Blind Point Detection Digital Safety and Entertainment Helmet based on IOT with Isolated Solar Charging Station

An Undergraduate CAPSTONE Project
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Spring Semester 2020-2021, August, 2020

Faculty of Engineering
American International University - Bangladesh

Blind Point Detection Digital Safety and Entertainment Helmet based on IOT with Isolated Solar Charging Station

A CAPSTONE Project submitted to the Faculty of Engineering, American International University - Bangladesh (AIUB) in partial fulfillment of the requirements for the degree of Bachelor of Science in their mentioned respective programs.

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DECLARATION

This is to certify that this project is our original work. No part of this work has been submitted elsewhere partially or fully for the award of any other degree or diploma. Any material reproduced in this project has been properly acknowledged.

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APPROVAL

The CAPSTONE Project title "**BLIND POINT DETECTION DIGITAL SAFETY AND ENTERTAINMENT HELMET BASED ON IOT WITH ISOLATED SOLAR CHARGING STATION"** has been submitted to the following respected members of the Board of Examiners of the Faculty of Engineering in partial fulfillment of the requirements for the degree of Bachelor of Science in the respective programs mentioned below on **August 2020** by the following students and has been accepted as satisfactory.

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ABSTRACT

There is some way to avoid many major dangers and preparation for road accidents. Keeping an emergency phone number on telephones and using a location tracker can help after any kinds of accidents. In this project, a digital helmet is designed by using smart technology. This project meets major factors of safety from road accidents. The blind point detection system was designed in this project which can detect any object nearby the riders. Arduino and the ultrasonic sensor are used here to detect any object. If any object comes in a specific range the buzzer will activate to alert the rider. The vibration sensor module will work when the helmet will hit by any hard object. After an accident, it can send the location to any emergency number that is fed by the rider by using Global System for Mobile Communication (GSM) and Global Positioning System (GPS) module. The Bluetooth module is used because when the rider cannot hold the mobile phone directly by using his hand, he can use the Bluetooth module. The IoT section is controlled by the mobile application, which can be controlled from anywhere. Automation systems work based on sensors. A solar-based charging system is also added to charge the battery.

Chapter 1

INTRODUCTION

1.1. Overture

While riding a two-wheeler, the mandatory part is to wear a helmet for safety reasons. In 1885, Gottlieb Daimler and Wilhelm Maybach made a motorcycle for the first time in Stuttgart. A Motorcycle designed only for two persons to ride. A Motorbike allows the riders to move anyplace they need and at any time. Motorbike riders are at hazard of being included in a life-threatening vehicle mischance. In our day-today life, many accidents are motorbike related. Most of them occur because of the reckless acts of the riders. For not maintain the traffic rules, also for the lack of proper protection features. There is a reason to design a helmet for bikers. Whenever an accident happens, it has a high chance to harm the upper part of a body first. If any lower parts of the body are hits by accident, people can still survive. When something hits in the head, it has a low chance for that person to stay alive. That is why now it is mandatory to wear a helmet.

1.2. Significance of the Project / Research Work

Helmet protects the motorbike riders head from concussion in case of an accident. It is important for bikers to understand the risks of riding without a helmet. If there is in an accident, they suffer a traumatic brain injury, even most of time they die on spot. In 2012, the National Highway Traffic Safety Administration estimated 1,699 lives were saved because individuals wore helmets [1]. From 2008 to 2010, there were 14 ,283 motorcyclist fatalities in the United States, and 6,057(42%) of those who did were not wearing helmets [1]. Without a helmet, there are serious dangers involved in riding. A helmet is a lifesaver.

1.2.1. Related Research Works

The earlier research paper elaborated about how head protector guarantees the security of the rider by making it vital to wear, additionally ensures that the rider hasn't expended liquor more than the permissible restrain. In case any of these prime security rules are violated, the proposed framework will avoid the biker from starting the bicycle. The framework moreover makes a difference in efficient handling of the consequence of mischances by sending a SMS with the area of the biker to the police station. This

ensures that the casualties get appropriate and provoke medical attention, in case he/she met with a mischance [2].

1.3. Engineering Problem Statement

Main goal of this project is to ensure a comfortable and safe ride for any two-wheeler rider. For that, to accomplished this goal some wonderful features are added with this IOT based helmet. Firstly, a blind point detection system is added, then if any accident happed an emergency accident alert system is added to it so that it can automatically notify riders relative to his location so that they can find him easily and take effective precaution to save his life. Also, an entertainment system is added which can receive call and also play some music which is connected with rider's phone via Bluetooth module. This whole system is powered by an isolated solar charging system so that there is no extra cost for its power consumption.

1.4. Objective of this Work

The fundamental goal is to secure rider from accident and make the journey more comfortable but in case of an accident, the system will automatically inform their family members so they can find him easily and take effective steps to save his life. Actually, the main purpose of helmet is to protect riders head from serious injury but this helmet has some special features. Many riders die every day only because they are not concern about to wear helmet. But this smart helmet not only protect rider but also prevents accidents caused by vehicles at blind point when changing lanes.

Mainly this helmet is based on Arduino uno. In this digital helmet rider can senses that close range vehicle crossing him without looking at the mirror because it can detect close range vehicle at blind points of the rider via ultrasonic sensors. Also, in case if an accident occurs with the help of GSM module, it can automatically send an emergency message with GPS location to rider's contacts. And there is no additional power consumption for this device because it will be operated with battery and which will be charged by an isolated solar charging panel. Drivers can also reap the benefit of music via a Bluetooth module integrated within the helmet. On the other hand, according to Bangladesh law, wearing a helmet is compulsory for each bike rider. A helmet protects riders as a car seat belt protects a passenger. A statistic shows, 78% of people survived an accident just because they wear a helmet [2]. The moral of this story, there is no alternative to wear a helmet to survive.

1.4.1. Primary objectives

The primary objective is to ensure not only the safety of a rider but also makes the ride easier and comfortable for the motor vehicle driver. In this helmet two ultrasonic sensors are added to measuring any close call. If any vehicle comes near, those sensors detect them and a LED light blink on that side of the helmet. So that rider can understand a vehicle is coming near of his bike. The main important part of this helmet is the accident alert system. In case any accident occur it automatically send a SMS with the location coordinates to the riders relative so that they can emergency steps to save this life.

1.4.2. Secondary Objectives

The secondary objectives are the multimedia system and the isolated solar charging system. This multimedia system is operated by a Bluetooth system. With this system rider can receive call while riding. There is no need to hold the phone by his hand next to his ear while riding cause there is a high opportunity to encounters a serious accident. Next there is an isolated solar charging part which is charge through solar panels. There will be no power consumption for to charge the helmet due to the isolated solar charging panel. There is no power shortage issue because it gets its operational power when the sunlight is available. Rider can charge the isolated part only by opening those solar panels even in the parking. Most importantly solar panels are eco-friendly and reduces the cost of generator of the device.

1.5. Comparison with Traditional Method

In 1914 the first head protection helmet was invented for motor bike racers. The Joined United Kingdom of Great Britain and Northern Ireland wiped out the primary efficient examinations of helmet function and adequacy in the 1940s. [3] Day by day it has been upgraded. In 2018 December, IJRTE published a research paper based on smart helmet and bike system.[4] Also, International Journal of Emerging Technologies and Innovative Research published another paper on Smart helmet in May,2017[5]. In those research paper mainly focused on alcohol detection and accident alert system. But in this project some extra features are integrated with this accident alert system which are behind blind sport detection and multimedia system and also the isolated solar power system. This isolated solar power system is a unique feature which is not included in previous research papers.

Advantage:

- The helmet protects the head from injury.
- The helmet protects against insects, and dust in the air.
- The helmet protects from sun and rain.
- The emergency message will go to the family member when an accident.
- Location can be identified.
- Any car moving nearby will alert the rider.

Disadvantage:

- Helmets will be heavy to have many elements which can be overcome by using specific electronic integration.
- A Solar panel will not work well if the weather is not good. For which the charge will not last long.
- The Ultrasonic sensor will not work well during rain.

1.6. Innovation / Scope of the Project

It is a complete IoT base system which is solely powered by solar energy and it has got special features of a blind point detection system with indications within the helmet that is done by the LED light. Compare to any other helmet, it has a feature of multimedia system where the rider can connect his/her phone with Bluetooth. It can fare with a Bluetooth system within the helmet where the rider can receive calls and even listen to music. It has not been done this type of indications in any other helmets still now.

1.7. Impact of Project on Society

Before designing and implementing any complex project, it is very important to understand the public perceptions which includes social, political, economic and environmental concerns. So, we do a survey to qualitative analysis. Prepared some questions for the participants to respond and 69 persons respond to our survey on this project.

Let see the graphical analysis of the survey.

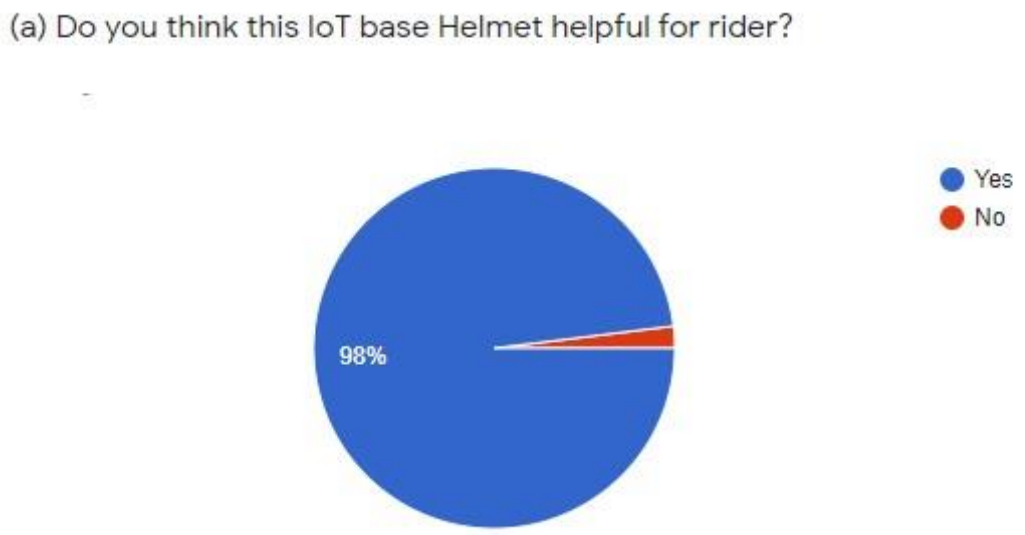

Figure 1.1 – Pie chart of question no (a)

This data showed that 98% of people said yes, only 2% of people said no on this project.

