Intelligent helmet for bikers using sensors

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ABSTRACT

Background: Nowadays, more bike accidents occur due to not wearing the helmets, alcohol consumption, rash driving, and violation of traffic rules. Many countries make it mandatory to wear the helmet, but still, violation occurs which leads to the loss of life and damages to the environment. Objectives: To overcome this issue, initially, sensors in helmet check whether the rider wears the helmet or not and also a breath analyzer test. In case of any negativity, bike does not start. Materials: During the course of accident, the helmet uses the service of global system for mobile communications with the help of global positioning system it sends message with exact location to the ambulance or predefined contact. In helmet side, RF transmitter gets signals from those sensors on the basis of above-mentioned condition then encodes it to the receiver. Results and Conclusion: In bike side, receiver decodes which is continuously scanned by the PIC MC; accordingly, it takes the desired actions. Air pollution sensor is placed as it indicates the amount of pollution in air.

KEY WORDS: Breath analyzer, Global positioning system, Helmets, RF module

INTRODUCTION: SENSOR BASED SAFETY HELMETS

Intelligent safety helmet for motorcyclist is to highlight the system secure riding. It introduced a security system on the rider with the perfect helmet usage before riding. Using RF transmitter and RF receiver, the motorcycle can be moved if it receives signal from the helmet.¹⁶

A report on road accidents in India, in 2016, published by transport research wing under Ministry of Road Transport and Highways, Government of India, has revealed that more people died on roads accidents in India past year, as compared to the number of deaths in 2015. The data have further revealed that the states of Uttar Pradesh and Tamil Nadu have accounted for maximum number of deaths this year.⁷⁻¹⁵ The accident severity, which is measured as the number of persons killed per 100 accidents, was recorded at 29.1 in 2015 which is lower than 31.4 in 2016. The report further revealed that highways are not the “biggest killers.” As per the report, 34.5% of accident deaths occurred on national highways, while 27.9% of accident deaths took place on State Highways, while maximum percentage of deaths occurred on other roads (37.6).

MATERIALS AND METHODS

RF Module

The RF module operates at radio frequency. The corresponding frequency range varies between 30 kHz and 300 GHz. In this RF system, the digital data are represented as variations in the amplitude of carrier wave. This kind of modulation is known as amplitude shift keying.¹⁶⁻²¹ This RF module comprises an RF transmitter and an RF receiver. The transmitter/receiver (Tx/Rx) pair operates at a frequency of 434 MHz. An RF transmitter receives serial data and transmits it wirelessly through RF through its antenna connected at pin 4. The transmission occurs at the rate of 1 Kbps–10 Kbps. The transmitted data are received by an RF receiver operating at the same frequency as that of the transmitter.²²⁻²⁹

Alcohol Sensor

Basically, it has six pins but can use only four of them. Two of them are for the heating system and the other two are for connecting power and ground. Basically, this tube is a heating system that is made of aluminum oxide and tin dioxide and inside of it there are heater coils, which practically produce the heat if
the coil is heated up, $\text{SnO}_2$ ceramics will become the semiconductor, so there are more movable electrons, which means that it is ready to make more current flow. Then, when the alcohol molecules in the air meet the electrode that is between alumina and tin dioxide, ethanol burns into acetic acid, then more current is produced. Hence, the more alcohol molecules there are the more current we will get.[14] Due to this current change, we get different values from the sensor.

Global System for Mobile Communications (GSM) Module

GSM is an open, digital cellular technology used for transmitting mobile voice and data services. Here, we are using it only for transmitting and receiving the messages. GSM wireless data module is used for remote wireless applications, machine to machine, or user to machine and remote data communications in many applications. Microcontroller sends AT commands to GSM modem and accordingly it operates.[22-28]

Global Positioning System (GPS) Module

GPS is based on time and the known position of specialized satellites. The satellites carry very stable atomic clocks that are synchronized with one another and to ground clocks. Any drift from true time maintained on the ground is corrected daily. Likewise, the satellite locations are known with great precision.[20-15]

GPS receivers have clocks as well; however, they are usually not synchronized with true time and are less stable. GPS satellites continuously transmit their current time and position. A GPS receiver monitors multiple satellites and solves equations to determine the precise position of the receiver and its deviation from true time. At a minimum, four satellites must be in view of the receiver for it to compute four unknown quantities.[36-44]
PIC16F877A
This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip’s powerful PIC architecture into an 40- or 44-pin package and is upward compatible with the PIC16C5X, PIC12CXXX, and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self-programming, an ICD, two comparators, eight channels of 10-bit analog-to-digital (A/D) converter, two capture/compare/PWM functions, and the synchronous serial port can be configured as either 3-wire serial peripheral interface™ or the 2-wire integrated circuit™ bus and a universal asynchronous receiver transmitter. All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances, and consumer applications.

Block Description
Initially, the sensors check whether the driver wears helmet properly and also non-alcoholic if conditions are true, then bike starts or else bike does not start. RF transmitter gets signal from the sensors and transmits it to the receiver.

Once data received by the receiver it is continuously scanned by the microcontroller; accordingly, it performs the desired actions.

FUTURE WORK

Phase 1
All the components required for the construction of the intelligent helmet device have been purchased. The necessary papers and articles required for the development of the project have been done during the first phase of the project.

Future Work
All the components required for the construction of the intelligent helmet device have been purchased. Theoretically, the device is proved, practically the device is yet to be designed. Further, the procedure has to be followed and the device is to be constructed.

REFERENCES


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