SMART HELMET

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from

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Certificate

*This is to certify that the project report entitled "***SMART HELMET***" is a bonafide record of the work done by* **MUNASAF P. K.(CEAOECS049), RAEES MOHAMMED P. P.(CEAOECS061), SAFAR SAJID(CEAOECS065)& SAJIHE C. K.(CEAOECS066)** *under our supervision and guidance. The report has been submitted in partial fulfilment of the requirement for award of the Degree of* **Bachelor of Technology** *in* **Computer Science & Engineering** *from the University of Calicut for the year 2017.*

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Abstract

In present time many cases of bike accident can be seen around us. Peoples get injured or might be dead and one of the reason is not wearing helmet. Many peoples could save their life in accident cases if they worn helmet at the time of accident. Continuously road rules are violated. So as to overcome these problems, Smart helmet is proposed having a control system built inside a helmet. Smart Helmet for Motorcyclist is a project undertaken to increase the rate of road safety among motorcyclists. The idea is obtained after knowing that the increasing number of fatal road accidents over the years is cause for concern among motorcyclists. It consist a RF transmitter and a RF receiver system. the bike will not get start without wearing helmet by the user, as user wear helmet a rf signal radiate from transmitter and once these rf signal get sensed by the receiver placed in the ignition switch of the bike, bike will get start. Security system applied in this project meet the characteristics of a perfect rider and the application should be highlighted. The project is expected to improve safety and reduce accidents, especially fatal to the motorcyclist.

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List of Abbreviations

APP	**A**pplication
RF	**R**adio **F**requency
IC	**I**ntegrated **C**ircuit
ECG	**E**lectro **C**ardiogram
CMG	**C**ontrol **M**oment **G**yro

CHAPTER 1

INTRODUCTION

In today's era, especially in the young generation, the craze of motorbikes is really remarkable. The middle class families prefer to buy motorbikes over 4-wheelers, because of their low prices, various varieties available in the market, due to cut-throat competitions between 2- wheeler companies and durability. 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 due to most common negligence of not wearing the helmets, also many deaths occur due to lack of prompt medical attention needed by the injured person.

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. The project aims at the security and safety of the bikers against road accidents. The circuit is so designed that the bike wont' start without wearing helmet It introduced a security system on the rider with the perfect helmet usage before riding. in this system no advanced concepts of JAVA Programming (JavaScript, j2me) and Micro controller 8051 based circuitry is used. Based on RF link simple working and operation. By using RF transmitter and RF receiver, the motorcycle can be moved if it receive signal from the helmet .Here our main object is to design the circuit that can improve the safety of motorcyclists.

CHAPTER 2

LITERATURE SURVEY

2.1 “Bluetooth Technology

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994, It was originally conceived as a wireless alternative to RS-232 data cables[1]

2.1.1 Advantages

1. Low power consumption
2. Used for voice and data transfer
3. Available at very cheap cost

2.1.2 Disadvantages

1. Security
2. Interference
3. Low bandwidth

2.2 Proximity Sensor

It detect the presence of nearby objects without any physical contact. The Object being sensed is often referred to as the proximity sensor's target. It helps to reduce the collision of vehicles. This sensor is Widely used as parking sensors [2]

2.2.1 Advantages

1. Able to detect both metallic and non-metallic targets
2. High reliability and long functional life

2.2.2 Disadvantages

1. Chance for failures is high
2. Expensive when compared with other sensors

2.3 Embedded system

Aim is to provide smart bike monitoring system that will help in saving human lives. This avoids robbing of vehicles. The system has four units

1. Detecting an accident and providing a SMS to the mobile number stored in the memory
2. Vehicle tracking system that will give position
3. A wireless remote that will control on/off mechanism of the bike
4. Side Stand automation mechanism provide balance to the user

[3]

2.3.1 Advantages

1. Provides safety for both bike and rider
2. Access to location helps to locate the bike is being accident

2.3.2 Disadvantages

1. Chance for errors are high
2. Circuits are complicated
3. Expensive Implementation

2.4 Vital signs from inside a helmet: A multichannel face-lead study

A face-lead ECG (Electrocardiogram) is placed inside a helmet to enhance comfort and convenience in racing scenarios. Multiple electrodes were attached to facial locations, which exhibit good contact with a helmet, and bipolar configurations were examined between the left and right side of the subject's face. Standard and data-driven filtering algorithms were employed to improve the extraction of R peaks from the ECG data. Extracted R peaks were subsequently used to estimate heart activity and respiration effort [4]

