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Smart Helmet

Jibin PS[1], Gopika K Madhavan[2], Amrutha M S[3], Catherine Antony[4]
[1, 2, 3, 4]*Sahrdaya College Of Engineering And Technology, Department Of Electronics And Communication*

Abstract: ***A Smart helmet is a special idea which makes motorcycle driving more safe than before. Nowadays two wheel vehicle users are given least importance in terms of improvements and innovations, even though many smart devices came into market. So we are developing a Smart helmet to make the rider more comfortable with respect to the different needs. Our smart helmet makes rider to feel more comfortable as well as with high protection and high security. The problems we identified is droplet clubbing in rain on the windshield glass, no communication facility to use mobile phones in helmet, no navigation system and sound isolation while using headphones. We introduced solutions for these problems. To avoid water clubbing, water repellant film laminated on windshield is attached to the glass of helmet. To provide a proper communication over mobile phones, bone conduction system is introduced to transmit sound waves through bone which let us hear both audios from connected device and surrounding sounds. Bluetooth connectivity is an interesting feature introduced in our project. To ease the use of navigation system, a smart helmet technology is installed for displaying navigations, warning and displaying important messages. So our Smart helmet with modern features is of great use and can improve the comfort of the user. Our project Smart helmet would definitely bring a rapid revolutionary change for two wheelers.***

Keywords: Smart Helmet, Bone Conduction, Holographic display, Head unit display, Piezoelectric crystals

I. INTRODUCTION

By the beginning of the 21st century many devices have transformed into smart devices. This smart concept took place I the case of helmets also. As per the survey conducted in India there are around 698 accidents occurring due to bike crashes per year. The reasons for this may be low knowledge of driving, fast riding, drunken and drive etc.

This is there right situation we observe in our day to day life, a thought of finding some solutions to resolve this problem of coming up to this idea of smart helmet. The goal of smart helmet is motor cycle safety by protecting the riders head during impact, thus preventing head injury and saving their lives.

Another main objective is to design an intelligent system which will prevent a drunken person from driving. The very common type of head injury in motorcycle accidents is closed head injury, means the skull is not broken as in case of distinct open head injury. Its impact will be dangerous as it causes the brain lurches forwards inside the skull, squeezing the tissue near the impact side and stretching the tissue on the opposite side of the head. This will cause high bleeding and will cause to death..

The main components required for making the smart helmet are OLED module. Bluetooth transceiver, Arduino Nano, piezoelectric crystal, SMP 5v amplifier. OLED module used for daily purpose. Bluetooth transceiver is used for communication. Arduino Nano is used for microcontroller purpose, piezo electric crystal is used for audio output and SMP 5V amplifier is used for amplification. Other hardware components used are lens for focusing rays, fiber glass for holographic display and micro pet thermos hydrophobic. Power amplifiers classes are the letters applied to different power amplifier types. Piezo electric crystals are mechanically deformed vibration to generate small voltage commonly known as piezoelectricity.

Main features of a smart helmet to an ordinary helmet are bone conduction audio device and a Bluetooth transmitter and receiver, water repellent visor lamination. Bone conduction audio system take so audio signals from Bluetooth transmitter and receiver like a narration from phone calls, music etc. It is amplified to a 5v audio amplifier and it is fed to a piezo electric crystal. Hydrophobicity is another main technique used in smart helmet. It is the another main technique used in smart helmet.

II. LITERATURE REVIEW

Two wheel vehicle users are given least importance in terms of improvements and innovations, even though many smart devices came into market. So we are developing a Smart helmet to make the rider more comfortable with respect to the different needs. The idea of this project comes from social responsibility towards society.The idea for developing this project is from [1] and idea about working of aurdinonano microcontroller is taken from [2]

The impact when a motorcyclist involves in a high speed accident without wearing a helmet is very dangerous and can cause fatality. This project is specially developed as to improve the safety of the motorcycle's rider. Motorcyclist will be alarmed when the speed limit is exceeded. A Force Sensing Resistor (FSR) and BLDC Fan are used for detection of the rider's head and detection of

