iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 5 **Issue:** VII **Month of publication:** July 2017

DOI:

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor:6.887
Volume 5 Issue VII, July 2017- Available at www.ijraset.com

Smart Helmet Based On IoT Technology

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Abstract: IOT has enabled us to connect our day to day devices in a network for a sole purpose to exchange data. Today a number of countries has made it mandatory to wear helmet while riding. In this paper, I describe a helmet which is made smart using latest IOT technologies. This helmet for the comfort of riders provide various functions such as Listening to the music on the go, sending SOS messages in case of emergency, use navigation services.
Keywords: IOT, Internet of Things, Arduino Uno, HC-05 Bluetooth sensor, Android app, Smart Helmet.

I. INTRODUCTION

Today we all talk about Internet of Things and how it is changing our lives. The Internet of Things is creating a new world, a quantifiable and measurable world where people and businesses can manage their assets in better informed ways, and can make more timely and better informed decisions about what they want or need to do. This new world brings in many practical improvements such as convenience, health and safety in our lives.

A. Objective

Today in India there is one death every four minutes due to road accidents [9]. Out of total road accidents, 25% accounts for two wheeler accidents [9]. According to recent study 98.6% bikers who died didn't wear a helmet [2]. Hence police department has made it mandatory to wear helmet while riding. Riders face many problems on the go such as unable to take calls, unable to see maps for navigation purposes etc. While having these helmets as a safety measure is a boon, we add more features to it to make it smart. Smart Helmet is an innovative way of building a helmet with latest technologies. Did you ever feel the need to listen to music or maybe send a SOS message in case of Emergency? To make the riders feel more comfortable, we designed a smart helmet. This project is built to aid people to do various task such as listen to music, navigation, receive calls and many more while they are driving. This helmet is integrated with latest Bluetooth technology through which it will get connected to the driver's smartphone. This project helps user's to even more wear helmet because of its features in addition to safety purposes.

II. OVERALL DESCRIPTION

A. Product Perspective

Smart Helmet is integrated with Bluetooth sensor, which connects to user's smartphone. The helmet consists of push buttons which when pressed does a specific functionality. By pressing the buttons user can play music, pause music, shuffle between music files, get directions to destination, receive incoming phone calls and in case of accident send SOS message to emergency contacts. This product is aimed at regular two wheeler users. In addition to safety this product is designed for two wheelers who feel the need to have extra features while driving. Some might not know the directions to the destinations and to know the route they have to stop at some intervals and check for the route in their mobiles. To help these riders we have integrated navigation in the helmet. This navigation system uses mobile phones location to get the route.

B. Product Functions

The helmet comes with built in Bluetooth sensor to connect to the smartphone through Bluetooth, Bluetooth speakers to listen to music and answer calls, Arduino Uno microcontroller, push buttons with specific functionality, microphone to talk on the phone. These modules are connected based on circuit diagram. At the start of the drive user connects his smartphone to the Bluetooth sensor and the speakers. This connection is through an android app. Button 1 when pressed plays the song. Button 2 when pressed pauses the song. Button 3 when pressed answers incoming calls. Button 4 when pressed sends SOS message to the emergency contacts of the smartphone. Button 5 is for navigation purpose.

III.SPECIFICATION

A. Arduino Uno

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Arduino is an open-source prototyping platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - turning on an LED, publishing something online. All this is defined by a set of instructions programmed through the Arduino Software (IDE). We used Arduino board to reduce the complexity of system design and computational complexity. An important aspect of the Arduino is its standard connectors, which let users connect the CPU board to a variety of interchangeable add-on modules termed shields. Some shields communicate with the Arduino board directly over various pins, but many shields are individually addressable via an I²C serial bus—so many shields can be stacked and used in parallel. The Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases.

Fig. 1 Arduino Uno board

B. Bluetooth Module

Bluetooth HC-05 Module 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). Range is approximately 10 Meters (30 feet). These small (3 cm long) modules run on 3.3V power with 3.3V signal levels, they have no pins and usually solder to a larger board. The module has two modes of operation, Command Mode where we can send AT commands to it and Data Mode where it transmits and receives data to another Bluetooth module. We use a common HC-05 rangefinder module for this purpose.

Fig. 2 Hc-05 Bluetooth module

C. Push Buttons

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. 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.

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Fig. 3 Push Button

D. 9V Battery

Battery is used to power the Arduino and Bluetooth speakers.