2.4.1 Advantages

1. Opportunity to monitor simultaneously both the vital signs and the electroencephalogram (EEG)
2. Developed signal processing algorithms do not require a prior knowledge of any parameters

2.4.2 Disadvantages

1. Requires the application of a saline solution to the soft electrodes embedded into the helmet lining
2. Expensive

2.5 Modelling of bike steered by CMG (Control Moment Gyro)

Enhancing brakes if it detects pedestrians ahead of the vehicle (AEB Autonomous Emergency Breaking). The system help a cyclist/motorcyclist to maintain a balance in case of too excessive deflection of the vehicle from vertical direction [5]

2.5.1 Advantages

1. Helps to reduce collision due to failure of balance
2. Increase safety of riders
3. Efficient braking effect is applied to the vehicle

2.5.2 Disadvantages

1. Expensive implementation
2. Enhanced braking may fail

CHAPTER 3

OBJECTIVES

The purpose of the project is to create a helmet that helps to reduce bike accidents. Main objectives of this App are as follows:

1. An application for easier connectivity between phone and helmet.
2. Caller name speaker.
3. Light blink if side stand is not in the correct positions.
4. Light blink in the helmet if a vehicle is too close to the bike.
5. Easy Communication with pile rider.
6. Bike doesn't starts until helmet worn.
7. Pick calls during ride.
8. Hear music.
9. Hear navigation sounds.
10. Water repellent (nano technology) and day/night glasses.

CHAPTER 4

PROPOSED SYSTEM

Smart helmet for safe rider is designed with radio frequency link. , as user wear helmet a RF signal radiate from transmitter and these RF signal get sensed and synchronized with the help of address matching by the receiver section placed in the ignition switch of the bike and bike get started and bike stopped working as helmet keep out from head. This means bike work properly till helmet keep on head.

4.1 System Design

4.1.1 System Modules

4.1.1.1 RF Transmitter

An RF transmitter module is a small PCB sub-assembly capable of transmitting a radio wave and modulating that wave to carry data. Transmitter modules are usually implemented alongside a micro controller which will provide data to the module which can be transmitted. RF transmitters are usually subject to regulatory requirements which dictate the maximum allowable transmitter power output, harmonics, and band edge requirements.

FIGURE 4.1: RF Transmitter

4.1.1.2 RF Receiver

An RF receiver module receives the modulated RF signal, and demodulates it. There are two types of RF receiver modules: superheterodyne receivers and super-regenerative receivers. Super-regenerative modules are usually low cost and low power designs using a series of amplifiers to extract modulated data from a carrier wave. Super-regenerative modules are generally imprecise as their frequency of operation varies considerably with temperature and power supply voltage.[citation needed] Superheterodyne receivers have a performance advantage over super-regenerative; they offer increased accuracy and stability over a large voltage and temperature range. This stability comes from a fixed crystal design which in the past tended to mean a comparatively more expensive product. However, advances in receiver chip design now mean that currently there is little price difference between superheterodyne and super-regenerative receiver modules.

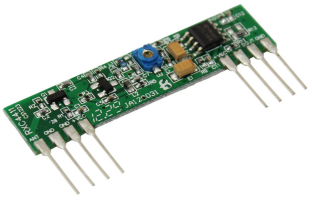


FIGURE 4.2: RF Receiver

4.1.1.3 BLUETOOTH Module

Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz[3]) from fixed and mobile devices, and building personal area networks (PANs). Invented by telecom vendor Ericsson in 1994,[4] it was originally conceived as a wireless alternative to RS-232 data cables.

FIGURE 4.3: BLUETOOTH Module

4.1.2 ENCODER IC

HT12E is an encoder integrated circuit of 212 series of encoders. They are paired with 212 series of decoders for use in remote control system applications. It is mainly used in interfacing RF and infrared circuits. The chosen pair of encoder/decoder should have same number of addresses and data format.