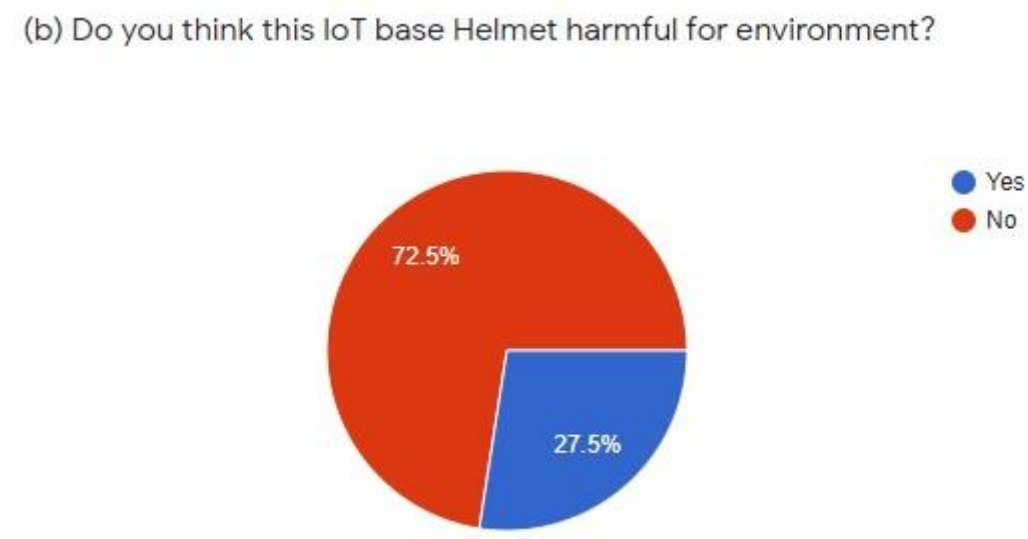

Figure 1.2 – Pie chart of question no (b)

This data showed that 29% of people said yes, only 71% of people said no on this project, in figure 1.2

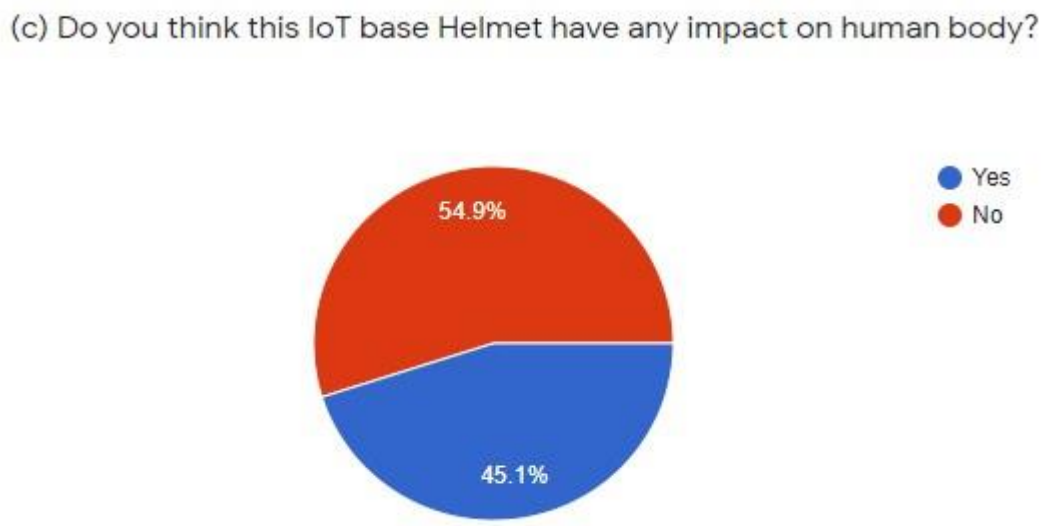

Figure 1.3– Pie chart of question no (c)

This data showed that 50% of people said yes, only 50% of people said no on this project.

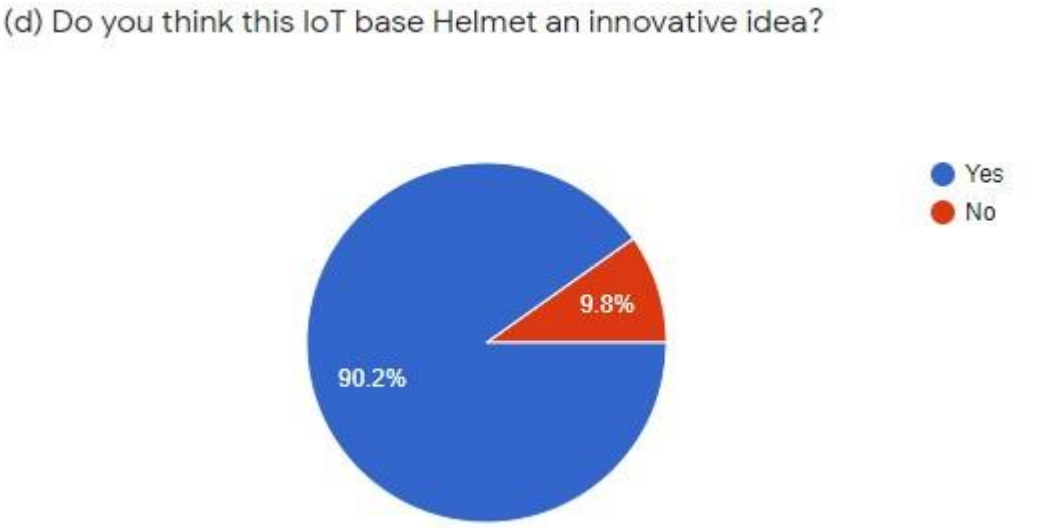

Figure 1.4– Pie chart of question no (d)

This data showed that 90% of people said yes, only 10% of people said no on this project.

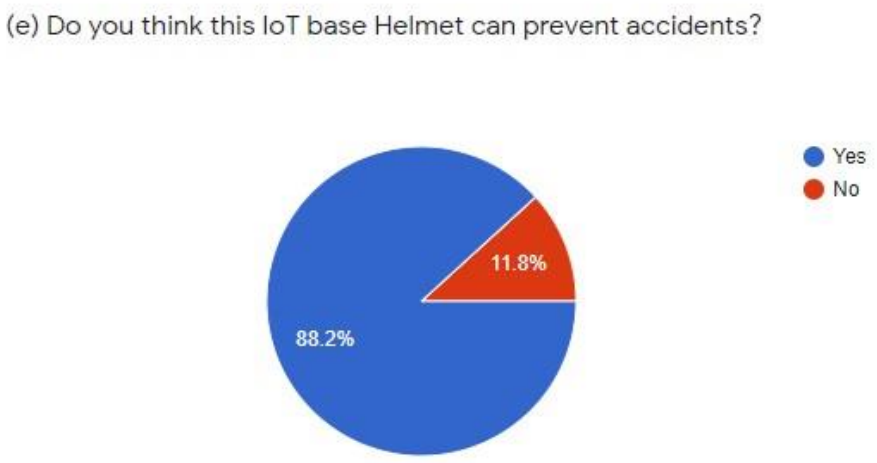

Figure 1.5– Pie chart of question no (e)

This data showed that 87% of people said yes, only 13% of people said no on this project.

So, overall say that, this project can do positive impact on society.

1.8. Organization of Book Chapters

Chapter-1: Introduction:

In Chapter 1, historical background of Blind Point Detection Digital Safety and Entertainment Helmet for Motorbike Driver with Isolated Solar Charging Station.

Chapter-2: Literature Review with in-depth investigation:
In chapter-2, discusses the in-depth analysis of Blind Point Detection Digital Safety and Entertainment Helmet for Motorbike Driver with Isolated Solar Charging Station that has its own properties and characteristics.

Chapter-3: Project Management:

In Chapter-3 discusses the cost analysis, managerial function and skills, P.E.S.T analysis and S.W.O. T analysis.
Chapter-4: Methodology and Modeling:
Chapter-4 discusses the mechanism of the project with the help of the block diagram and the flow chart. It also discussed the properties and application of the software that was used in the project.

Chapter-5: project Implementation:
In chapter-5 discusses the list of materials that were used in the implementation

Chapter-6: Results Analysis & Critical Design Review:
In Chapter-6 shows, the data obtained from the project implementation. It also contains the analysis along with the graphs.

Chapter-7: Conclusion:
In Chapter-7 discusses the social and environmental impact of the project on global population.
Limitations, future recommendations, pros and cons of the project.

Chapter 2

LITERATURE REVIEW WITH IN-DEPTH INVESTIGATION

2.1. Introduction

The first motorcycle helmet standard was published during the 1960s, by the United States of America Snell Memorial Foundation and introduced a certification scheme. [6]

Motorcycle helmets comprise of a polystyrene froth internal shell that assimilates the stun of an effect and a defensive plastic external layer. Acrylonitrile Butadiene Styrene (ABS), polycarbonates (PC), and polypropylene (PP); carbon fiber is a commonly used plastic material. As an elective to fiberglass other progressed materials blends are progressively utilized. A few varieties exist, eminently protective caps that cover the chin area. A few helmets give extra comforts, such as ventilation; confront protection, sun visors, ear protection. Numerous quality levels of safety plans have been seen over roadways. Some common types of motorcycle helmets are full face helmet, half face helmet, open face helmet, modular helmet, half shell helmet, off-road helmet, dual sport helmet. Some common head injuries that happened in a bike accident are nerve damage, facial injuries, brain injuries. Helmets help to decrease the number of skulls crashing during any crash. [6]

2.2. Historical Background

There is a bit of controversy with the real creator of the helmet, the first major milestone in the history of the helmet was in 1935 when T.E Lawrence died due to head wounds endured amid a bicycle crash. The origins of the safety helmet date back to the Brook land's racetrack in early 1914. [7]

A medical officer, Dr. Eric Gardner, noticed a motorcyclist with head wounds almost every 2 weeks. He got a Mr. Moss of Benthal Green to make canvas and shellac helmets which can stand a heavy blow and smooth sufficient to look off any projections it experienced. The design he presented to the Auto Cycle Union where it was at first condemned, later the thought changed over and made them obligatory for the 1914 Isle of Man TT races.[8]

Gardner took 94 of these helmets with him to the Isle of Man, and the helmet spared one rider who hit an entryway with a looking blow. Dr. Gardner got a letter afterward from the Isle of Man restorative officer expressing that after the T.T. they regularly had "a few curiously concussion cases" but that in 1914 there were none.[9]

In May 1935, T.E. Lawrence had a motorbike accident while he was not wearing a helmet, as a result, he suffered serious head injuries, which left him in a coma, and died right after six days [10]. Hugh Cairns who was a neurosurgeon was attending him, began a long study about what he saw as the needless loss of life by motorbike dispatch riders through head wounds. Cairns' investigation was driven to the expanded utilize of crash helmets by both military and civilian motorcyclists [10].

2.2.1. Blind Point Detection system in helmet

The Blind Spot Detection uses radar sensors to warn the driver if such an object is identified, thereby assisting the driver in maneuvering [11]. Bikers frequently endure from exceptionally penniless permeability, in spite of being liberally prepared with mirrors. Nearly most of the time, the driver cannot see imperative zones next to the vehicle. Road accidents, collisions are unavoidable parts of road traffic. The immense majority is caused by vulnerable road users which caused are particularly tragic. Each year traffic accidents caused by the blind spot zone, trucks, and heavy cars are responsible for that most of the time. Blind Spot Detection systems assist in avoiding crashes.

