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SMART HELMET BY USING MICROCONTROLLER

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Abstract: Road accidents in our country are increasing day by day. Most of the accidents occur due to not wearing helmet, which can cause severe head injuries or even fatality of the rider. So it is necessary to make it mandatory to wear helmet while riding on a bike. In this project I have made a prototype of smart helmet. It has an Infrared sensor inside the helmet, which will detect whether the rider is wearing helmet or not. The bike will not start until the rider will wear the helmet. There are two modules on is mounted on helmet and another is mounted on vehicle. Infrared sensor is attached with the helmet module and Microcontroller is attached to the vehicle module. These two modules will communicate wirelessly using Radio frequency transmitter and receiver with microcontroller.

Keywords: *Sensor, Infrared Sensor, Transmitter, Microcontroller.*

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I INTRODUCTION

Safety and security is very important aspect of our life. Majority of people of our country prefer two wheelers as compared to other vehicles due to low cost and simplicity. Two wheelers are invented for making human life better but it affects on human beings in the form of accidents.Now a day's most of the human deaths and severe injuries to people occurs because of two wheeler road accidents. According to a research, for every four minutes there is a one death being reported in our country. Hence helmets are very important to avoid severe head injuries and deaths. These road accidents can be avoided by using SMART HELMET.

The main purpose behind this project is to design a smart helmet to avoid accidents and to make the journey safe. The idea of this project comes from our responsibilities towards society. Even though there have been continuous awareness from the government authorities, most of the people do not heed them. The main aim of this project is to make it mandatory for rider to wear Helmet while riding.

There are two important criteria which will be verified by this helmet first is to check whether the rider is wearing the Helmet and second is to check that the rider is just keeping it throughout the journey or not. The IR sensor will check if the person is wearing the Helmet or not. If the person is not wearing helmet, the vehicle module will not start the bike. The bike will start only when the rider will wear the Helmet. If using Smart Helmet while riding becomes mandatory, it will help to reduce number of accidents occurs every day as well as it will reduce death ratio caused by accidents.

II COMPONENTS USED:

I. SOLAR PANEL :

Fig.2.1:- Solar Panel

Solar energy is freely available in nature so we can use that energy to charge the battery connected in circuit. The battery used in the circuit is of rechargeable. Here, Solar Panel of 3 volt is used to charge that battery. It is placed on the top of helmet where solar panel will get maximum sunrays and achieve maximum efficiency.

II. BATTERY:

Fig. 2.2:- Battery

The battery is used to give supply to the overall helmet circuit including IR sensor. The rating of Battery is 3.7 volt 2600mAh. It is Replaceable and Rechargeable. It can be charged by connecting USB to the battery charging module and also by

using Solar Panel of 3 volt. The battery can run upto 3-4 days in single charge as there is minimum load in the circuit.

III. IR SENSOR:

Fig. 2.3:- IR Sensor

An infrared (IR) sensor is an electronic device which measures and detects infrared radiation in its surrounding. An IR sensor is placed inside the helmet. Whenever the user will wear the Helmet, the infrared light from LED reflects off and is detected by the receiver. The sensor then sends an electronic signal to the helmet circuit module.

IV. ENCODER:

Fig. 2.4:- Encoder

The Encoder IC HT12E converts the parallel inputs into serial output. It is used for parallel data transmission. Encoder will encode the electronic signal from IR sensor and transfer it to the RF transmitter for transmission.

V. DECODER IC:

Fig. 2.5:- Decoder

Decoder IC HT12D converts the serial input into parallel outputs. It decodes the data received by RF receiver, and sends them to output data pin of microcontroller.

VI. RF TRANSMITTER:

Fig. 2.6:- RF Transmitter

RF transmitter operates on Radio Frequency. It is placed in circuit mounted on Helmet. The RF transmitter operates at a frequency of 434 MHz An RF transmitter receives data from Encoder IC and transmits it wirelessly through RF through it's antenna.

