IMPLEMENTATION OF SMART HELMET MODEL USING EMBEDDED SYSTEM AND RF433 MODULE

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ABSTRACT

Road accidents are on the rise day by day, and in countries like India where bikes are more prevalent many people die due to carelessness caused in wearing motorcycle helmets. Even though there have been continuous awareness from the government authorities regarding helmets and seat belts a majority of drivers do not heed 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 RF transmitter and receiver with encoder and decoder, AT89S52 is used as CPU.

KEYWORDS: Encoder/Decoder IC, RF Transmitter And Receiver, Smart Bike Helmet System

A helmet is a form of protective gear worn on the head to protect it from injuries. The oldest now use of helmets was by Assyrian soldiers in 900BC who wore thick leather or bronze helmets to protect the head from blunt object and sword blows and arrow strikes in combat. In civilian life, helmets are used for recreational activities, sports and transportation.

The road accident is one of the major problems all over the world. The recent report says that the annual average road accident is estimated to about 7,00,000 of which 10% occur in India which has overtaken China. The annual statistics revealed by the World Health Organization(WHO) in its global status report on road safety says that around 80,000 people are killed on Indian roads due to rush driving, drunken driving and less usage of helmets. Also, most of the countries are forcing the motor riders to wear the helmet.

This motivates us to think about making a system which ensures the safety of biker, by making it necessary to wear helmet, as per government guidelines.

This proposal aims at the security and safety of bikers against road accidents, while also providing them with a luxurious, comfortable two-wheeler experience. Each smart helmet has an in-built circuit and software with various functions.

The circuit in each helmet is designed in such a manner that the bike won't start unless the rider wears the helmet.

In this smart bike helmet system, RF transmitter transmits the analog signal wirelessly and RF receiver receives the analog signal, unless receiver will not receive signal the bike won't start.

OBJECTIVE OF PROJECT

The objective of the project is to design a helmet with features like road hazards, to improve the safety of the motorcycles.

LITERATURE REVIEW

After reading various literature papers that were based on smart helmet, we found this topic (smart helmet) as the most useful technology in the present growing technology. After reading many papers relative to this concept we found one paper that was very much helpful to us in leading the project. In this technical paper smart helmet explains how to establish a safety society and secure society. This smart helmet has various application like useful for school students, Useful for bike and scooters, help to protect life in accident case, number of cases of violated traffic rules can be reduced. In all the above mention application we will use RF module, but with a little change in the hardware. Along with this I will explain you how these application are used to improve the safety of motorcyclists, to develop an Smart safety helmet for complete rider, and to study and understand the concept of RF Transmitter and RF Receiver circuit in implementing the project. This technical paper plays an important role in safety purpose.

Main Concluding Points From Paper

This paper very briefly explains us about the working of RF module and how to create a working environment for this module. This also explains us about the serial communication technique used in this concept of information transmission.

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1. Smart Helmet Using Arduino [1] : This is a report about a smart helmet which makes motorcycle driving safer than before. The aim of this project is to give information at accident to ambulance N family members. This is implemented using Arduino. This smart helmet was implemented by placing vibrations sensors in different places of helmet where the probability of hitting is more which are connected to arguing board. When the date exceeds minimum stress limit then the GSM module sends message to family members automatically. The hardware used in this system is Arduino board, Bluetooth module, vibration sensor and mobile phone.

2. Smart Helmet for Indian Bike Rider [2] : This paper presents the smart helmet that makes sure that the rider cannot start the bike without wearing it. This helmet replaces the cable connections for wirelessly switching on a bike, so that the bike would not start without both the key and the helmet. A LED indicator is used to demonstrate the working of the model. The system is a simple telemetry system, which is activated with the help of a pressure that is applied to the inner side of the helmet when the rider wears it. The framework model uses DPDT electromechanical relay and hence there is some time lag in wearing the helmet and switching on of the circuit.

3. Smart Helmet Using GSM & GPS Technology for Accident Detection and Reporting System [3] : A smart helmet is an innovative concept which makes motorcycle driving safer than before. It uses the GPS and GSM as its core technologies. The mechanism of this smart helmet is very simple, vibration sensors are placed in different sections of helmet where the chances of hitting is more which are connected to microcontroller board. So when the rider crashes and the helmet hit the ground, these sensors sense and provide it to the microcontroller board, then controller extract GPS data using the GPS module that is integrated to it. When the data goes below the minimum stress limit then GSM module automatically sends alerting message to ambulance or family members. The hardware used in this system is alcohol sensor, GSM, GPS, microcontroller, pressure sensor and vibration sensor.

4. Alcohol Detection Using Smart Helmet System [4] : The system automatically checks whether the person is wearing the helmet and has non- alcoholic breath while driving. There is a transmitter at the helmet and a receiver at the bike. There is a switch used to sure the wearing of helmet on the head. The data to be transferred is coded with RF encoder and transmitted through radio frequency transmitter. The receiver at the bike collects the data and decodes it through RF decoder. MCU controls the function of relay and thus the ignition; it controls the engine through a relay and a relay interfacing circuit.

SYSTEM DEVELOPMENT

This project is divided into two sections helmet and bike. The easiest solution would be to make a handmade wireless toy bike. We will be using ASK (Amplitude Shift Keying) based Tx/Rx (transmitter/receiver) pair operating at 433 MHz. The transmitter module accepts serial data at a maximum of XX baud rate. It can be directly interfaced with a microcontroller or can be used in remote control applications with the help of encoder/decoder ICs.