Fig. 4 9V Battery

E. Bluetooth Speaker with Microphone

These speakers are used to play songs, listen to navigation and answer calls.

IV. SYSTEM DESIGN

A. Block Diagram

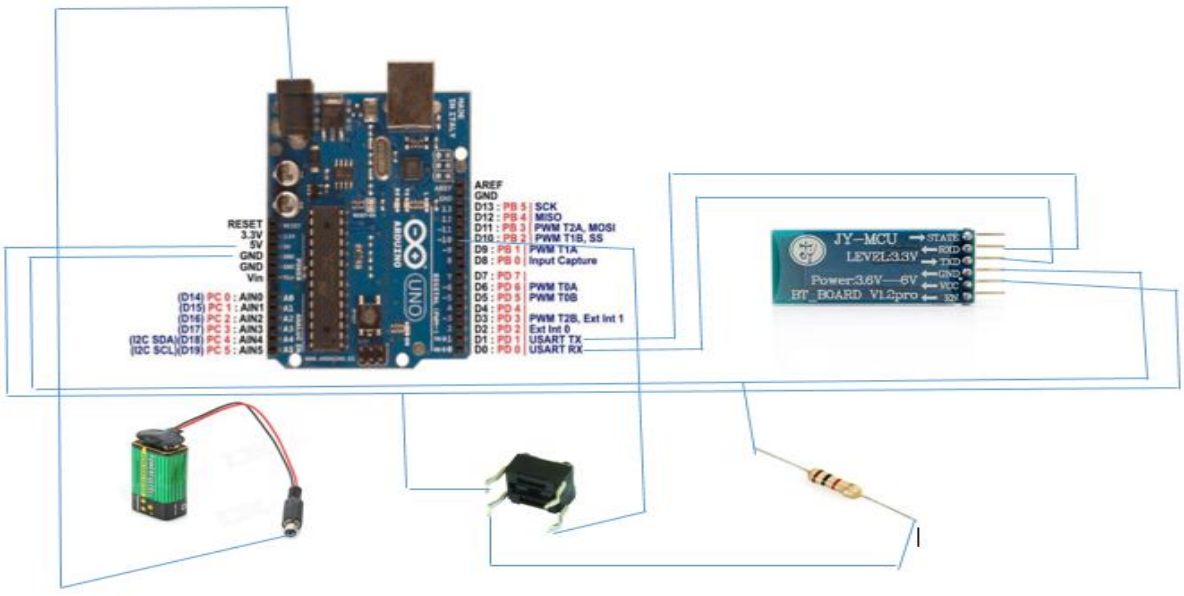

Fig. 5 Complete Block Diagram

Figure 5 shows the complete block diagram of the circuit in the smart helmet. It consists of Arduino Uno which gets its power from the 9v battery. The battery also powers the hc-05 Bluetooth module. The Bluetooth module transmits and receives data from the

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smartphone. The push button is connected to provide input. If pressed, the Arduino sends signal to the android app through Bluetooth module, which in turn does the specific task a particular button is assigned to. When button 4 is pressed the app sends SOS message to the emergency contacts, which are stored in the mobile.