VII. RF RECEIVER:

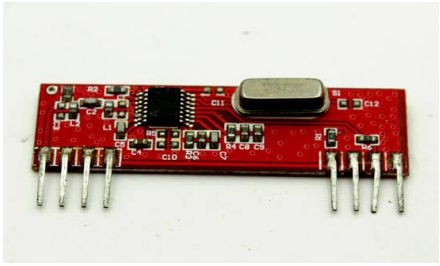

Fig. 2.7:- FR Receiver

The RF module, operates at Radio Frequency. The corresponding frequency range varies between 30 kHz & 300 GHz. The transmitted data from transmitter is received by an RF receiver operating at the same frequency as that of the transmitter which is 434MHz

VIII. ATMEGA 328P:

Fig. 2.8:- ATMEGA 328P Microcontroller

ATMEGA328P is high performance, low power, an 8-bit microcontroller. Output data from Decoder IC is given to the microcontroller. Microcontroller is programmed to operate the load according to the received input. When rider will wear Helmet, receiver will receive the signal and will turn on the load/bike through relay coil and vice-versa.

IX. RELAY MODULE:

Fig. 2.9:- Relay Module

A power relay module is an electrical switch which is operated by an electromagnet. The electromagnet is activated by a separate low-power signal from a micro controller. Initially the switch is in NC State, at that time Red LED will turn on and Alarm will start ringing. when relay coil receives signal from microcontroller, it will change its state from NC to NO and load/ bike will get connected and the load/bike will start

III. MODULES:

3.1: Helmet Module

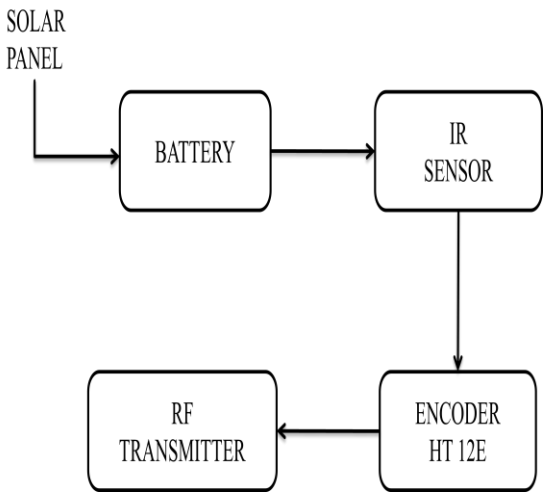

Fig-1: Block Diagram of Helmet Module

- **Working:**

While wearing the helmet, rider should first turn ON the switch on the helmet unit to turn on the supply. The circuit is supplied by the battery of 2600mAh.

When the battery will turn on, the supply will get connected to the IR sensor, Encoder IC and RF transmitter module.

When rider will wear the Helmet, IR sensor will detect it and it will send output in the form of signal to the Encoder IC. Whenever rider will wear Helmet, IR sensor will send high output and when rider is not wearing helmet, it will send low output to the Encoder.

Encoder IC will encode that signalled output into bytes format. That output is then given to the RF transmitter. The RF transmitter will amplify that data and will transmit it to RF Receiver.

As the circuit will remain ON until that rider turns OFF manually, the battery used in circuit will discharge continuously. If at a point the battery get discharged totally, then the supply of helmet circuit will get cut off and the IR sensor will not be able to detect whether the rider is wearing helmet or not. Also the RF transmitter will not be able to transfer signals to the RF Receiver. Due to this the alarm in vehicle module will continue ringing.

To avoid all this, the Rechargeable and replaceable Battery is used in this circuit. The battery can be charged by using very small solar panel of 3 volt. It is mounted on upper side of helmet. Also it can be charged by connecting USB to the battery charging module. If the battery gets damaged, then user can replace that battery easily.

