Smart Helmet using Licencetronic System

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Abstract:
In India, common man uses motor cycles as affordable vehicle for travelling. As per the Indian Population the ratio of middle class people is more. The ratio of accidents occurs due to motor cycle are more as compared to other vehicles. These accidents happens due to many reasons like high speed of the bike, drunk and drive cases and last because of not wearing helmets during driving. The solution to these problems is smart helmet. The helmet is mandatory to wear to start ignition of bike. Smart helmet is protective headgear use by biker to make driving safe. This System has two modules, bike module and helmet module. Helmet module which will help to detect helmet is wear or not and drunken biker. The bike will start only when helmet is wear by non drunken rider. The novel of this smart helmet includes alcohol sensor.

I. INTRODUCTION

The thought of developing this project comes to do some good things for the society. Day by day the accidents are increasing which leads to loss of many lives. According to a survey in India there are around 698 accidents occurring due to bike crashes per year. The reasons may be many such as improper driving knowledge, no fitness of the vehicle, fast riding, drunk and drive etc. Sometime the person injured, the accident may not be directly responsible for the accident, it may be fault of rider, but end of the day it’s both the drivers involved in the accident who is going to suffer. This is a situation we observe our day to day life. In today’s era, especially in the young generation, the craze of motorbikes is really remarkable. As the bikers in our country are increasing, the road mishaps are also increasing day by day, due to which many deaths occur, most of them are caused by the negligence in wearing helmet. And one of the reasons for this accident is alcohol consumption. Even though breath analyzers are used to detect whether the rider has consumed alcohol or not by the traffic department, it is difficult to check each and every rider on the road. Also other important reason for the accident is people who do not know how to ride a bike still ride a bike and also young generation who is not above 18 years also ride a bike in our country. Due to which road accident happens more. In recent times proper riding gear and proper documents have been made compulsory by the government of India. Traffic accidents in India have been increased every year. As per Section 129 of Motor Vehicles Act, 1988, every single person riding a two-wheeler is required to wear protective headgear following the standards of BIS (Bureau of Indian Standards). Also, drunken driving under the influence (DUI) is a criminal offence according to the Motor Vehicle act 1939, which states that the bike rider will get punishment. Currently bike riders easily escape from the law.

These are the three main issues which motivates us for developing this project.
1. Make wearing the helmet compulsory.
2. Avoid drunk and drive.
3. Make compulsory to carry valid license.

The first step is to identify whether the helmet is worn or not. If helmet is worn then ignition will start otherwise it remains off. For this, push button (push to OFF type) sensor is used. The second step is alcohol detection. Alcohol sensor is used as breath analyzer which detects the presence of alcohol in rider’s breath and if it exceeds permissible limit ignition cannot start. It’ll send message to the number saying that “Rider is drunk and is trying to ride the bike”. MQ Sensor is used for this purpose. The third step is license detection. RFID system is used for the detection of valid license. When these three conditions are satisfied then only ignition starts. Otherwise if a person will fail in any of these three requirements the ignition will not start.

II. COMPONENTS

ATMEGA 328P
The high-performance Microchip picopower 8-bit AVR RISC-based microcontroller combines 32KB ISP flash memory with read-while-write capabilities, 1024B EEPROM, 2KB SRAM, 23 general purpose I/O lines, 32 general purpose working registers, three flexible timer/counters with compare modes, 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 (8-channels in TQFP and QFN/MLF packages), 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 achieves throughputs approaching 1 MIPS per MHz, balancing power consumption and processing speed.

HT12E
HT12E is a 212 series encoder IC (Integrated Circuit) for remote control applications. It is commonly used for radio frequency (RF) applications. By using the paired HT12E encoder and HT12D decoder we can easily transmit and receive 12 bits of parallel data serially. HT12E simply converts 12 bit parallel data in to serial output which can be transmitted through a RF transmitter. These 12 bit parallel data is divided in to 8 address bits and 4 data bits. By using these address pins we can provide
8 bit security code for data transmission and multiple receivers may be addressed using the same transmitter.

**HT12D**
HT12D is a 212 series decoder IC (Integrated Circuit) for remote control applications manufactured by Holtek. It is commonly used for radio frequency (RF) wireless applications. By using the paired HT12E encoder and HT12D decoder we can transmit 12 bits of parallel data serially. HT12D simply converts serial data to its input (may be received through RF receiver) to 12 bit parallel data. These 12 bit parallel data is divided in to 8 address bits and 4 data bits. Using 8 address bits we can provide 8 bit security code for 4 bit data and can be used to address multiple receivers by using the same transmitter.

**RF TRANSMITTER AND RECEIVER**
The RF module, as the name suggests, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. 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). Transmission through RF is better than IR (infrared) because of many reasons. Firstly, signals through RF can travel through larger distances making it suitable for long range applications. Also, while IR mostly operates in line-of-sight mode, RF signals can travel even when there is an obstruction between transmitter & receiver. Next, RF transmission is more strong and reliable than IR transmission. RF communication uses a specific frequency unlike IR signals which are affected by other IR emitting sources. This RF module comprises of RF transmitter and 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 pin4. The transmission occurs at the rate of 1Kbps – 10Kbps. The transmitted data is received by an RF receiver operating at the same frequency as that of the transmitter. The RF module is often used along with a pair of encoder/decoder. The encoder is used for encoding parallel data for transmission feed while reception is decoded by a decoder. HT12E-HT12D, HT640-HT648, etc. are some commonly used encoder/decoder pair ICs.