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motorcycle's speed respectively. A 315 MHz Radio Frequency Module as wireless link which able to communicate between transmitter circuit and receiver circuit. PIC16F84a is a microcontroller to control the entire component in the system. Only when the rider buckled the helmet then only the motorcycle's engine will start. The idea for developing this project is from [3]

III. SYSTEM DESIGN

The smart helmet system basically consists of a bone conductive audio hearing system, a smart visor console lets the rider to have a virtual holographic display in his view field without giving him any distraction, water repellent visor lamination, Bluetooth transmission and reception and a led indicative system. The bone conductive hearing system is a conduction of audio signals in their sound wave format through the skull to the inner ear, this system is employed in order to cancel the noise isolation which is prevalent in other conventional audio devices. Bone conduction device is essentially a piezoelectric crystal that is fed with an audio signal received through the Bluetooth transmitter and receiver module and the amplified using a 5v SMP audio amplifier, the piezoelectric crystal vibrates in the frequency of audio signal this vibration is transmitted through the bones to the inner ear and the inner ear perceives this vibrations as sound waves. The block diagram is given in figure.1

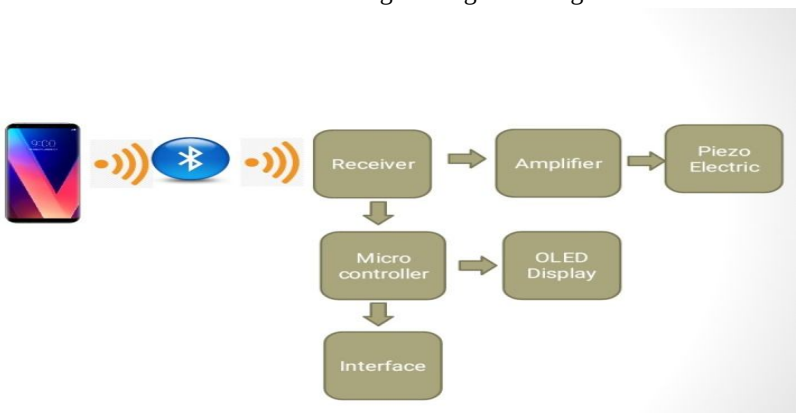


Figure.1

The virtual holographic display is the projection of images from source to the viewer's eye through different sets of mirrors and lens to superimpose the projected image in the users view field or to let the user to see both the digital moving images and the view field through a transparent eyepiece. Here the image source is an 1.35 inch OLED display which is controlled by microcontroller which is an arduino Nano in this case. The essential riders information like the navigation map, notifications and important messages, body vitals and others valuable information are being displayed through the virtual holographic display. The working principle of display is given on figure.2

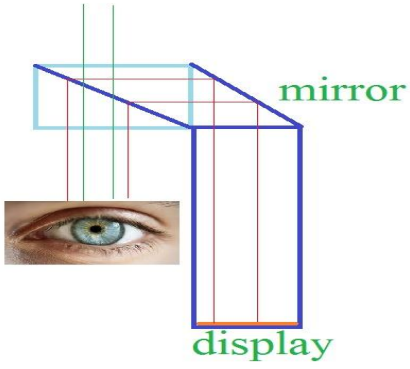


Figure.2

The visor is laminated with a special coating, the micro pet water repellant film that avoids fogging up of the visor during foggy days and cold winter weathers and also repels water from the visor giving it a water proof coating preventing water droplets from clubbing up blocks the users view. The helmet also features an touch sensitive input interface to change the modes and other features of the head unit display and LEDs to as indicative lights to others.