Simply put, HT12E converts the parallel inputs into serial output. It encodes the 12 bit parallel data into serial for transmission through an RF transmitter. These 12 bits are divided into 8 address bits and 4 data bits.

HT12E has a transmission enable pin which is active low. When a trigger signal is received on TE pin, the programmed addresses/data are transmitted together with the header bits via an RF or an infrared transmission medium. HT12E begins a 4-word transmission cycle upon receipt of a transmission enable. This cycle is repeated as long as TE is kept low. As soon as TE returns to high, the encoder output completes its final cycle and then stops.

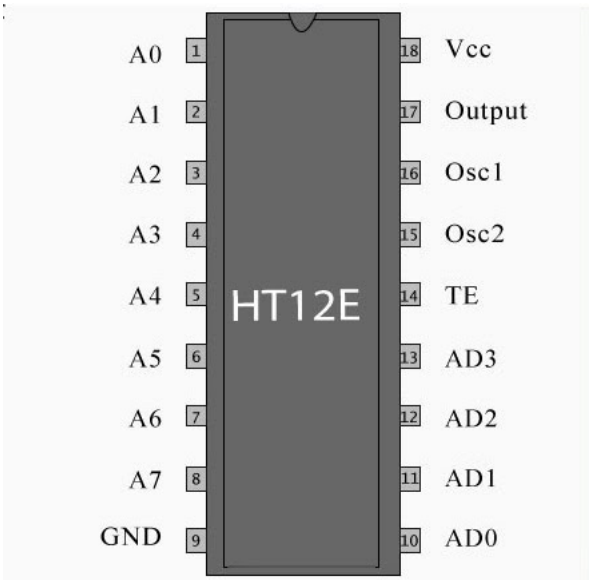


FIGURE 4.4: ENCODER IC

4.1.3 DECODER IC

HT12D is a decoder integrated circuit that belongs to 212 series of decoders. This series of decoders are mainly used for remote control system applications, like burglar alarm, car door controller, security system etc. It is mainly provided to interface RF and infrared circuits. They are paired with 212 series of encoders. The chosen pair of encoder/decoder should have same number of addresses and data format.

In simple terms, HT12D converts the serial input into parallel outputs. It decodes the serial addresses and data received by, say, an RF receiver, into parallel data and sends them to output data pins. The serial input data is compared with the local addresses three times continuously. The input data code is decoded when no error or unmatched codes are found. A valid transmission in indicated by a high signal at VT pin.

HT12D is capable of decoding 12 bits, of which 8 are address bits and 4 are data bits. The data on 4 bit latch type output pins remain unchanged until new is received.

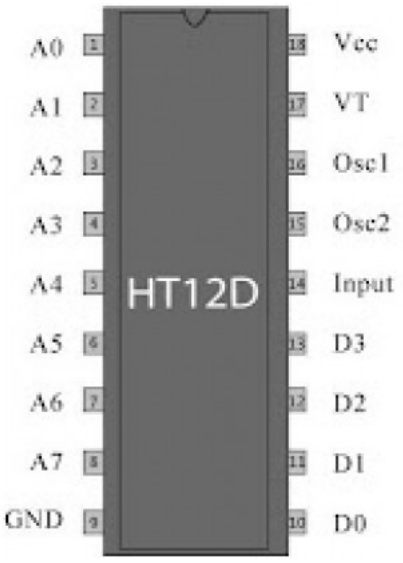


FIGURE 4.5: DECODER IC

4.1.4 TSOP IR SENSOR

The TSOP 1738 is a member of IR remote control receiver series. This IR sensor module consists of a PIN diode and a pre amplifier which are embedded into a single package. The output of TSOP is active low and it gives +5V in off state. When IR waves, from a source, with a centre frequency of 38 kHz incident on it, its output goes low.

Lights coming from sunlight, fluorescent lamps etc. may cause disturbance to it and result in undesirable output even when the source is not transmitting IR signals. A bandpass filter, an integrator stage and an automatic gain control are used to suppress such disturbances.