**RELAY12V/10A**
A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals. The switch may have any number of contacts in multiple contact forms, such as make contacts, break contacts, or combinations thereof. Relays are used where it is necessary to control a circuit by an independent low-power signal, or where several circuits must be controlled by one signal. Relays were first used in long-distance telegraph circuits as signal repeaters: they refresh the signal coming in from one circuit by transmitting it on another circuit. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

**ALCOHOL SENSING**
An alcohol sensor detects the attentiveness of alcohol gas in the air and an analog voltage is an output reading. The sensor can activate at temperatures ranging from -10 to 50° C with a power supply is less than 150 Ma to 5V. The sensing range is from 0.04 mg/L to 4 mg/L, which is suitable for breathalyzers. To check the alcohol concentration users have to blow in the straw for some minutes. The air blown contains the vapors which are used for calculating the alcohol content. This happens because alcohol doesn’t get digested instead it is absorbed by the mouth and stomach. Thus some traces are always left even after several hours of drinking.

**BATTERY (9VOLTS AND 12 VOLTS)**
The nine-volt battery, or 9-volt battery, is a common size of battery that was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in walkie-talkies, clocks and smoke detectors. The nine-volt battery format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury-oxide batteries of this format, once common, have not been manufactured in many years due to their mercury content.

**GENERAL PCB**
Printed circuit boards are used in all but the simplest electronic products. They are also used in some electrical products, such as passive switch boxes. Alternatives to PCBs include wire wrap and point-to-point construction, both once popular but now rarely used. PCBs require additional design effort to lay out the circuit, but manufacturing and assembly can be automated. Specialized CAD software is available to do much of the work of layout. Mass-producing circuits with PCBs is cheaper and faster than with other wiring methods, as components are mounted and wired in one operation. Large numbers of PCBs can be fabricated at the same time, and the layout only has to be done once. PCBs can also be made manually in small quantities, with reduced benefits.

**Push button (Push to OFF type) as helmet sensor**
control some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, although many un-biased buttons (due to their physical nature) still require a spring to return to their un-pushed state. Terms for the “pushing” of a button include pressing, depressing, mashing, slapping, hitting, and punching.

**RFID**
Radio-frequency identification (RFID) uses electromagnetic fields to automatically identify and track tags attached to objects. An RFID tag consists of a tiny radio transponder; a radio receiver and transmitter.

When triggered by an electromagnetic interrogation pulse from a nearby RFID reader device, the tag transmits digital data, usually an identifying inventory number, back to the reader. This number can be used to inventory goods. There are two types. Passive tags are powered by energy from the RFID reader's interrogating radio waves. Active tags are powered by a battery and thus can be read at a greater range from the RFID reader; up to hundreds of meters.
III. SYSTEM DESCRIPTION

HELMET MODULE
The three sensors—alcohol and the helmet sensors are assembled here; it will run with a 9V battery. The 7805 linear regulator IC connected to the circuit will convert 9V to 5V. This circuit contains RF transmitter, Encoder, sensors and regulator. Output from each of the sensors is connected to the data input pins of encoder (AD9, AD10 and AD11). Encoder will continuously encode and these sensors values are fed to RF transmitter to transmit data to the ECU unit for further actions. All the sensors we have used here is digital (TTL output) to makes our system easier. Push button is used here as helmet sensor i.e. it will detect the wearing of helmet. It must be push off type i.e. in normal condition it will be ON and when pushed it will be OFF.

Alcohol sensor must be placed in front of the mouth to check alcohol content in the breath.

ECU MODEL

RF receiver receives signals from the helmet module and are decoded by decoder IC HT12D. Decoder is directly connected to PORT E; it is continuously scanned by PIC and does the required actions. Relay is used to short the spark plug to ground; normally vehicle body is connected to ground. In normal case spark plug is shorted to ground, it will disconnect from ground only after wearing helmet and when no alcohol is detected. LCD display shows the status of the system—Alcohol detection and the license.

ADVANTAGES

Very compact, thin and light, especially in comparison with bulky, heavy CRT displays.

Low power consumption
Little heat emitted during operation, due to low power consumption

No geometric distortion

The possible ability to have little or no flicker depending on backlight technology

Emits almost no undesirable electromagnetic radiation (in the extremely low frequency range), unlike a CRT monitor

Can be made in almost any size or shape

Unaffected by magnetic fields, including the Earth's magnetic fields

DISADVANTAGES

Limited viewing angle in some older or cheaper monitors, causing colour, saturation, contrast and brightness to vary with user position, even within the intended viewing angle

Black levels may not be as dark as required because individual liquid crystals cannot completely block all of the backlight from passing through

Only one native resolution. Displaying any other resolution either requires a video scalar, causing blurriness and jagged edges, or running the display at native resolution using 1:1 pixel mapping, causing the image either not to fill the screen (letterboxed display), or to run off the lower or right edges of the screen

Subject to burn-in effect, although the cause differs from CRT and the effect may not be permanent, a static image can cause burn-in in a matter of hours in badly designed displays

In a constant-on situation, thermalization may occur in case of bad thermal management, in which part of the screen has overheated and looks discoloured compared to the rest of the screen

IV. CONCLUSION

Design such a project and implement it, we gather great practical experience. We tried to implement our theoretical knowledge successfully. This project teaches us about the far difference between theoretical and practical knowledge. The designed Smart helmet ensures the safety of the rider by making it necessary to wear helmet, and also ensures that the rider hasn’t consumed alcohol more than the permissible limit. If any of these prime safety rules are violated, the proposed system will prevent the biker from starting the bike. 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 intelligent 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.

FUTURE SCOPE

In future we have planned to construct our intelligent system during a compact size and additionally as globally acceptable to notify the No entry and No parking areas.

Can be modified for four wheelers

GPS can be used to track the location of accident

Light dimmer sensors can be used to dim the light automatically when light from other vehicles falls on it.

Various bioelectric sensors can be implemented on the helmet to measure various activities

Small camera can be fitted on helmet to record driver’s activity

V. REFERENCES