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IV. SOFTWARE DESIGN

In this we designed an arduino program.

```
#include <SPI.h>
#include <Wire.h>
#include <Adafruit_GFX.h>
#include <Adafruit_SSD1306.h>
#define OLED_RESET 4
Adafruit_SSD1306 display(OLED_RESET);
#if (SSD1306_LCDHEIGHT != 64)
#error("Height incorrect, please fix Adafruit_SSD1306.h!");  that means
#endif
int a=1;
void setup()   {
  Serial.begin(9600);
    display.begin(SSD1306_SWITCHCAPVCC, 0x3C);
 display.clearDisplay();
display.setTextSize(2);
  display.setTextColor(WHITE);
  display.setCursor(5,0);
  display.println("SMART HELMET");
  display.setTextSize(1);
  display.setTextColor(BLACK, WHITE);
  display.setCursor(12,25);
  display.println("Currently no Updates");
  display.setTextSize(3);
  display.setTextColor(WHITE);
  display.setCursor(13,44);
  display.println("Default Screen View");
  display.display();
  delay(2000);
  display.clearDisplay();
}
void loop() {
  display.clearDisplay();
  if(a>10){a=0;}
  display.drawPixel(127, 63, WHITE
  display.drawPixel(0, 0, WHITE);
  display.setTextSize(3);
  display.setTextColor(WHITE);
  display.setCursor(13,44);
  display.println("Default screen view");
  display.setCursor(10,0);
  display.setTextSize(2);
  display.println(a);
  a++; //
  display.display();
  delay(1000);
}
```

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V. RESULT AND DISCUSSION

The circuit we designed is successfully tested. All the components performed well as required.

1) *Smart Visor Console:* It lets the rider to a virtual holographic display in his view field without giving him a distraction. It gives valuable information like navigation status from smart phones warnings etc. It is controlled by a microcontroller (arduinonano).
2) *Bone Conduction Audio System:* It takes in audio signals from Bluetooth transmitter and receiver from the smart phone like navigation narration phone calls music etc. And it is amplified by a 5V audio amplifier and is send to piezoelectric crystal (here we use piezo electric discs)
3) *Visor Lamination:* The visor is laminated with a micro pet water repellent film which is used to repel water from car's rear view mirror.