TSOP module has an inbuilt control circuit for amplifying the coded pulses from the IR transmitter. A signal is generated when PIN photodiode receives the signals. This input signal is received by an automatic gain control (AGC). For a range of inputs, the output is fed back to AGC in order to adjust the gain to a suitable level. The signal from AGC is passed to a band pass filter to filter undesired frequencies. After this, the signal goes to a demodulator and this demodulated output drives an npn transistor. The collector output of the transistor is obtained at pin 3 of TSOP module. Members of TSOP17xx series are sensitive to different centre frequencies of the IR spectrum.

For example TSOP1738 is sensitive to 38 kHz whereas TSOP1740 to 40 kHz centre frequency.

FIGURE 4.6: TSOP IR SENSOR

4.2 Software Requirement Specification

4.2.1 Introduction

4.2.1.1 Scope

The purpose of this work is to develop a better android app which will ensure a good connectivity between helmet and the android device. It also helps to identify the caller without looking into the mobile by speaking the caller name loud.

4.2.1.2 Product Features

One of the main feature of SMART HELMET is that the user can identify the caller without looking into the phone.

4.2.1.3 User Characteristics

This application mainly focuses on rider's safety and rider's comfortable

4.2.1.4 Constraints

The follower should install the app on their smart phone

4.2.2 Functional Requirements

To install this app we need android device with bluetooth facility.

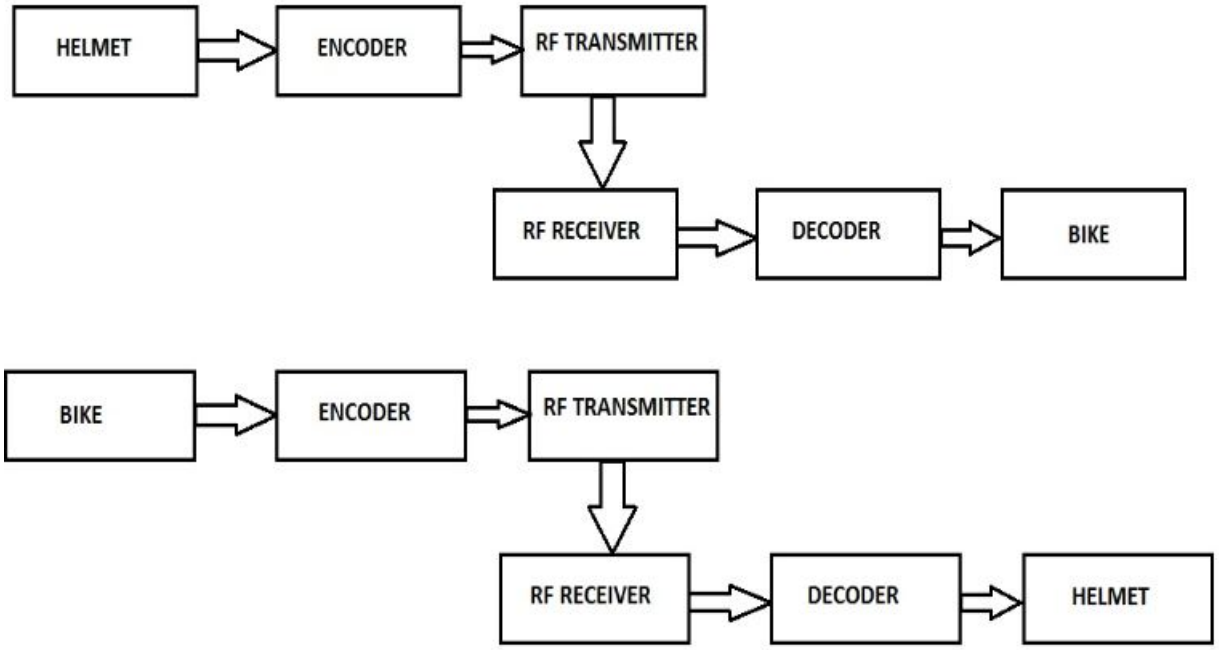
4.2.3 Nonfunctional Requirements

Android studio Express for an phone(SDK) is used for implementation. it provides the high-fidelity designers,code editor and emulator to create play store apps for android phone . The code is implemented in java script language. it is well ordered and at the same time reduces the amount of typing the user needs to do. In order to make the application more accessible,the android phone chosen