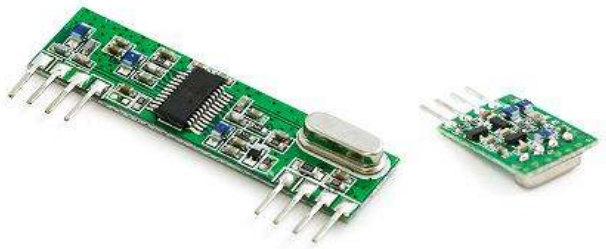

Figure 3.1: RF433 Module

The encoder IC takes in parallel data which is to be transmitted, packages it into serial format and then transmits it with the help of the RF transmitter module. At the receiver end the decoder IC receives the signal via the RF receiver module, decodes the serial data and reproduces the original data in the parallel format.

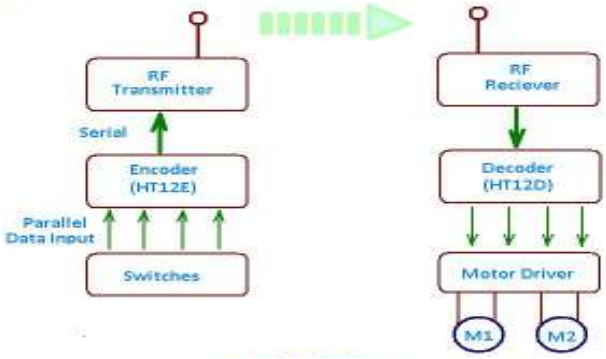

Figure 3.2: Block Diagram of Project

Now in order to control say a dc motor, we require 2 bits of information (switching it on/off) while we need 4 bits of information to control 2 motors. HT12E

and HT12D are 4 channel encoder/decoder ICs directly compatible with the specified RF module. In order to drive motors, we would need to connect a suitable motor driver at the output of the decoder IC. The motor driver circuit can consist of a relay, transistorized H-Bridge or motor driver ICs like the L293D, L298 etc. The block diagram is as shown below.

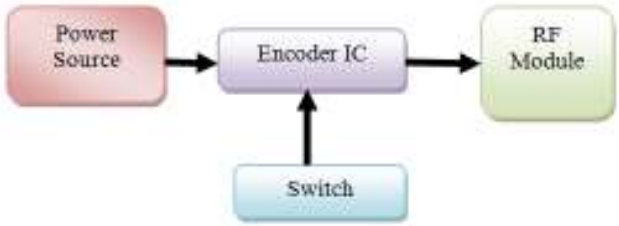

Figure 3.3: Transmitter Section

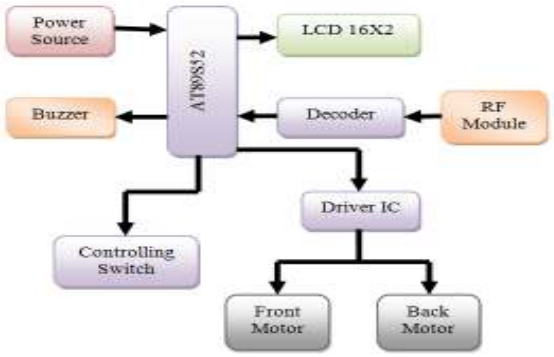

Figure 3.4 Receiver Section

RESULTS AND CONCLUSION

A RF signal radiates from transmitter section and receives a synchronized address bit through RF receiver. The ignition of the bike starts, this implies that the smart helmet system is working properly.

Figure 7.1: Implemented Handmade Bike Model

Figure 7.2: Helmet-Transmitter Section

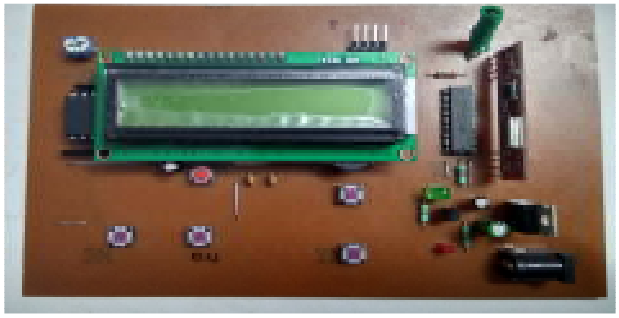

Figure 7.3: Receiver Section

The developed system efficiently ensures that rider is wearing helmet throughout the ride. By implementing this system a safe two wheeler journey is possible which would decrease the head injuries during accidents and reduce the accident rate. The proposed approach makes it mandatory for the rider to use this protective guard in order to drive a two wheeler vehicle and ensures the safety of the human brain and therefore reduce the risk of brain injuries and death in case of an accident. Besides, the developed system prevents theft of the two wheelers.

This smart helmet system technology can further be enhanced into four wheeler also by replacing the helmet with seat-belt. It can be used in real time safety system.

Through the smart helmet system technology detection of accident in remote area can be easily detected and medical services provided in short time. It works on a range of 100 meters and is cheaper at cost production. Smart helmet system has a limitation as due to limited number of data combinations a vehicle may receive data of another helmet and may get started.

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