2.2.2. GSM and GPS module in helmet

A Global System for Mobile Communication (GSM) module may be a chip or circuit that will be utilized to set up communication between a portable gadget or a computing machine. In 1970 at Bell Laboratories the idea of GSM was developed.[11] It could be a broadly appropriated mobile communication system within the world. GSM is an open and advanced cellular innovation utilized for transmitting voice and information administrations [12]. They can highlight all the functionalities of a phone through a computer like making and getting calls, SMS, MMS, etc. These are utilized for computer-based SMS and MMS administrations. The necessity for an individual to be reachable or to call anybody at any time is exceptionally appealing. GSM technology will allow communication anywhere, anytime, and with anyone.

The system is suitable enough to guide clients by means of SMS from a particular cell number to alter the condition of the home appliance according to the user's needs and necessities.[12]

Global Positioning System (GPS) stands for a Worldwide positioning system by which anybody can continuously get the position data from anywhere within the world. The ephemeris gives the exact circle for the satellite itself, which can be utilized to create the exact area of the satellite, fundamental data for calculating position information. It is the inborn information that is utilized by each of the GPS satellites with the particular distinguishing identification number. GSM and GPS are used in a helmet to ensure a safe and valuable ride for the bikers.

2.3. Earlier Research

The quick evolution of the Internet-of-Things (IOT) based approaches modernized nearly every industry. With the help of digital technology, people are trying to upgrading those products we used in our everyday life. When the helmet was invented, it was only intended to protect the rider's head from any serious injuries but with time, people are trying to make it more interesting to wear.

From some IEEE papers, there is a lot of development regarding a digital helmet system. Many works have already been done about safety such as an alcohol sensor to ensure that the biker is sober, used a module to detect whether the rider is wearing the helmet, and analyses the breath of the rider to check for the consumption of alcohol and a rider authentication using face recognition to control theft, accident detection system to prevent serious accidents, use of GPS and GSM modules which helped in order to avoid such situations.

2.4. Related Research or Published Works

People are already working on how to make our life more enjoyable through the help of technology. Various advancements and innovations occur in the motorbike helmet system with the help of technology to decrease the number of head injuries during motorbike crashes from the 1900s time.[12] A helmet is basically used for ear, face, and head protection. To protected the head of a rider while the rider hits any object helmets were designed with a soft inner and hard outer shell. All the materials contribute to improving both comfort, protection, and stability. But in recent times we can see different features in a helmet such as an engine control system it indicates the bike will start only when the bikers wear the helmet. Also, there is a cooling

fan so that riders can have a comfortable journey on a hot sunny day. With Bluetooth, system riders can make calls without lifting the helmet. All of this together makes a ride easier for everyone. In many digital helmets, we can see a voice recognition system where everything starts with voice commands. Auto stand system with this system a motorbike will automatically stand by itself also it will get locked so that other than the owner nobody can start the bike, A 360-degree camera with this rider can look from all the side which gives a smooth ride.

2.5. Critical Engineering Specialist Knowledge

Blind point detection, Bluetooth pairing, solar charging system, location tracker all of those systems was integrated into the system. In blind point detection system works with the help of ultrasonic sensor as they send sound signal with Tx and received that signal with Rx. Sending and receiving signals time duration is calculated and converted by a formula which is distance = (Time * Speed of Sound) / 2 and with this formula distance of the other object had been detected. If any object under 50 cm distance, integrated arduino module send a signal to LED and the buzzer and they indicate the rider about the object. In Bluetooth system an integrated Bluetooth module with microphone had been added and it can be paired with any phone with the help of Bluetooth network as other Bluetooth device are been connected. Rider can use this as a Bluetooth handset for receiving any call or play music also. The location tracking system is designed with GPS and GSM module which send accident sport location to rider's relative contract number. In solar system a small and powerful solar panel is added which adsorbed the sun light and produce electric power which power the lithium ions battery.

2.6. State of the art technology

This is the most unique GPS, GY-GPS6MU2 which is the advantage of using GPS integration. Its integration with Arduino Uno is getting much better. In fact, this model is widely available in the market. It can certainly go into production. For multimedia, it is using the prototype board of Arduino Uno. It is the latest technology. After that, no other technology came out.

2.7. Summary

In this chapter, the historical background of a helmet was discussed. Some advanced feature was also discussed. There was a comparison with previous research papers. The critical engineering knowledge of this project was carried out.

Chapter 3

PROJECT MANAGEMENT

3.1. Introduction

In order to set up the project, to make sure this project will run smoothly we are considering some financial situations as well as the availability of strength, weakness, opportunity, and threats that is the internal factor of this project. At the same time to determine the external factor of the project pest analysis is carried out where political, social, technological, and environmental aspects of the project which impact the project externally have been discussed in this chapter. Other than that, the finances of the project considered between the predicted and actual cost of the project materials. Also at the end, the standard deviation was calculated, there was a suitable result to start this project.

3.2. S.W.O.T. Analysis of the Project

In today's world, there is a lot of choices for transportation. The airplanes, cars, buses, trains, bikes got to be the prime mode of transportation. The use of bikes is rising exponentially. Along with this, bike accidents are increasing. The purpose of this project is to reduce the number of accidents happening around us.

Strength: This project is done for the betterment of the general public who had risked their lives every day while riding. To convert a normal helmet into a digital helmet the use of Ultrasonic Sensor, GPS GSM Module, Vibration Sensor, solar panel. We are using the multimedia system in this helmet so that riders can enjoy their ride. The main purpose of our project is to reduce the number of bikes accidents. Worldwide riders will be benefited from this digital helmet.

Weakness: There is a challenge of how people will accept this project. This is an IoT-based project, the used GPS GSM Module to track the location so internet access is needed. It can be difficult to maintain constant internet access because there is poor internet coverage in some areas. Also, we are using solar panels, for a rainy day, it will be a little bit difficult to charge the battery.

Opportunity: The way our world is changing our lifestyle is also changing. Everything is upgraded in terms of our lifestyle. This project is advanced compared to other helmets. This helmet can be used by riders worldwide. It is capable of garbling world market if it can hit the manufacturing industries.

Threat: There is a threat to intellectual property regarding this project. As this is a new idea, this can be stolen and someone else might use this idea to build this project other than us if it is not patented.

3.3. Schedule Management

Gantt Chart

Task	Status	Oct 31-Nov 10	Nov 11- 12	Nov 13-28	Nov 29- Dec 12	Dec 13-Dec 26	Dec 27- Jan 9	Jan 10	May 01-10	May 11-30	April 10	10th May 21	22nd May 21	28th May 21	29th May 21	3rd June 21
Topic Selection																
Preparing Proposal reports & Submission																
Journal reading																
Optimizing Circuit through simulation																
Writing project report																
Preparation for Progress defense																
Attend Progress Defense																
Component collection																
Implementation of Circuits																
Writing thesis book																
Submission of project report to Course Teacher																

Submit corrected thesis Book to external															
Submission of poster & summary															
Preparation for final presentation															
Attend final presentation															

3.4. Cost Analysis

The cost analysis is done using the standard deviation formula.

Formula SD = $\sqrt{\frac{\sum(x-x')^2}{n-1}}$

Where, x = Estimated Value,

x' = Actual Cost and

n = No of Product

Now, the list is shown as a table

Table 3.1: Cost analysis

Serial	**Name of Components**	**Quantity**	**Estimated Cost, x BDT**	**Market Price, x'**	**(x-x')**	**$(x-x')^2$**
01	Arduino Uno	1	450	480	-30	900
02	Bluetooth Module	1	1200	1580	-380	144400
03	Ultrasonic Sensor	2	350	390	-40	1600
04	Vibration Sensor	1	220	280	-60	3600

05	Buzzer	1	20	15	5	25
06	GPS Module	1	850	890	-40	1600
07	GSM Module	1	550	590	-40	1600
08	Helmet	1	1800	2050	-200	40000
09	Battery	1	400	590	-190	36100
10	Switch	4	40	40	0	0
11	LED	5	10	10	0	0
12	Solar controller	1	500	490	10	100
13	PVC Board	1(Sheet)	700	780	-80	6400
					total	236325

Now According to Standard Deviation, SD = $\sqrt{\frac{\sum(x-x')^2}{n-1}}$ =140.33 BDT

As the deviation was not that much for this project the initiative on implementing the project was taken on hand.

3.5. P.E.S.T. Analysis

The situations of new modernized and evolving technologies impact our lives in numerous ways. Everything from our domestic life to our work life has changed. New innovations make new occupations and opportunities. By learning and obtaining an understanding from the past development and use of technologies there will be a way for better implementation. Nowadays few people stop to consider the political, economic, social impact technology has had on our lives. The improvement of exploration in a worldwide context has accomplished its targets of improving and expanding the mindfulness and understanding of the political, financial, and social effect of innovations and technologies on society.

The potential is progressive within the sense that communication, organizing, computational, and other information-based innovations supporting the IoT are important to essentially any division of industry, commerce, and administrations and give the nearly boundless potential for integration, development, and induction of encouraging modifications.

Political: The universal motorcycle helmet laws require all riders to wear a helmet to save the rider's head from any kind of crash [1]. In this project, we are using some extra material on a helmet to decrease the rate of accidents. Such as Arduino Uno, Bluetooth Module, Ultrasonic Sensor, Vibration Sensor, GPS-GSM Module, LED, etc. All of these materials are available in our country also legal to use. For initially this project is not funded by any authors or any organization.

Economical: Technology and innovation drive everything from education to economic extension. To build this project successfully different types of equipment were used. As technologies are developing sensors are also developing so the prices might vary for different components. For future implementation, the price might not be the same as now.

Social: Technology remains to influence and impact society. In this project, we are using a solar controller for that we need sunlight to operate this. This project is environmentally dependent. The components are used in this helmet are not going to harm the environment. As this is a new idea to people, this might increase riders' curiosity and they will love to give it a try on this helmet. Our literacy rate is not that high for that reason some people might face difficulties because it needs a little bit of instruction before start it.

Technological: Modernization and development quickly and frequently to remain ahead of the creating world where progress comes instantly. The impact of technology on our lives is substantial. For designing this digital helmet some different materiel used to make this helmet new and innovative compare to the general helmets. Based on recent sensors and recent technologies the device was implemented and the reading obtained was merely perfect. In future this helmet can be more upgraded with some advance sensors. There will be new technologies which can added to this helmet

3.6. Individual Accountabilities

To complete this capstone project, we all work hard. As we work as a team, we divided our work between 4 members. Individually we did our part of the work to complete this whole project by the given deadline.

Sourav Das: Sourav Das has been involved in the writing of the code. Also, implemented the hardware components.

MD Shahadat Hossain Shanto: MD Shahadat Hossain has been involved in the simulations part. And did the hardware implementation part.

Rifah Tasnim Binta Rashid: Rifah Tasnim has been involved to complete half part of the book writing also cross-check the circuit connection.

Tasmia Akter: Tasmia Akter has been involved to complete the other half of the book writing part, check the quality of the materials also be involved in procurement required papers.

3.7. Summary

S.W.O.T. and P.E.S.T. analysis along with the financial analysis was carried out in this chapter. And it was seen that the strength and opportunities of this project were much higher compare to weaknesses and threats. Ans as of pest analysis it has more of a positive impact on political social and environmental rather than the negative sides. It used the most recent technology that can be helpful for mankind.