4.2.4 Informational Requirements

This application requires android device

4.3 Data Model



CHAPTER 5

IMPLEMENTATION AND TESTING

SMART HELMET contains three different sections in both the hardware and software

1. RF Transmitter and Receiver
2. Bluetooth connectivity
3. Android application

5.1 RF Transmitter and Receiver

Here we use two transmitter and receiver. a pair is placed in both helmet and the bike. This is used for implementing three objectives

1. For making the bike unstarted until the helmet is worn
2. For making the rider alerted about the misplaced side stand
3. For making the rider alerted about the too close backside vehicle

5.1.1 Making the bike OFF until the helmet worn

The implementation is made in both the helmet and the bike

5.1.1.1 In Helmet

This technique is made to make the bike unstated until the helmet is worn. Inside the helmet we can find a jaw strap. inside this strap we place a button. If this button is pressed during the wearing of the helmet a signal is passed to the RF transmitter. then RF transmitter transmits a signal to the receiver in the bike

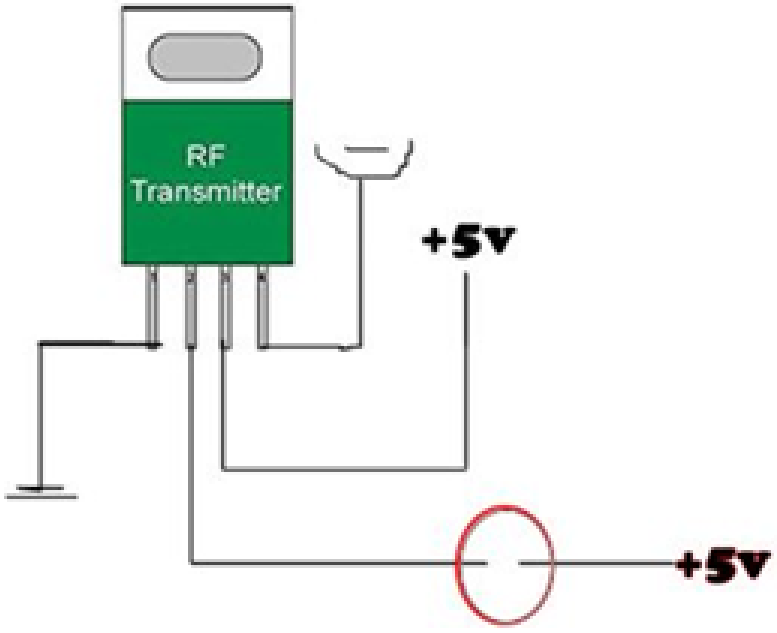


FIGURE 5.1: Starting control inside helmet

5.1.1.2 In Bike

While explaining about the mechanism in the bike we have to be familiarized with to things.ie, Relay and Bike's ignition. Relay is switching based device. It has two type of connections. 1. Normally closed and 2. Normally open. During the purchase of a relay the connection will be on normally closed. When a signal is passed to the relay it will change to normally open and then the relay changes its state from OFF to ON.

Next we have to be aware about the working of the ignition of the bike. A bike's ignition contains a main connection from the battery. A red wire is present inside the ignition which is responsible for the connection. In our mechanism we cut this wire and place the relay between them. So that the connection will be established only when

the relay changes its state. The relay changes its state only when the receiver receives the transmitted signal. The signal will only be transmitted if the button is pressed inside the Helmet

