol sensor used in this project is MQ3 which detect the alcohol content in human breath. This smart helmet will help the rider to compulsory wear helmet and restrict drink and drive condition.**

***Keywords*: ADXL335, MQ3, ATMega328, ESP8266**

1. Introduction

Today in India there is one death every four minutes due to road accidents. Out of total road accidents, 25% accounts for two wheeler accidents. According to recent study 98.6% bikers who died, didn't wear a helmet. Hence police department has made it mandatory to wear helmet while riding. peoples face many problems on the go such as unable to get immediate medical service and it is difficult to find actual accident location etc. The main objective of the project is to design a low-cost intelligent helmet that is capable of identifying alcohol consumption, helmet detection and gives accident location. This system provides security, safety and assistance for the bikers. The circuit is so designed that the bike won't start without wearing helmet and if the rider is drunk. And in case of accident, WIFI module will globally locate the biker and immediate message will be sent using it to the family members about the location of accident as soon as possible.

2. Problem statement

According to recent study 98.6% bikers who died didn't wear a helmet. Hence police department has made it mandatory to wear helmet while riding. Riders face many problems on the go such as unable to take calls, unable to see maps for navigation purposes etc. These are the three main issues which motivates us for developing this project. While having these helmets as a safety measure is a boon, we add more features to it to make it smart. To make the riders feel more comfortable, smart helmet has been invented. The main objective of the project is to design a low-cost intelligent helmet that is capable of identifying alcohol consumption and helmet detection. This system provides security, safety and assistance for the bikers.

3. Proposed system

We designed the smart helmet, which gives the three main things as first is user or biker have to wear helmet or not, second is alcohol detected or not, and third one is if any emergency will arrived it sends alert message and it will help the user to gives the indication. We use the alcohol sensor it detects the alcohol and if it is more than predicted value it will block the ignition. We are going to use two units as helmet unit and bike unit and both are connected via wi-fi module. We can also turns on the indicators simply by tilting our neck. And in an emergency case such as accident, alert message is send to the family member with location.

4. Block diagram and description

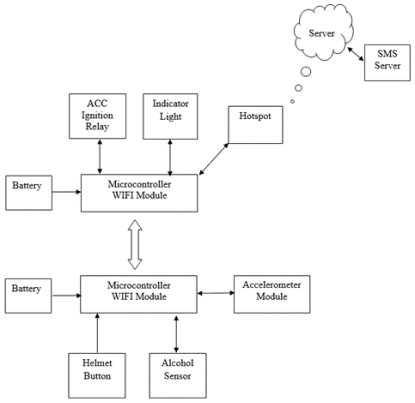

Fig. 1. Block diagram

A. Description

There are two units, Helmet and Bike. Helmet unit will provide accelerometer sensor, alcohol sensor, WIFI Module. If the driver has non-alcoholic breath and the helmet has been detected, the corresponding digital output is given to wifi module of Bike unit. The helmet unit collect the information and transmit to the Bike unit using wifi module through server. The MQ3 is used for alcohol detection and ADXL335 will act

as accelerometer sensor which helps to give 3 axis acceleration and sends the message to the family that provides accident location. It consists of different hardware components mainly,

- ATMega328x
- WIFI module
- MQ3
- ADXL335
- Battery

B. ATMega328x

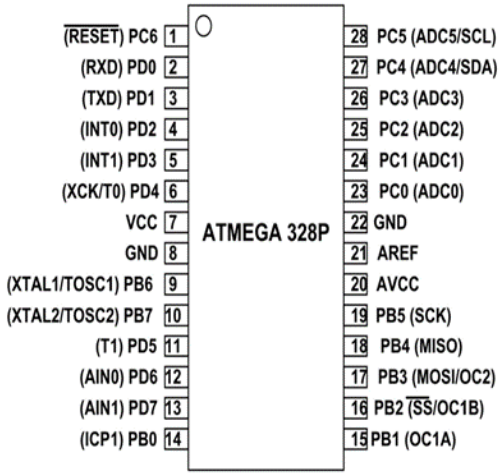

Fig. 2. B. ATMega328x

The high-performance Microchip Pico Power 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-write capabilities, it has 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes. It has internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, a 6-channel 10-bit A/D converter programmable watchdog timer with internal oscillator, and five software selectable power saving modes. The device operates between 1.8-5.5 volts. By executing powerful instructions in a single clock cycle, the device reaches throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

C. ESP8266

ESP8266 is high integration wireless SOCs, it designed for space and power constrained mobile platform designers. It provides unsurpassed ability to embed Wi-Fi capabilities within other systems, or to function as a standalone application, with the lowest cost, and minimal space requirement. ESP8266EX also integrates a next version of Tensilica's L106 Diamond series 32-bit processor, with on-chip SRAM, besides the Wi-Fi functionalities. ESP8266EX is often united with external sensors and other application specific devices through its GPIOs; a codes for such applications are provided in examples in the SDK.