Chapter 4

METHODOLOGY AND MODELING

4.1. Introduction

This chapter describes Methodology and Modeling of the project. Arranging and executing of equipment is extravagantly composed here. This section contains the definite depiction of materials utilized in the undertaking alongside the flow chart of the framework.

4.2. Methodology and Modeling

The general methodology of the system is represented into two sections:

- Sensors and modules
- Solar charging system

In sensors and module's part, all sensors and modules are associated with Arduino nano for ensuring riders safety. Arduino pro mini also utilized in this framework to help both GSM and GPS to work simultaneously, so that GPS can send the exact longitude and scope with appropriate geomatics position. Ultrasonic sensors are used to indicate the blind point for rider's vison so it become more simpler for notice another vehicle which is passing by the rider. GPS and GSM sending the accident alert if any accident occurs suddenly. Also, rider can receiver any emergency phone call while riding by the build in Bluetooth module and also play some music by connecting his phone to the build in Bluetooth module. Main objective is to make the ride more secure and more enjoyable for rider.

Solar system is designed to supply power to the entire framework. Those panel will be set on the top of the helmet for to make sure that the direct sun light fall into the PV panel. This system fully run by a 3.7 V lithium ions battery and the battery is charged by this PV panel. Additionally, in some emergency case if there is a shortage of daylight, this whole can charge through direct current by a mobile charging adaptor. So, there are dual charging system are available in the helmet. Also, all those components are used in this helmet are less power consumption device.

So, by one single charge rider can use this helmet for a long time.[14]

4.2.1. Flow Chart

Figure 4.1(a) and figure 4.1(b) show the flow chart of the project. Figure 4(a) is blind point detection and 4(b) is accident alarm system.

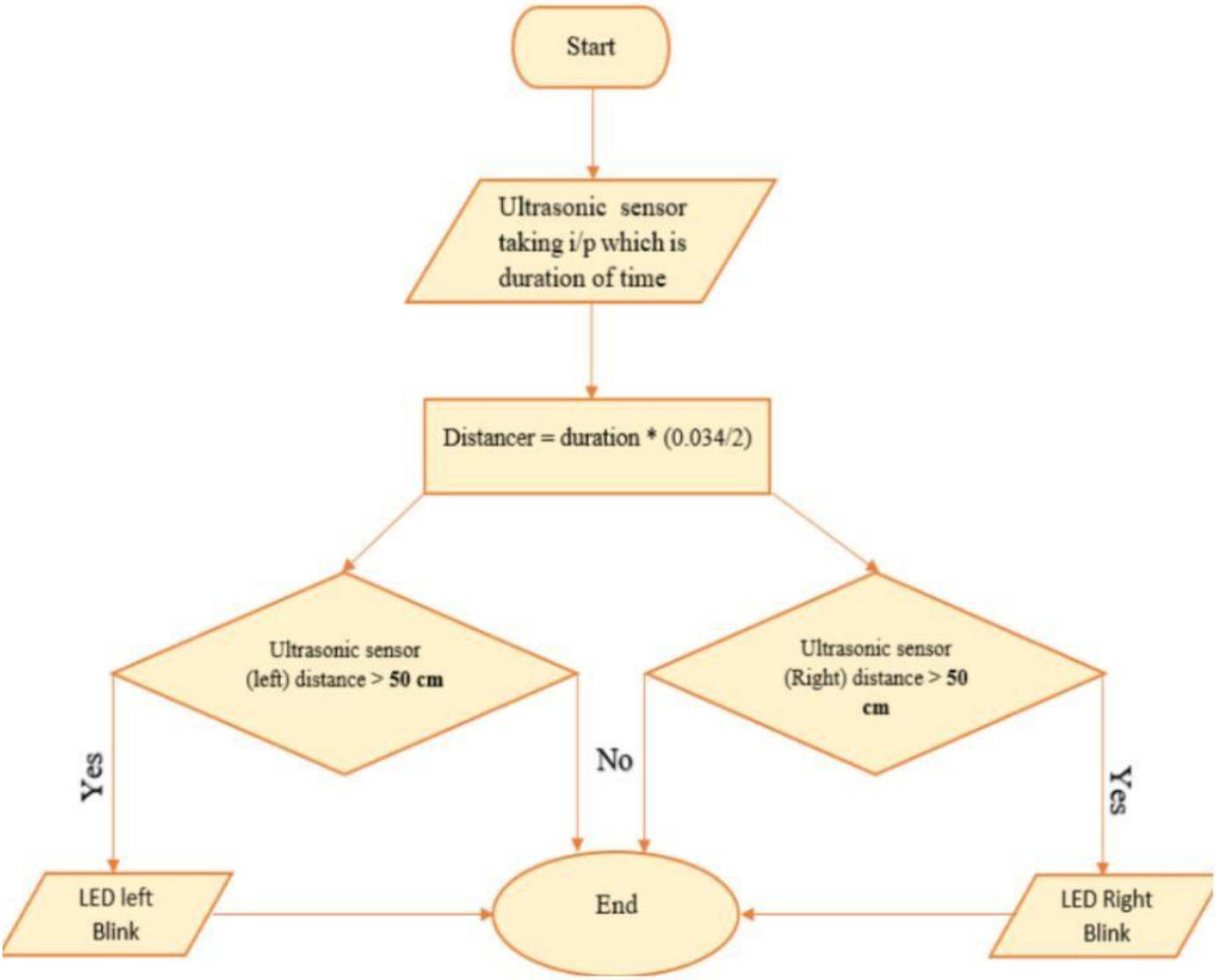

Figure 4.1(a): Blind point Detection

In figure 4.1(a) the flow chart mainly shows the blind point detection algorithm. When some objects are coming near 50cm of the ultrasonic sensor, led blinks.

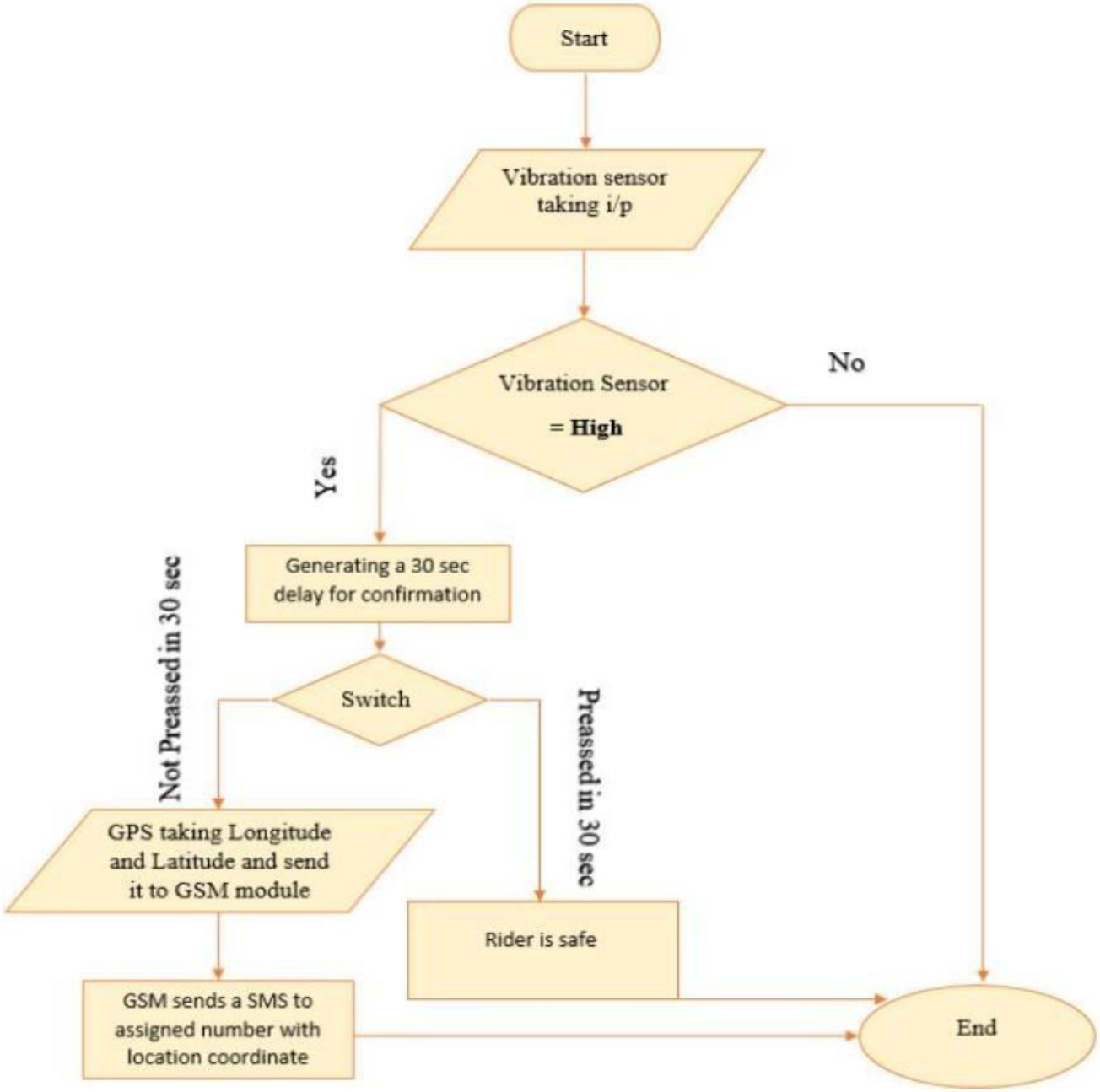

Figure 4.1(b): Accident alert system

Figure 4.1(b) shows the accident alert system algorithm. When any accident occurs, vibration is generated and when vibration sensor senses any vibration it sends a signal to the GPS module and it generates a location coordinate of the current location and send it through GSM module to the assigned number which is added through arduino coding. A switch is added to cancel the SMS if false alert is generated.

4.2.2. Operating System and Simulation Software

Arduino IDE: Arduino is an open-source equipment and program company, extend and client community that plans and fabricates single-board microcontrollers and microcontroller units for building advanced gadgets. It is imperative to know the foundation of the gadget called “Arduino”. In this Arduino IDE, all important coding parts are been done here.