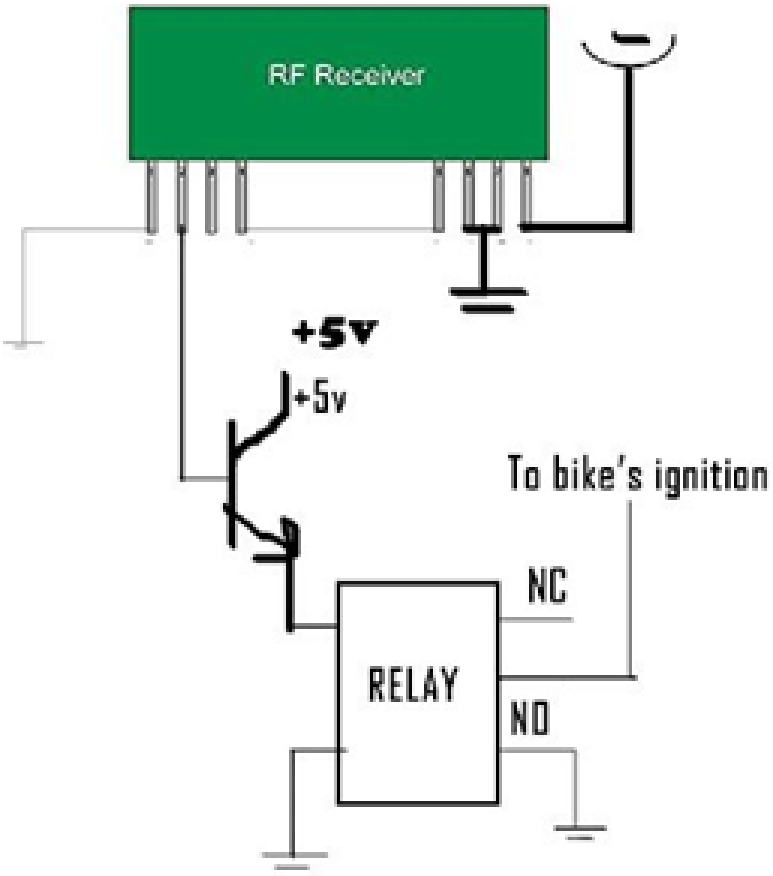


FIGURE 5.2: Starting control inside Bike

5.1.2 Alert when the side stand is in the wrong position

Two sided implementation is made

5.1.2.1 In Bike

In-order to implement an alert for the rider when the side stand is not in the right position, we place a transmitter in the bike and a receiver in the helmet. RF transmitter is placed besides the side stand. when the side stand is not in the right position the switch will turns to ON position and the RF transmitter starts its transmitting process.

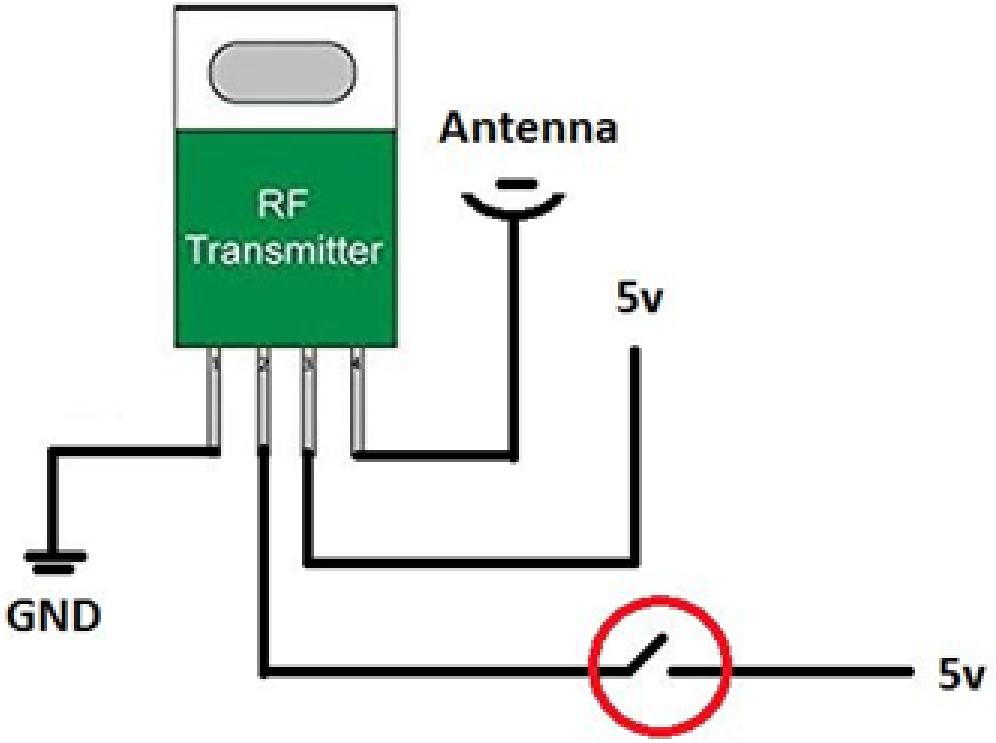


FIGURE 5.3: Side stand notifier inside the Bike

5.1.2.2 In Helmet

The module placed in the helmet contains an RF receiver. The signal transmitted by the bike will be received by helmet. The antenna receives the signal transmitted by the transmitter and hen the receive turns ON and the connection is established