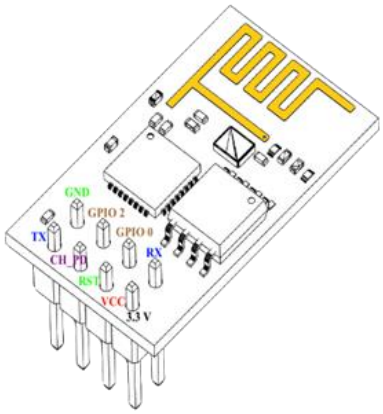

Fig. 3. ESP8266

D. ADXL335

The ADXL335 is a small, thin, low power, complete 3-axis accelerometer with signal conditioned voltage outputs. The product measures acceleration with a minimum full-scale range of ±3 g. The module was designed as breakout board because ADXL335's signal is analog (more ports requested), but the board outline is grove module that you can fix it convenient like others grove. The sensor combine 3.3 and 5V power supply, can be used in standard Arduino device and see Arduino stalker.

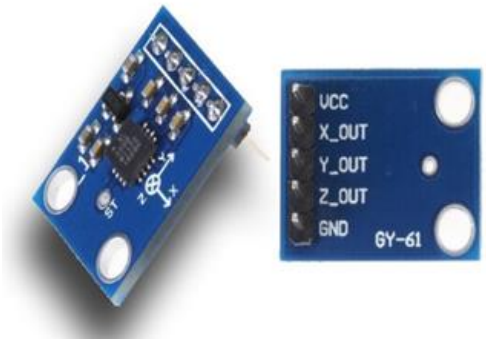

Fig. 4. ADXL335

E. MQ3

This module is made using Alcohol Gas Sensor MQ3. It is a low cost semiconductor sensor which can detect the presence of alcohol gases at concentrations from 0.05 mg/L to 10 mg/L. The sensitive material used for this sensor is SnO2, whose conductivity is lower in clean air. It's conductivity increases as the concentration of alcohol gases increases. It has high sensitivity to alcohol and has a good resistance to disturbances due to smoke, vapour and gasoline. This module provides both digital and analog outputs. MQ3 alcohol sensor module can be easily interfaced with Microcontrollers, Arduino Boards, Raspberry Pi etc.This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your common breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

Fig. 5. MQ3

F. Battery

In this project nickel cadmium battery is used. This battery (NiCd battery or NiCad battery) is a type of rechargeable battery using nickel oxide hydroxide and metallic cadmium as electrodes. The abbreviation NiCd is derived from the chemical symbols of nickel (Ni) and cadmium (Cd). It has ultra-fast charging 1 hour typically. Available in wide range of sizes.

5. Algorithm

- Start
- Initialize all the ports
- Initialize RF communication between two moldules.
- Check helmet is wear or not using vibration sensor. If not wear then ignition is not started.
- If value will be greater than threshold then also ignition is not started.
- Sense accelerometer sensor signal and conclude that accident will happened or not.
- Stop.

6. Conclusion

Smart helmet is an effective solution to many problems. Wearing the helmet and being sober are necessary conditions for the bike to start, reducing the possibilities of accidents. Even if a person takes caution sometimes accidents do occur. Here our engine cut off feature and handsfree call receiving and navigation reduces the chances of fatalities significantly. Executing the wireless system which is wifi module to send signal from helmet unit to the bike unit. Due to this wireless connection is better than wired link. The smart helmet acts as a virtual policeman keeping the drivers in check and making roads safer.

Acknowledgment

It brings us great pleasure in submitting this project report with the deep sense of gratitude profound respect. We should like to thank our guide Prof. S. P. Borate of E and TC department, for valuable guidance constructive suggestions. This helps us in preparing this project report. We are also very grateful to Dr. A. A. Patil, Head of department, for his timely guidance and innumerable suggestion. He has been ever helpful, boosting our morale and confidence and advising us on how to best than better. We are also thankful to our honorable Principal Dr. S. M. Mukane for providing necessary environment and facility to conduct our project work. Finally, I want to thank my family for the continuous encouragement, understanding and moral support.

References

[1] A. Ajay; G.Vishnu; V. Kishoreswaminathan; V. Vishwanth; K. Srinivasan ; S. Jeevanantham, “Accidental identification and navigation system in helmet”, International Conference on Nextgen Electronic Technologies: Silicon to Software (ICNETS2), 2017.

[2] Mohd Khairul Afiq Mohd Rasli; Nina Korlina Madzhi; Juliana Johari, “Smart helmet with sensors for accident prevention”, International Conference on Electrical, Electronics and System Engineering (ICEESE), 2013.

[3] Muthiah M; Aswin Natesh V; Sathiendran R. K, “Smart helmets for automatic control of headlamps”, International Conference on Smart Sensors and Systems (IC-SSS).

[4] Sudhir Rao Rupanagudi; Sumukha Bharadwaj; Varsha G. Bhat; S. Eshwari; S.Shreyas; B. S. Aparna ; Anirudh Venkatesan, Amrit Shandilya, Vikram Subrahmanya, Fathima Jabeen, “A novel video processing based smart helmet for rear vehicle intimation & collision avoidance”, International Conference on Computing and Network Communications (CoCoNet), 2015.

[5] Rashmi Vashisth, Sanchit Gupta, Aditya Jain, Sarthak Gupta, Sahil, Prashant Rana, “Safety Helmet with Alcohol detection and Theft control for bikers”, International conference on Intelligent Sustainable System(ICISS), 2017.