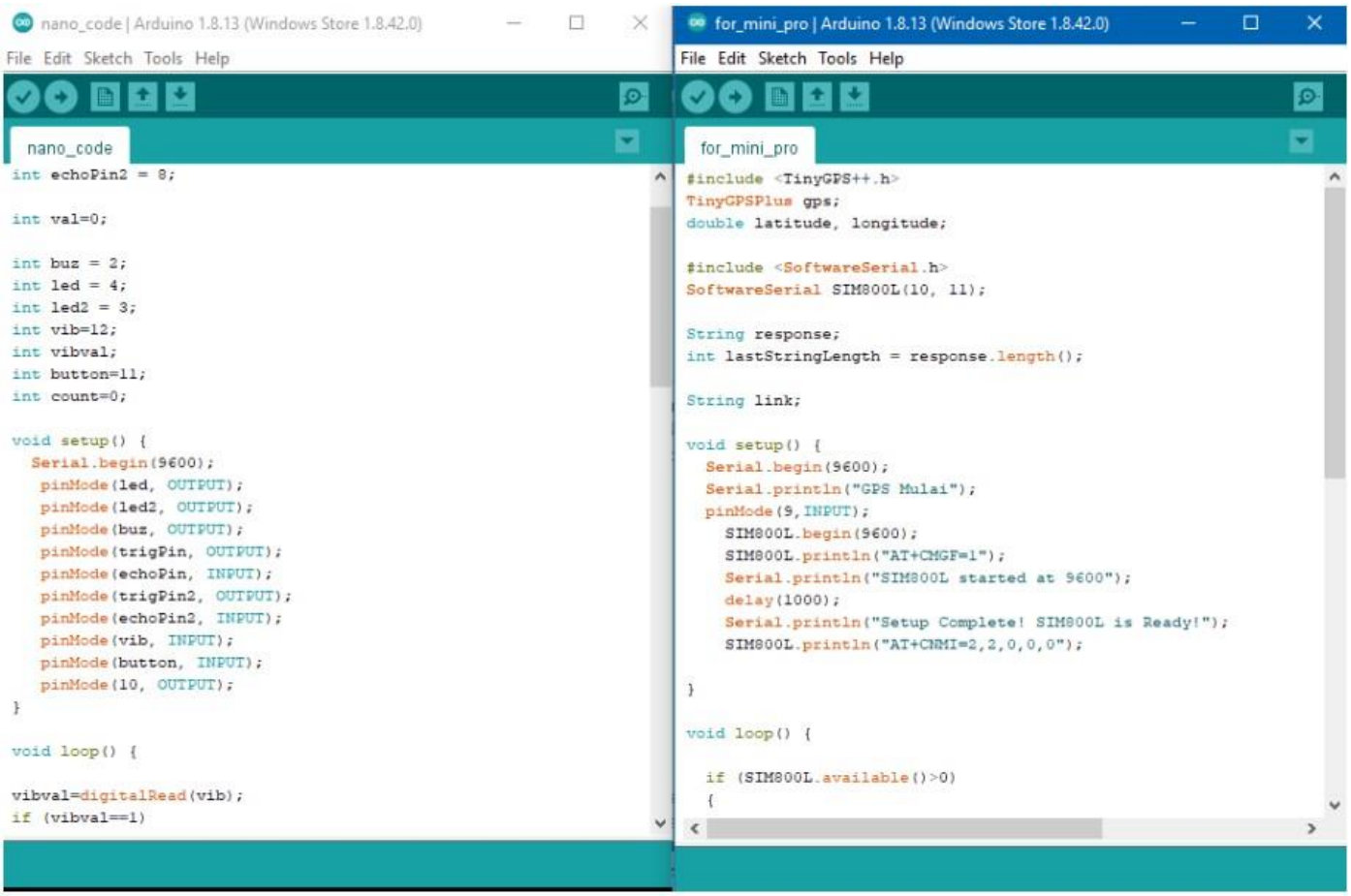

Figure 4.2: Code Compiler

Coding parts are divided into two parts. Blind point detection part is added in the nano_code part and accident alert system are added in mini, pro part. Mainly arduino nano handle the blind point detection system and arduino mini pro handle the accident alert system.

Proteus: Proteus is a circuit simulation software with varieties of electrical and electronic components. The software was created by British computer program firm named Lab center Electronic Ltd. This computer program is well known for circuit recreation and the PCB (Printed Circuit Board) organize plan

investigation. The program is integrated with Autodesk and SolidWorks 3D program. In our extend we are aiming to utilize Proteus 8.10 reenactment on windows working framework.

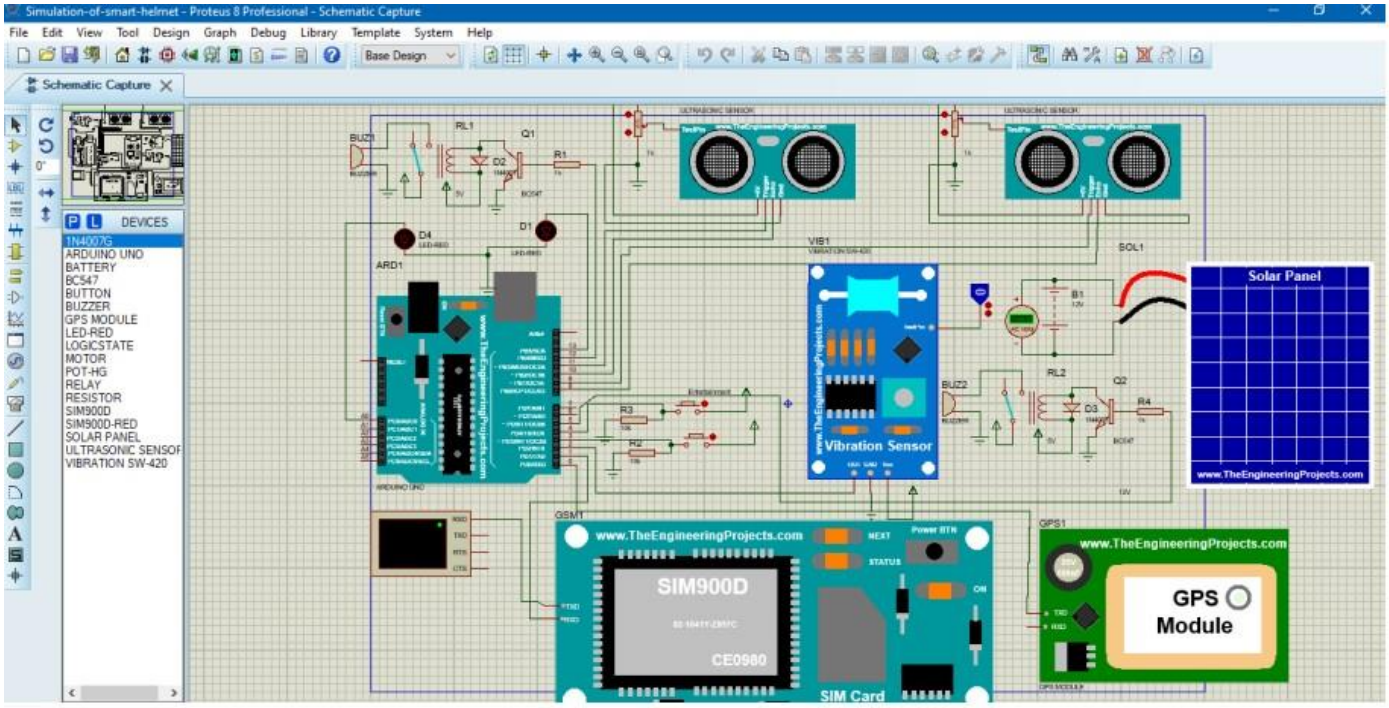

Figure 4.3: Schematic Capture in Proteus

In this simulation part which is in figure 4.3, all important libraries are added firstly. After that all components are added and connected according to dedicated circuit diagram.

Tinkercad: Tinker cad is a free, online 3D modeling program that runs in a web browser, known for its simplicity and ease of use. Since it got to be accessible in 2011 it has gotten to be a prevalent stage for making models for 3D printing as well as an entry-level presentation to helpful strong geometry in schools. We have used this software for 3D model.[14]

Figure 4.4(a)- Tinkercad logo [15]

In Tinkercad, helmet design is shown in different angle. In those angle position of all sensors and modules are shown.

Figure 4.4(b): Helmet Deign in Tinkercad

4.3. Summary

In this chapter, all the software details are been described. Arduino IDE is used for utilized the Arduino code. Proteus is used for project design and Tinkercad is used to design the prototype helmet. The details block diagram is also described and the circuit reenactment handles moreover depicted in detail. In a word, the systems of displaying of the broaden are described in this section.

Chapter 5

PROJECT IMPLEMENTATION

5.1. Introduction

In this chapter, the whole blind point detection digital safety and entertainment helmet for motorbike driver with isolated solar charging is discussed. It will be designed using Arduino modules like Bluetooth module, ultrasonic sensor, Global System for Mobile Communication (GSM) module, Global Positioning System (GPS) module & vibration sensor [16]. A Bluetooth Device is used because when traveling long distance, the rider can connect his mobile phone to listen to music and talk if he wishes. The feature that helps to rider's family to track the location when rider is injured, can be acquired by GPS & GSM.

5.2. Circuit diagram

Circuit diagram of blind point detection digital safety and entertainment helmet for motorbike driver with isolated solar charging is shown in this section.

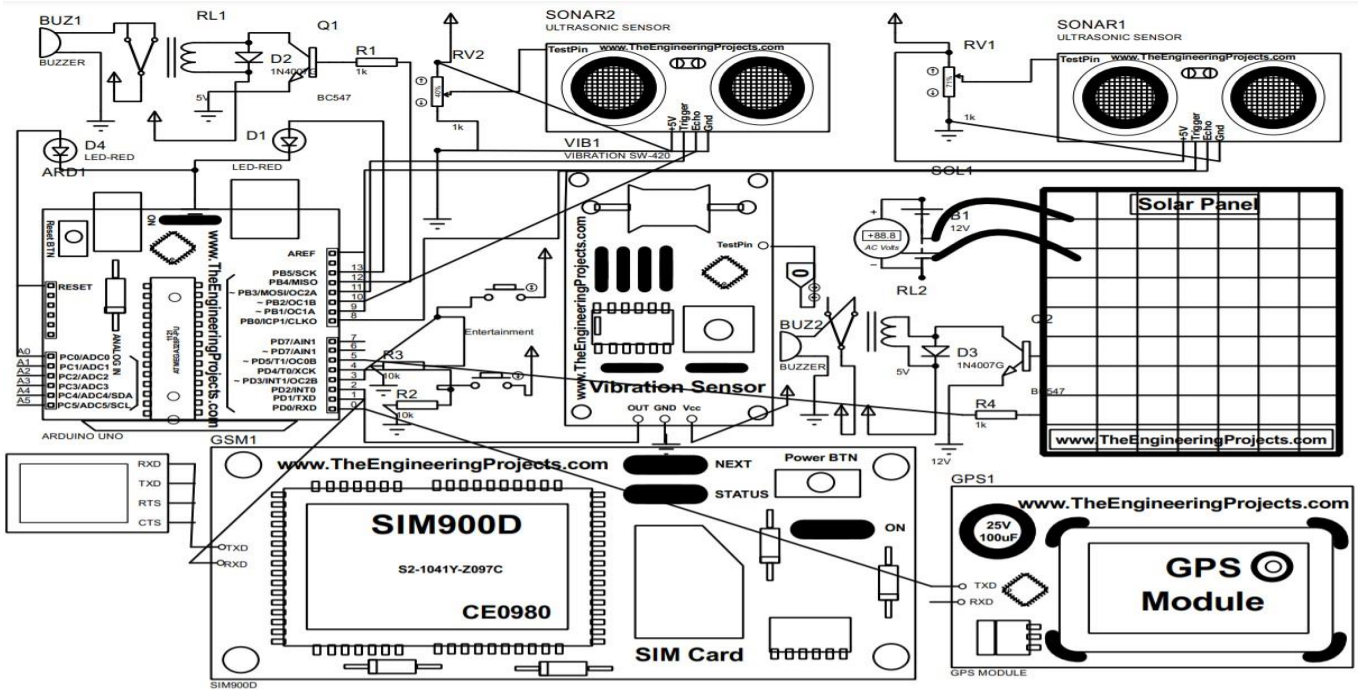

Figure 5.1: Circuit Diagram for project

Hardware:

The hardware used in this project:

- Arduino

- Ultrasonic Sensor
- Bluetooth module
- Vibration Sensor Module
- Buzzer
- Global System for Mobile Communication (GSM)
- Global Positioning System (GPS)
- Solar Plane

5.2.1. Processes of Implementation and Description

Details of the equipment used in the project are described below- **Arduino:**

Arduino is an open-source platform used for creating interactive electronics projects. Arduino consists of both a programmable microcontroller and a bit of program, or IDE (Integrated Development Environment) that runs on your computer, utilized to compose and transfer computer code to the microcontroller board. Arduino Uno moreover doesn't require an equipment circuit (programmer/ burner) to stack a new code into the board. We will effectively stack a code into the board fair employing a USB cable and the Arduino IDE (that employments a simpler adaptation of C++ to write a code) [17].