Final prototype is given in figure.3



Figure 3 Prototype developed

VI. CONCLUSION AND FUTURE SCOPE

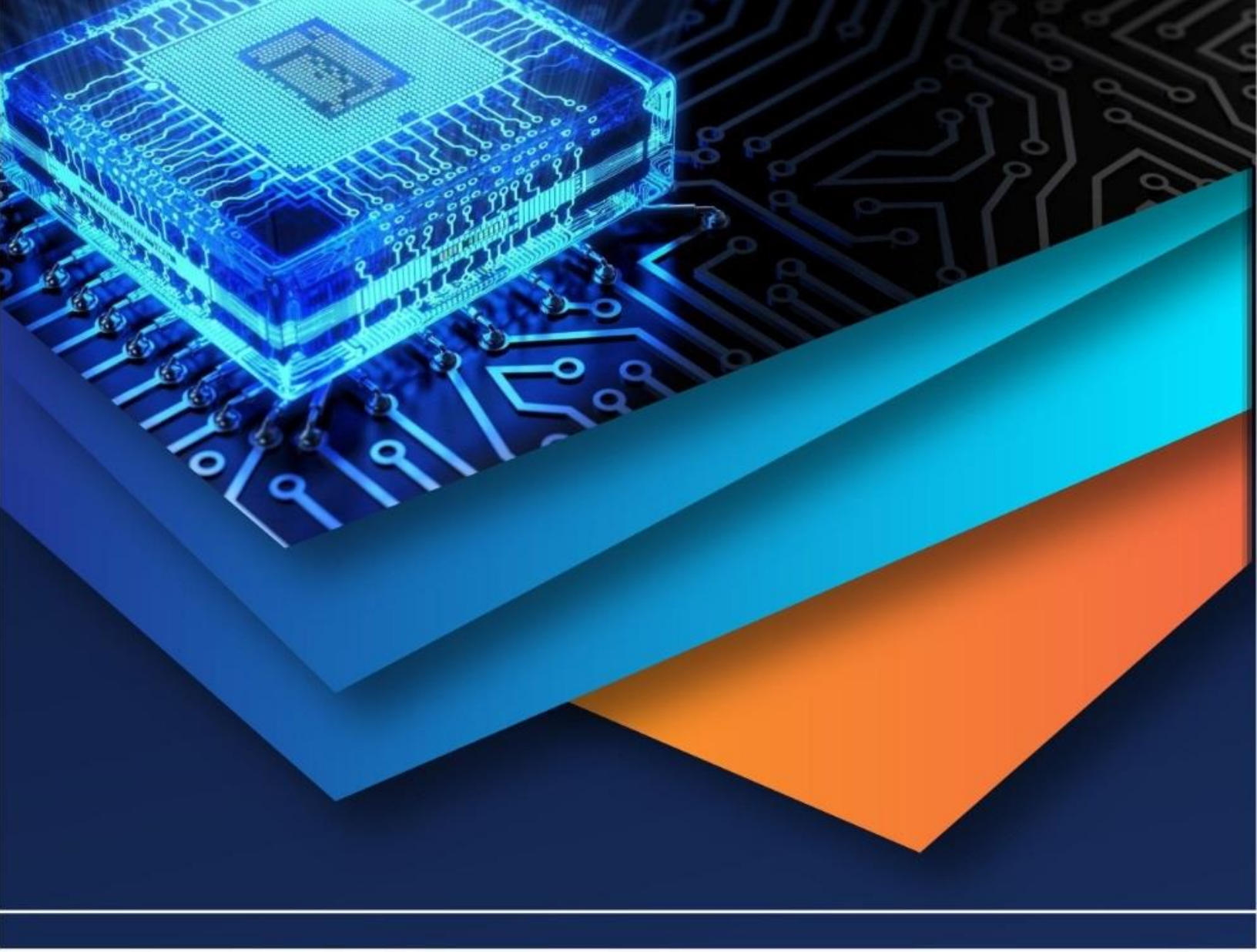
This project is a good real scope, if it is implemented by the government. It can help reduce a lot of accidents of two wheelers as it is the major cause of deaths in the whole world. It can help to prevent the damage occurred to the vehicles by the accidents. So this helps in curbing the road accidents by implementing mandatory helmet protection and detection of alcohol content during the starting on the bike. We incorporated new Bluetooth communication system, bone conduction system using piezo electric crystal, an extra smart glass for visual display and water repellent wind shield glass in our smart helmet. This project here is undertaken keeping in view of traffic, the traffic rules and also the safety of people. Implementation of this type of project by the government saves a lot of time for the traffic police and most importantly saves the precious life of a person as one cannot run a motor vehicle once he is drunk and if the helmet is not present. Family members will be informed as well.

In future if there is a large demand of this type of helmets, we can manufacture the whole circuit in printed circuit board, sob that circuit becomes smaller and can be easily fitted into helmet. Our project would definitely bring a rapid evolutionary change for two-wheelers. The circuit can also be powered by solar energy that it uses green energy and does no harm to environment. The flexible solar panels can be fixed at a long surface of helmet. This type off helmet technology can be implement for the compact helmets used by the soldiers working under extreme temperatures.

REFERENCE

[1] http://www.academia.edu/6541133/Smart_helmet_iee_format
[2] Arduino.cc/en/Reference/HomePage
[3] https://ieeexplore.ieee.org/abstract/document/6895036
[4] Smart Helmet with Sensors for Accident Prevention Mohd Khairul Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari Faculty of Electrical Engineering University Tecnology MARA40450 Shah Alam Selangor MALAYSIAjulia893@salam.uitm.edu.my)
[5] A Solar Powered Smart Helmet With Multifeatures Mr.P.Dileep Kumar1, Dr.G.N.Kodanda Ramaiah2 Mr.A.Subramanyam3, Mrs.M.Dharani4 International Journal of Engineering Inventions e-ISSN: 2278-7461, pISSN: 2319-6491 Volume 4, Issue 10 [June 2015] PP: 06-
[6] A Smart Safety Helmet using IMU and EEG sensors for worker fatigue detection Ping Li, Ramy Meziane, Martin J.-D. Otis, Hassan Ezzaidi, REPARTI Center, University of Quebec at Chicoutimi Chicoutimi, Canada Email: Martin_Otis@uqac.ca Philippe Cardou REPARTI Center, Laval University Quebec, Canada Email: pcardou@gmc.ulaval.ca
[7] www.seeedstudio.com
[8] www.futureelectronics.com

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