V. RESULTS

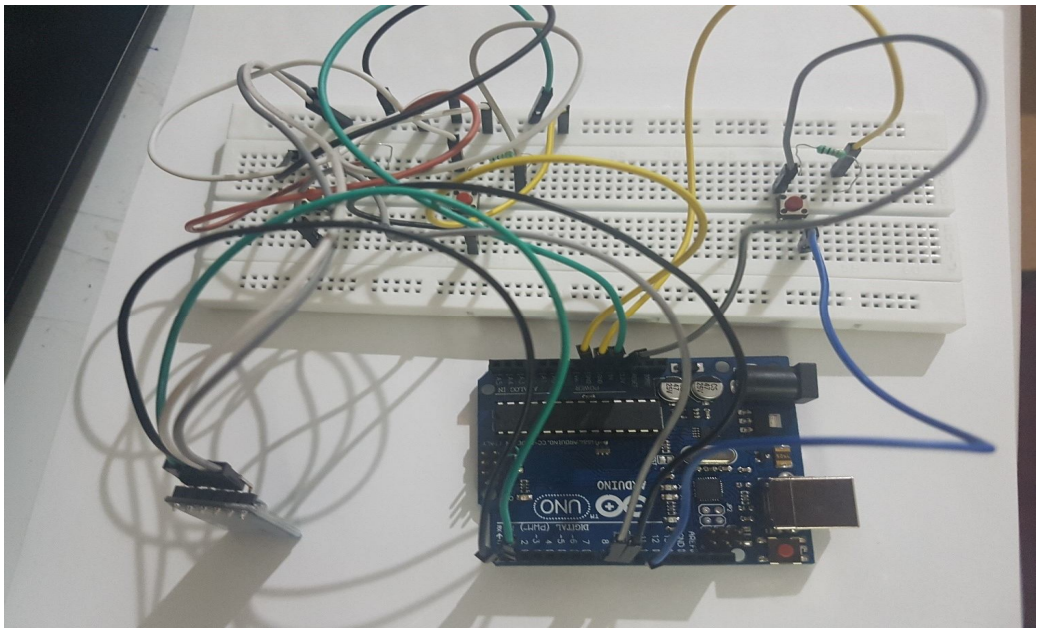

Fig. 6 Raw circuit connections

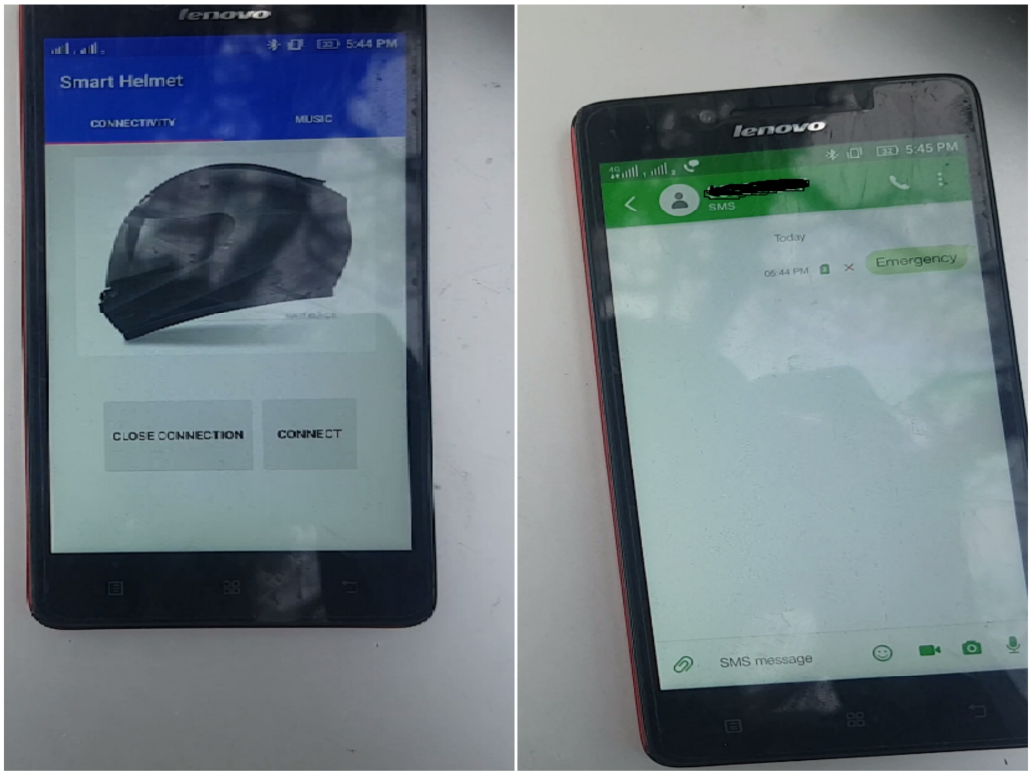

Fig. 7 Android app

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Figure 6 shows the complete connections of the Arduino with Bluetooth sensor and push buttons. Figure 7 shows android app which connects to the hc-05 Bluetooth sensor and the message sent to emergency contacts in case of emergency.

VI. CONCLUSIONS

Through this study, we developed a smart helmet which was designed to help local people get benefitted from wearing a helmet while riding. The user can listen to music, navigations, send SOS messages in case of emergency and even answer calls. All these functions are achieved using android app and Bluetooth sensors. Bluetooth sensors send data between the mobile and the helmet. The android app analyzes data and performs specific actions. Finally this product can be enhanced by adding additional features in the near future.