Arduino makes a few distinctive sheets, each with distinctive capabilities. In expansion, portion of being open-source equipment implies that others can alter and create subsidiaries of Arduino sheets that give indeed more frame components and usefulness. Here are many options that are well-suited to somebody modern to the world of Arduino.[18]

Arduino Nano:

Arduino Nano is a microcontroller board based totally on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 8 analog inputs, a sixteen MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, an energy jack, an ICSP header and a reset button. It contains everything wanted to help the microcontroller; certainly, join it to a pc with a USB cable or strength it with a AC-to-DC adapter or battery to get started. You can tinker with your Uno barring traumatic too an awful lot about doing something wrong, worst case situation you can change the chip for a few bucks and begin over again. "Nano" capacity one in Italian and was once chosen to mark the launch of Arduino Software (IDE)1.0. The Nano board and model 1.0 of Arduino Software (IDE) have been the reference variations of Arduino, now developed to more recent releases. The Uno board is the first in a collection of USB Arduino boards, and the reference mannequin for the Arduino platform; for a large listing of current, previous or old-fashioned boards see the Arduino index of boards.

Figure 5.1.1: Arduino Nano [12]

Here,

- Microcontroller ATmega328P
- Operating Voltage 5V
- Input Voltage (recommended) 7-12V
- Input Voltage (limit) 6-20V
- Digital I/O Pins 14 (of which 6 grant PWM output)
- PWM Digital I/O Pins 6
- Analog Input Pins 8
- Flash Memory 32 KB (ATmega328P) of which 0.5 KB used by way of bootloader
- SRAM two KB (ATmega328P)
- EEPROM 512 bytes (ATmega328P)
- Clock Speed 16 MHz
- LED_BUILTIN 13
- Length 68.6 mm
- Width 53.4 mm
- Weight 25 g

Ultrasonic Sensor:

An ultrasonic sensor is an electronic device that measures the separate of a target question by radiating ultrasonic sound waves, and changes over the reflected sound into an electrical signal. Ultrasonic waves travel quicker than the speed of capable of being heard sound. There are two main components in ultrasonic sensor.[11]

- The transmitter
- The receiver

The transmitter, which emits the sound using piezoelectric crystals and the receiver which encounters the sound after it has travelled to and from the target. In this project ultrasonic sensor defect any object come to the range.

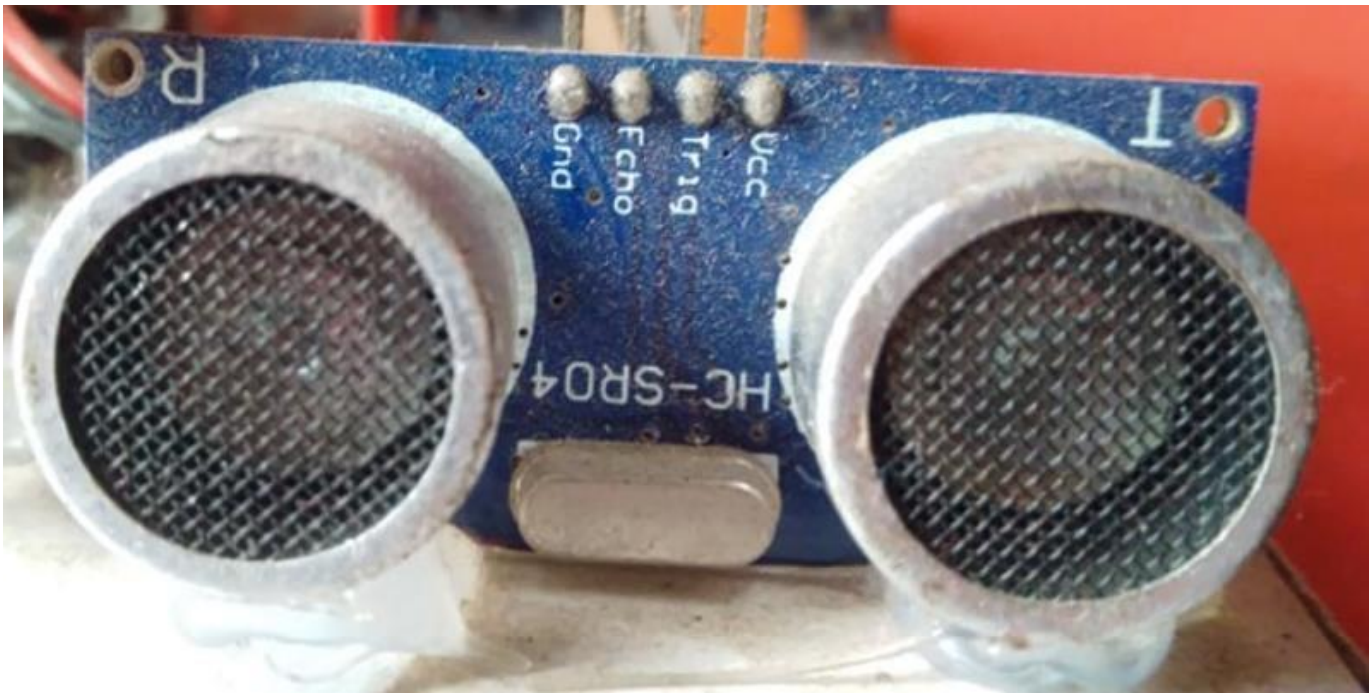

Figure 5.2: Ultrasonic Sensor

Bluetooth module:

A Bluetooth module is ordinarily an equipment component that gives. a remote item to work with the computer; or in a few cases, the. Bluetooth may be an extra or fringe, or a remote earphone, or other product. [14] The Bluetooth module HC-05 is a MASTER/SLAVE module. By default, the manufacturing unit placing is SLAVE. The Role of the module (Master or Slave) can be configured solely through AT COMMANDS. The slave modules can't provoke a connection to some other Bluetooth device, however can be given connections. Master module can provoke a connection to different devices. The person can use it truly for a serial port alternative to set up connection between MCU and GPS, PC to your embedded project, etc.

Figure 5.3: Bluetooth Module [14]

Pin Description: The HC-05 Bluetooth Module has 8 pins. They are as follows:

- **Enable / Key (Pin number-1):** It is utilized to flip between Information Mode (set low) and AT command mode (set high). By default, it is in Information mode.

- **VCC (Pin number-2):** Add to 5v supply voltage.
- **Ground (Pin number-3):** Ground pin.
- **TX – Transmitter (Pin number-4):** Everything received via Bluetooth will be given out by this pin as serial data.
- **Rx- Receiver (Pin number-5):** Receive Serial Data. Every serial data given to this pin will be broadcasted via Bluetooth.

Vibration Sensor Module:

The vibration sensor is also called a piezoelectric sensor[12]. These sensors are adaptable gadgets which are utilized for measuring different forms. This sensor employments the piezoelectric impacts whereas measuring the changes inside speeding up, weight, temperature, constrain something else strain by changing to an electrical charge. This sensor is additionally utilized for choosing scents inside the discuss by instantly measuring capacitance as well as quality.

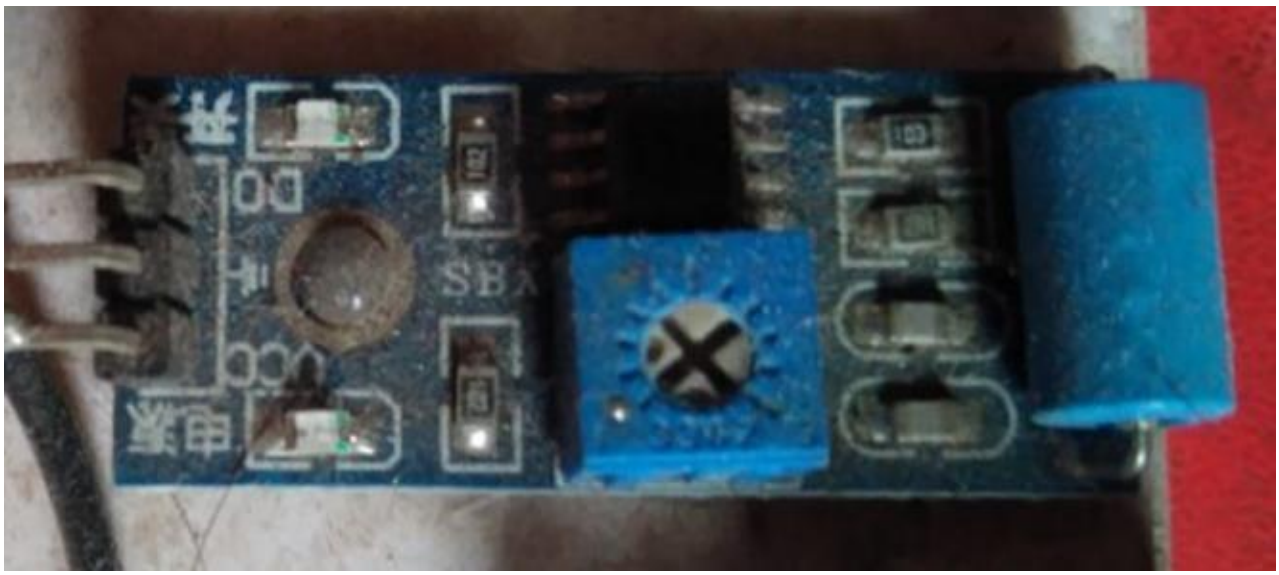

Figure 5.4: Vibration Sensor Module

The working principle of vibration sensor is a sensor which operates based on different optical otherwise mechanical principles for detecting observed system vibrations.[12] The affectability of these sensors ordinarily ranges from 10 mV/g to 100 mV/g, and there are lower and higher sensitivities are moreover open. The affectability of the sensor can be chosen based on the application. So, it is fundamental to know the levels of vibration plentifulness run to which the sensor will be uncovered all through estimations.[12]

Buzzer:

Buzzer is a kind of voice gadget that changes over sound show into sound flag. It is primarily utilized to provoke or caution. Agreeing to distinctive plan and application, it can create music sound, woodwind sound, buzzer, caution sound, electric chime and other diverse sounds.