3.2: Vehicle Module

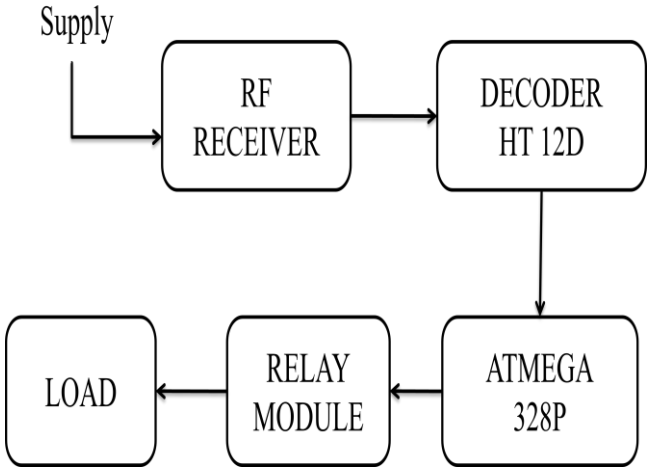

Fig-2: Block Diagram of Vehicle Module

- **Working:**

When rider will insert the key in key socket and start, it will only turn on the battery in vehicle and supply will get connected to the vehicle module. Generally batteries used in vehicles are of 12volt and Vehicle module runs on 5volt voltage supply. So, Voltage Regulator IC is used to convert 12 volt into 5 volt.

When RF Receiver will receive the signal, it will amplify and forward it to the Decoder IC. There is a Green LED connected to check whether the RF Receiver is receiving signal or not. Decoder will decode the data into one's and zero's format and forward it to the microcontroller.

Microcontroller is programmed to operate the load according to the data received from Decoder IC. There is a reset button is placed in 1st pin of microcontroller to refresh the program if necessary. Microcontroller is used to control the load through relay coil.

Initially the relay contacts are in closed state, at that time Red LED and Alarm is connected in circuit and load is off. When the contacts will switch their position from NC to NO, load/ vehicle will get start.

When rider will try to start the bike without wearing helmet, the Red LED will be turned on and Alarm will start ringing and Bike will not start until he or she wears the Helmet. When the rider will wear the helmet that Red LED and Alarm will be turned off and Bike will get start.

IV . ACTUAL WORK IMPLIMENTATION:

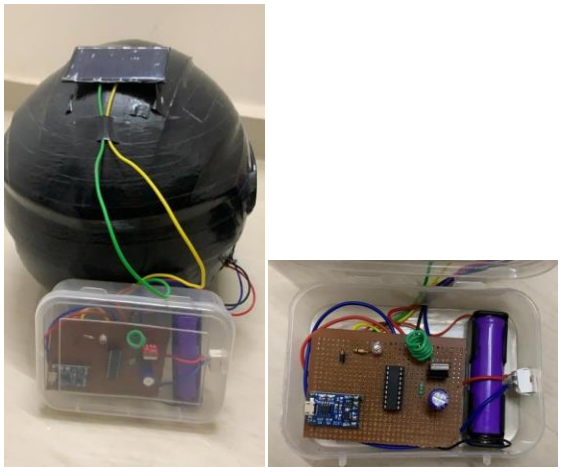

Fig.4.1:- Helmet Module.

Fig.4.2:- Vehicle Module.

V. RESULTS:

Sr. No.	Observations			
	Situations	LED	Alarm	Load
1	Not Wearing Helmet	*ON*	*ON*	*OFF*
2	Wearing Helmet	*OFF*	*OFF*	*ON*

VI. 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. The results of this project have proved that the motorcycle's engine will only start is the helmet is worn and the belt has been buckled. This system is very effective for the safety purpose of the user. It will reduce the impact from accident and can prevent motorcycles from being stolen.

ACKNOWLEDGMENT:

It gives me an immense pleasure to present a paper on successful completion of my project "Smart Helmet". I express my deep sense of gratitude towards my guide Prof. Y. R. Naik for their guidance. I am thankful of his assistance, advice and guidance towards making my project success.

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