VII. ACKNOWLEDGMENT

It is our pleasure to present our research paper titled “SMART HELMET BASED ON IOT TECHNOLOGY”. The success and final outcome of this project required a lot of guidance and assistance from many people and we are extremely fortunate to have got this all along the completion of our project work. Whatever we have done is only due to such guidance and assistance and we would not forget to thank them. We are highly indebted to Assistant Professors Mr. Shashi Kumar and Mr. Vinay Kumar for giving us an opportunity to do the project and providing us all support and guidance, which made us to complete the project on time. We are thankful to and fortunate enough to get constant encouragement, support and guidance from all Teaching staffs of Department of computer science which helped us in successfully completing our project work. Also, we would like to extend our sincere regards to all the non-teaching staff of department of computer science for their timely support.

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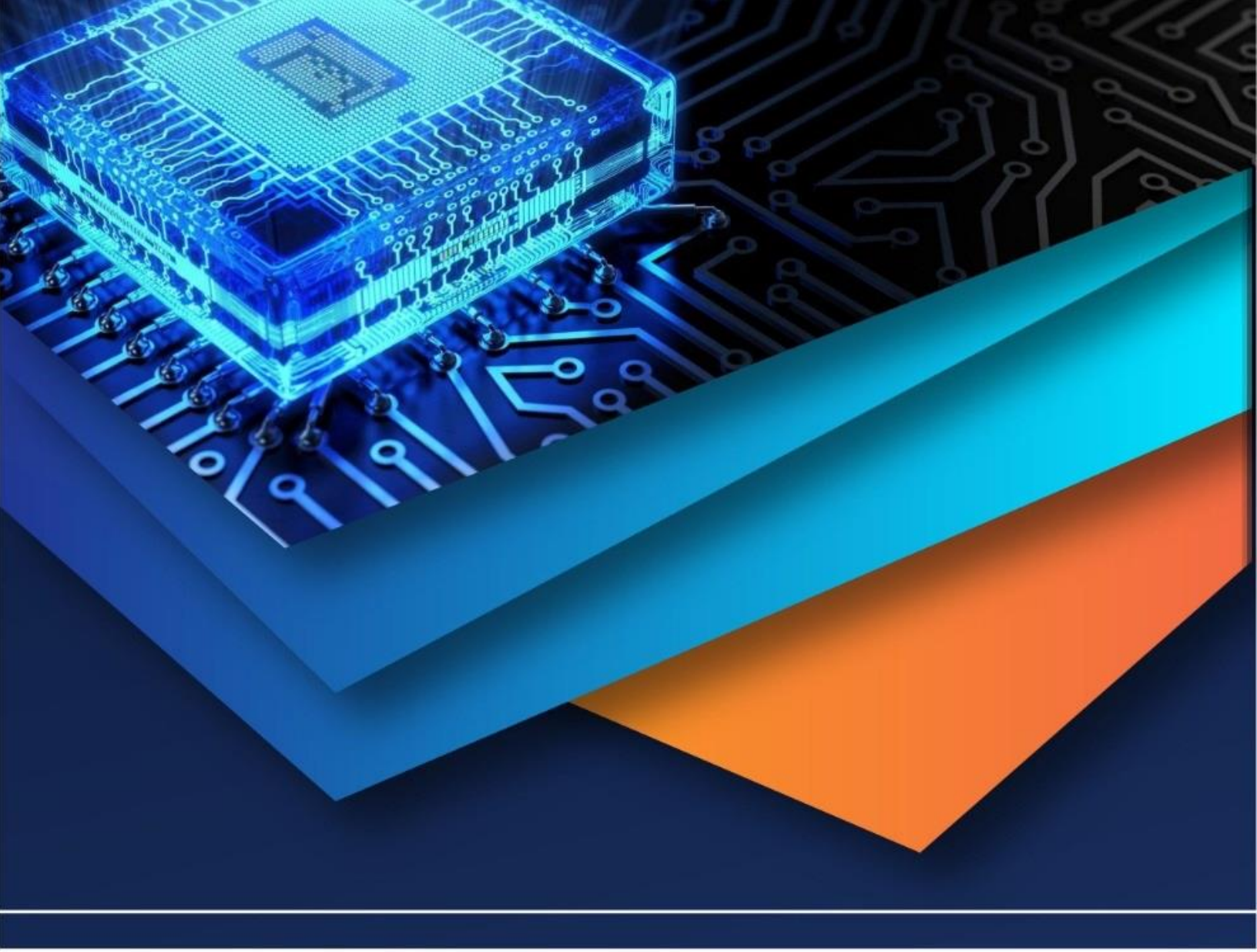

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