It can be utilized by basically controlling it employing a DC control supply extending from 4V to 9V. A basic 9V battery can too be utilized, but it is prescribed to utilize a directed +5V or +6V DC supply. The buzzer is regularly related with a exchanging circuit to turn ON or turn OFF the buzzer at required time and require interval.[13]

Figure 5.5: Buzzer

Buzzer Features and Specifications:

- Rated Voltage: 6V DC
- Operating Voltage: 4-8V DC
- Rated current: <30mA
- Sound Type: Continuous Beep
- Resonant Frequency: ~2300 Hz
- Small and neat sealed package
- Breadboard and Perf board friendly

In this project buzzer turn on when ultrasonic sensor detects any object come to the set range.

GPS Module:

The Global Positioning System (GPS) is a satellite-based navigation system that provides location and time information. The system is unreservedly open to anybody with a GPS collector and unhampered line of locate to at slightest four of GPS satellites.[14] A GPS collector calculates its position by accurately timing the signals sent by GPS satellites. GPS is these days broadly utilized additionally has gotten to be a fundamentally portion of keen phones.

Figure 5.6: GPS Module

VCC: Power Supply 3.3 – 6 V

GND: Ground

TXD & RXD: These two pins show as an UART interface for communication
GPS collector employments a star grouping of satellites and ground stations to calculate exact area wherever it is located. These GPS satellites transmit data flag over radio recurrence (1.1 to 1.5 GHz) to the collector. With the assistance of this gotten data, a ground station or GPS module can compute its position and time.

GSM Module:

The Global System for Mobile Communications (GSM) is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe the protocols for second-generation (2G) digital cellular networks used by mobile devices such as mobile phones and tablets. A GSM modem or GSM module is a hardware device that uses GSM mobile telephone technology to provide a data link to a remote network.[15] From the see of the portable phone arrange, they are basically indistinguishable to a conventional versatile phone, counting the require for a SIM to distinguish themselves to the arrange.

Figure 5.7: GSM Module [15]

A GSM modem could be a gadget that can be either a versatile phone or a modem gadget that can be utilized to create a computer or any other processor communicate over a organize. A GSM modem requires a SIM card to be worked and works over a organize extend subscribed by the arrange administrator.

Lithium-Ion Battery:

This lithium-ion battery includes a 2200mAh and a safety circuit that gives over-voltage, under-voltage and over-current protection. Yet, it is slim and effortless to suit into many undertaking cases. This phone can furnish 2C of height cutting-edge (4400mA). Note that these batteries are now not designed to preserve such excessive loads, we recommend preserving any consistent present day draw underneath about 0.5C (1 Amp). The battery comes with color coded wires, however, to use with our chargers anyone will in all likelihood choose to join a JST 2-pin cable. Because they have a proper JST connector, no longer a knockoff, the cable wont snag or get caught in a matching JST jack, they click on in and out smoothly. The cables are rated for 2A so if you use them preserve that in mind. The blanketed safety circuitry maintains the battery voltage from going too excessive (over-charging) or low (over-use) which capacity that the battery will cutout when useless at 2.5V.[15]

Figure 5.8- Lithium-Ion Battery [15]

However, even with this safety it is very necessary that solely use a Li-on/Lipolysis constant voltage/constant-current charger to recharge them and at a price of 0.5C (1 Amp) or less. Like most lithium ion packs, the batteries we promote do no longer have thermistors constructed in. This is why we endorse charging at 1/2C or even much less - 1A max in this case. Of course, you can cost at a decrease price – it will simply take a little longer to fill up. Additional security notes: Do now not use a NiMH/NiCad/lead acid charger! Also, do now not abuse these batteries, do no longer short, bend, crush or puncture. Never cost or use unattended. Always investigate batteries and surrounding circuitry continuously for any damage, free wiring, or opportunity of quick circuits. As with all Lithium-ion polymer batteries and with any energy supply - they need to be used by using professionals who are blissful working with electricity elements.

Solar Panel:

A PV module is a meeting of photo-voltaic cells established in a framework for installation. Photo-voltaic cells use daylight as a supply of electricity and generate direct modern electricity. A series of PV modules is referred to as a PV Panel, and a gadget of Panels is an Array. Arrays of a photovoltaic device provide photo voltaic electrical energy to electrical equipment.[16]

Figure 5.9: Solar Panel

5.2.2 Hardware

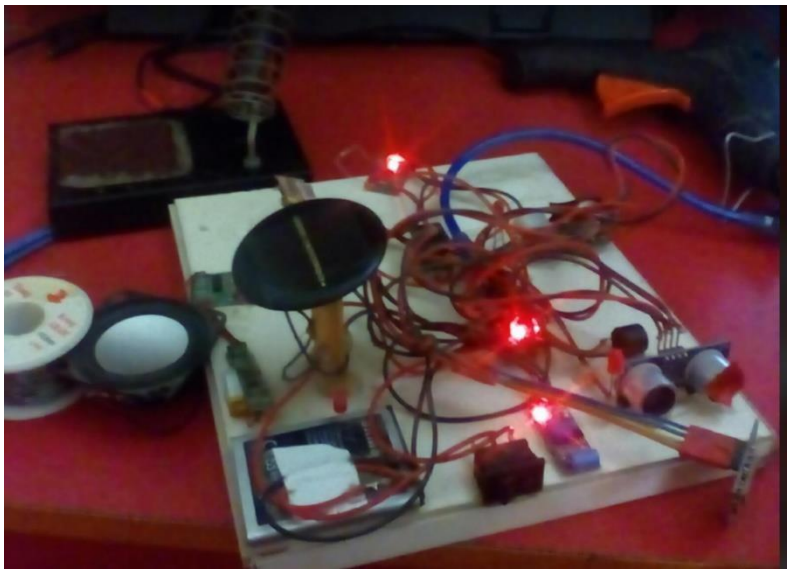

Figure 5.10: Implementation

In Figure 5.10, Circuit with sensors and modules is being installed. It is very critical to implement.

5.3. Summary

This project is aided with many hardware components. This proposed science is an amalgamation of specific sensors and microcontrollers to assist the biker. A clear description of all the component is presented in this chapter.

Chapter 6

RESULTS ANALYSIS & CRITICAL DESIGN REVIEW

6.1. Introduction

In this chapter, results and critical design are discussed. Blind Point Detection Digital Safety and Entertainment Helmet for Motorbike Driver with Isolated Solar Charging Station is a system for performing complex works and it can be operated easily. It will be designed using Arduino modules like display, Bluetooth module, ultrasonic sensor, Global System for Mobile Communication (GSM) module, Global Positioning System (GPS) module & vibration sensor.

This project is successfully implemented. The Simulation is successfully completed, and results are collected. Both results from hardware and simulation are presented in this chapter.

6.2. Hardware

The diagram provided below is a practical representation of the project – Blind Point Detection Digital Safety and Entertainment Helmet for Motorbike Driver with Isolated Solar Charging Station. Here, a chassis has been made. Sensors and other Module were set on the chassis and whole circuit is controlled by using an Arduino.

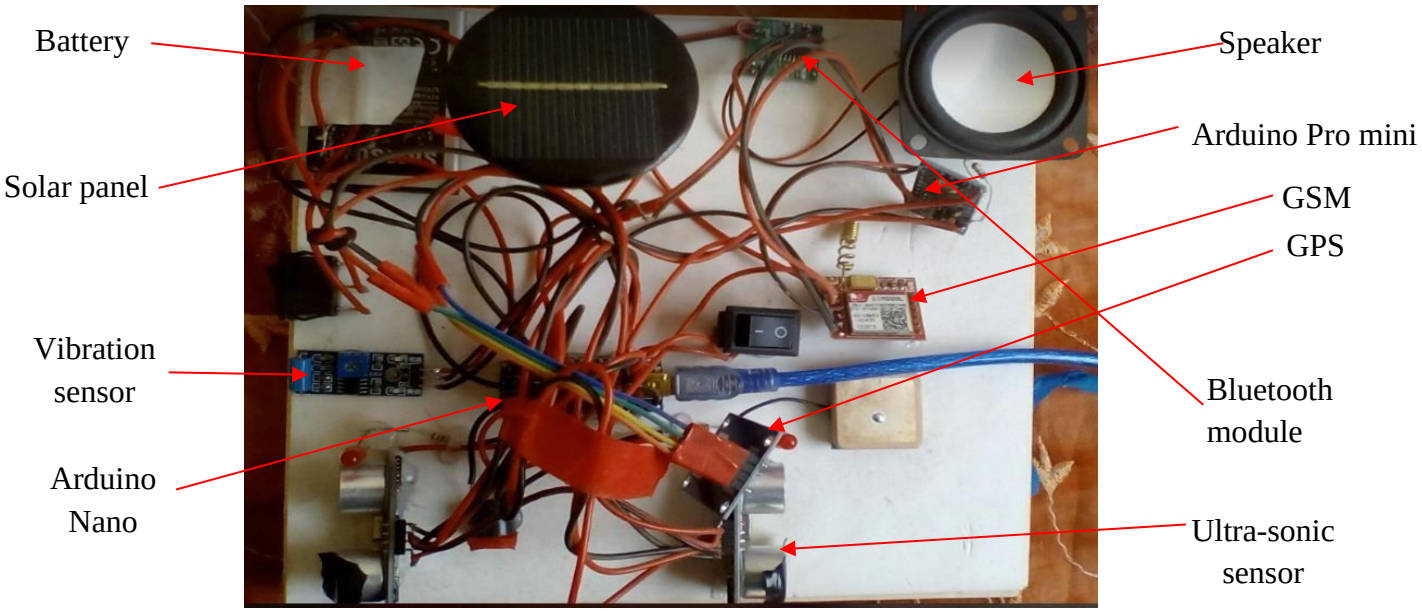

Fig 6.1: Circuit with sensors and modules with Arduino

Figure 6.2: Implementation

In Figure 6.2, Circuit with sensors and modules is being installed. It is very critical to implement. Then Digital Safety and Entertainment Helmet for Motorbike Driver is being installed.

6.2.1. Result Analysis using Simulation tools

To test the system, it is most important to check the outcome. The Simulation is successfully completed.

Simulation of the Project:

The simulation is done using Proteus 8 professional software.