between the LED and the RF receiver which turns ON the LED

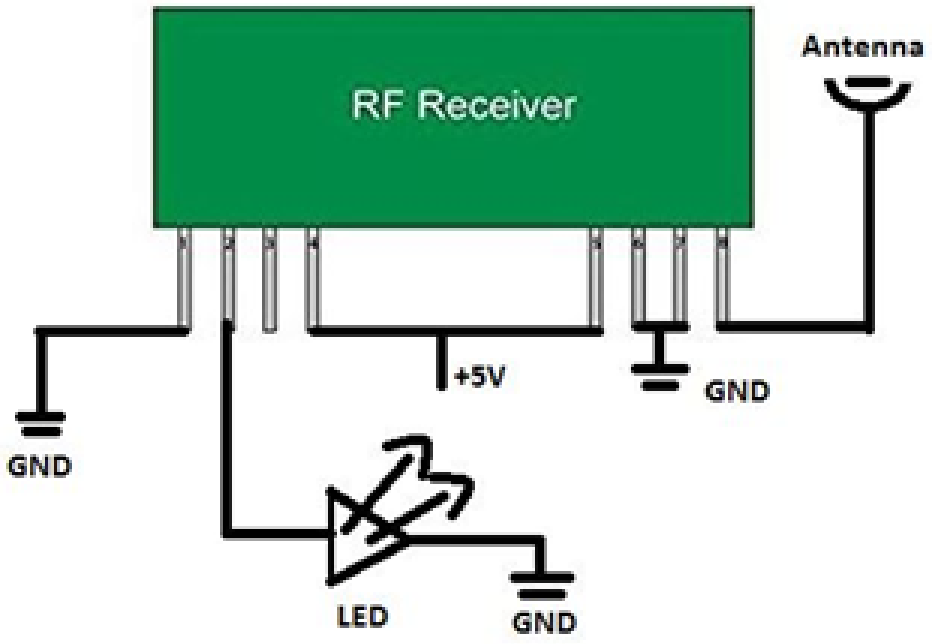


FIGURE 5.4: Side stand notifier inside the Helmet

5.1.3 Alerting when a vehicle is too close to the bike

Here also two sided implementation is made

5.1.3.1 In Bike

Here we use a new device. which is the TS-OP sensor. TS-OP is a IR sensor which transmits an IR wave and receive the signals. If the signal s covered by any disturbances, Then a signal will be produced. This signal will be fed to the data bit of the transmitter placed in the bike and turns ON the switch.

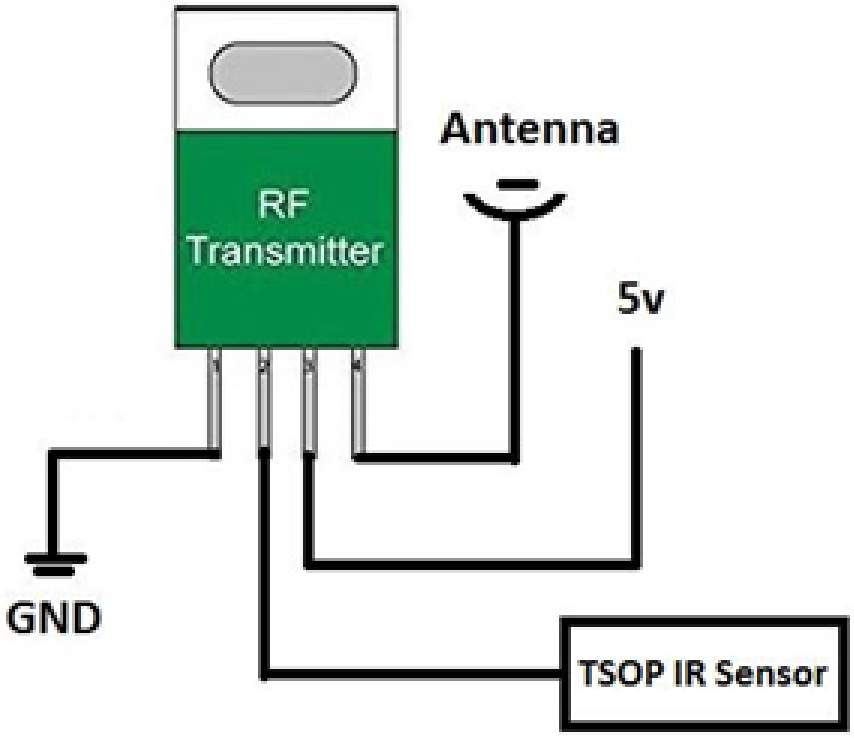


FIGURE 5.5: Proximity control inside Bike

5.1.3.2 In Helmet

The mechanism used here is same as that of the mechanism in the bike for receiving the signal from the side stand. If an obstacle is found, The TSOP sensor activates an a signal will be transmitted via antenna. An d in the receivers side, The transmitted signal will be received by the antenna in the helmet and then, This helps the LED to urn ON and establish the connection

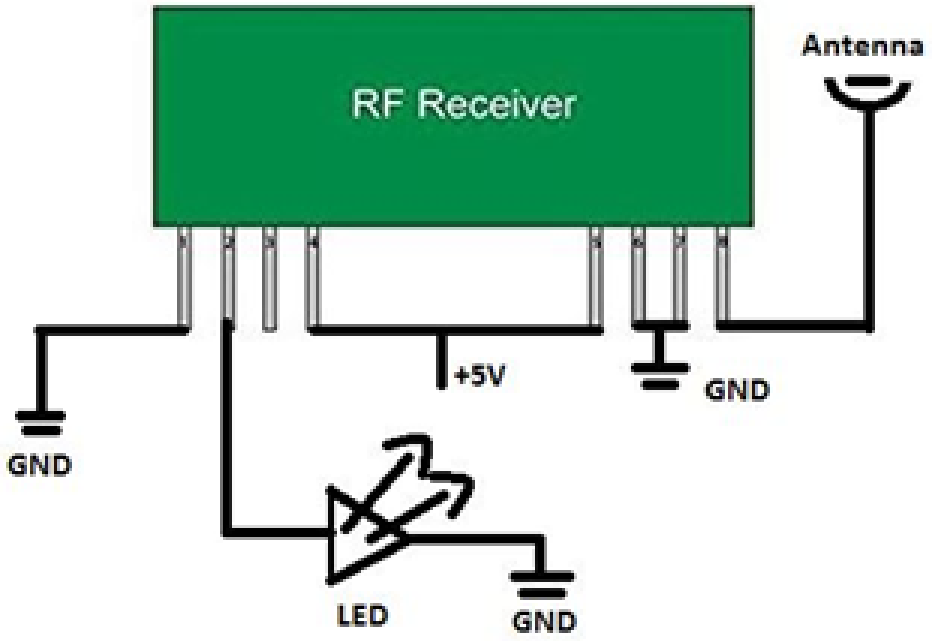


FIGURE 5.6: Proximity control inside Bike

CHAPTER 6

CONCLUSION AND FUTURE WORKS

This system is very effective for the safety purpose of the user. User has to wear helmet to ride two wheeler vehicle and hence traffic rules will follow with this. This system is under pocket control ie. Ride two wheeler vehicle having safety in hand and in budget also. Easy functioning to operate this system. It provides a better security to the biker.

The future works include developing a display for indicating the signs and also indicate the name of the speaker. A sound control for actions can also be implemented. A button can be implemented in the helmet itself to inform the police or hospitals if the rider has been met with an accident.

By the development of technology many further action or inventions can be implemented in the helmet and in the android application. Making the helmet more interactive helps the riders to wear the helmet more comfortably.

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