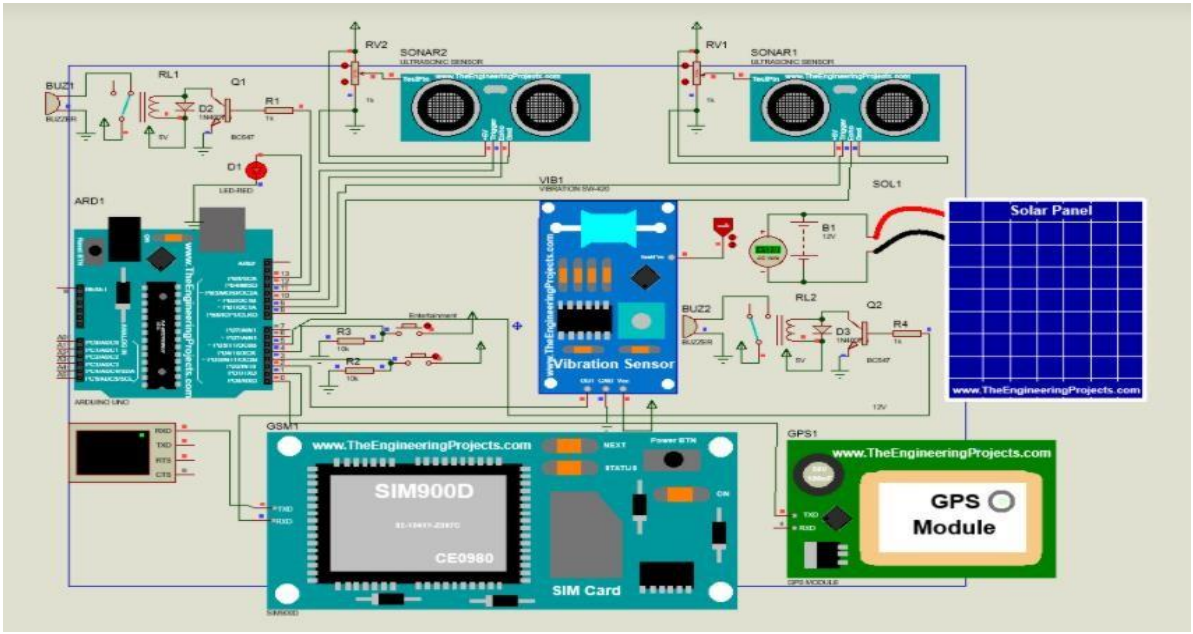

Figure 6.3: Schematic Capture for Blind Point detection

In figure 6.3, Schematic Capture for simulation of the project. Here Arduino uno, buzzer, ultrasonic sensor, vibration sensor, (Global System for Mobile Communication) GSM module, Global Positioning System (GPS) locator has been used.

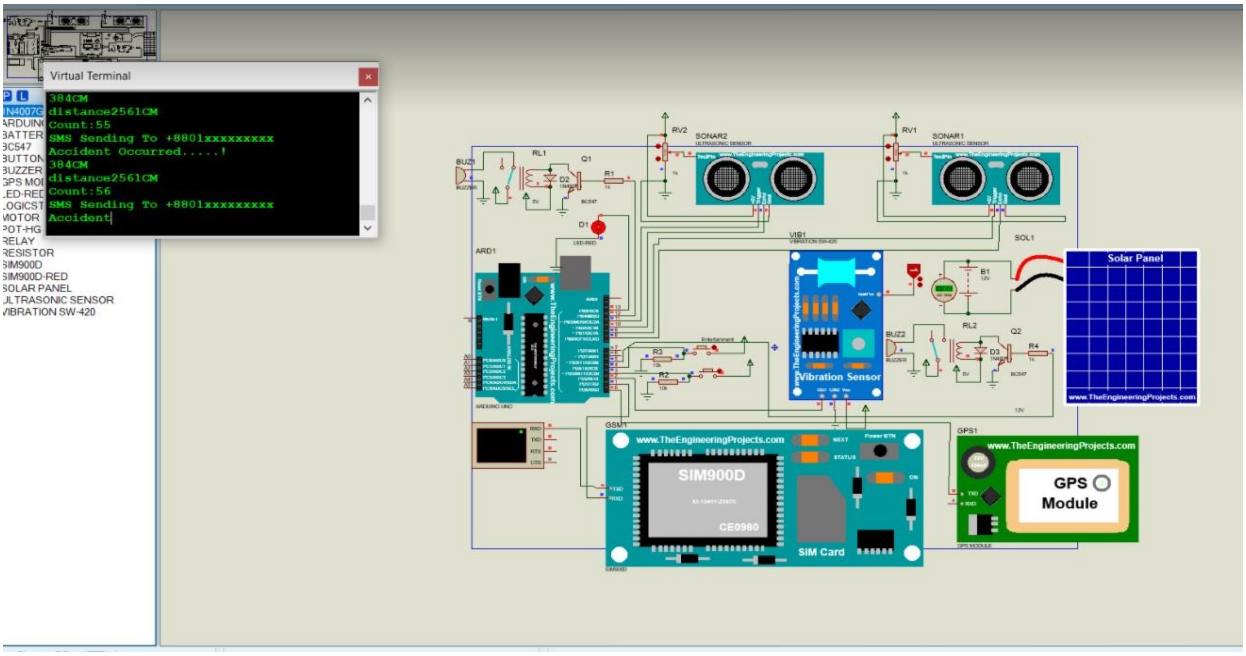

Figure 6.4: Simulation for Blind Point detection

In figure 6.4, Simulation for Blind Point detection. Here the resistor (RV1, RV2) is used instead of the object. The lower the resistance value, the closer the object will get. If any object come to the set range, ultrasonic sensor detects that and turn on buzzer. On other thing, if ever an accident occurs, the vibration sensor will detect it. Then wait a while, during this time the rider will press the switch if it is safe, otherwise it will SMS the location of the accident via GPS & GSM module. It can be seen in the virtual terminal in the figure 6.4.

6.2.2. Hardware:

This project was designed with renewable energy resources in mind. Include this component because solar can generate electricity directly from sunlight. It absorbs sunlight as a source of energy. That's why the rider does not have to worry about charging his helmet. Also used a Bluetooth device because when traveling long distance, the rider can connect his mobile phone to listen to music and talk if he wishes. But must use this feature to follow traffic rules.

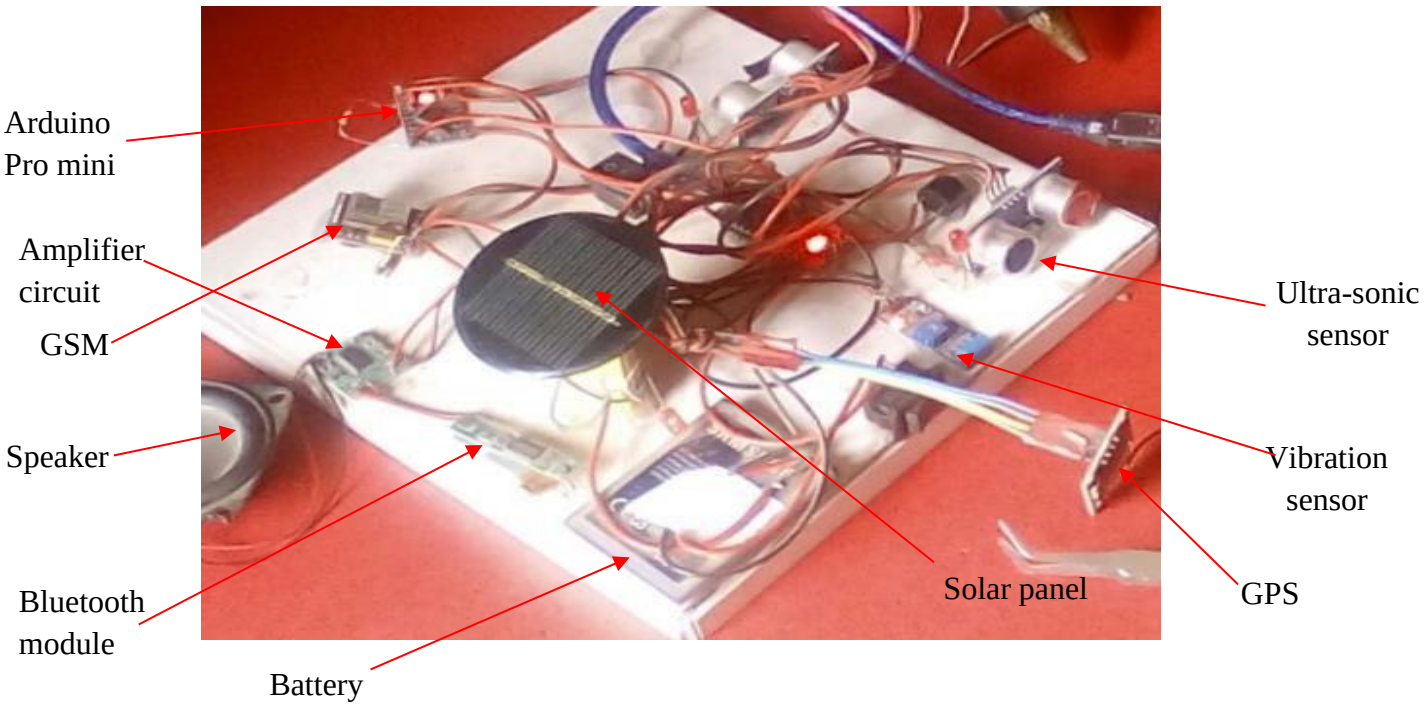

Figure 6.5: Hardware for this project

Result:

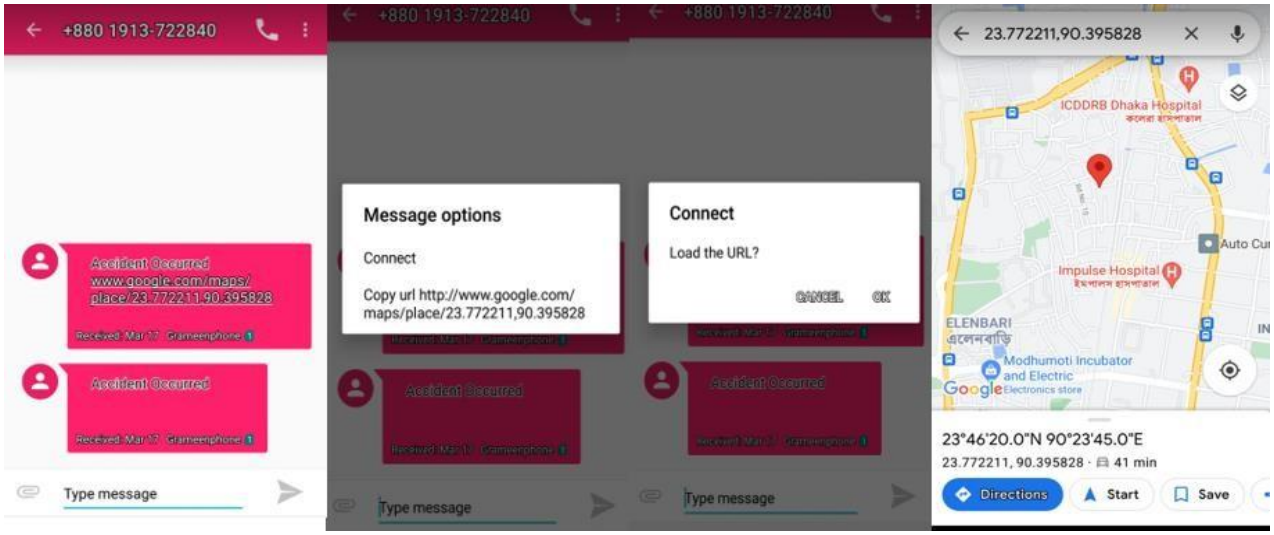

Figure 6.6: Result for GPS & GSM module

If ever an accident occurs, the vibration sensor will detect it. At that point hold up a whereas, amid this time the rider will press the switch in case it is secure, something else it'll SMS the area of the mishap by means of GPS & GSM module. This feature helps to rider's family to track the location when rides are injured. The location of the accident is shown through the attitude and longitude in Figure 6.6.

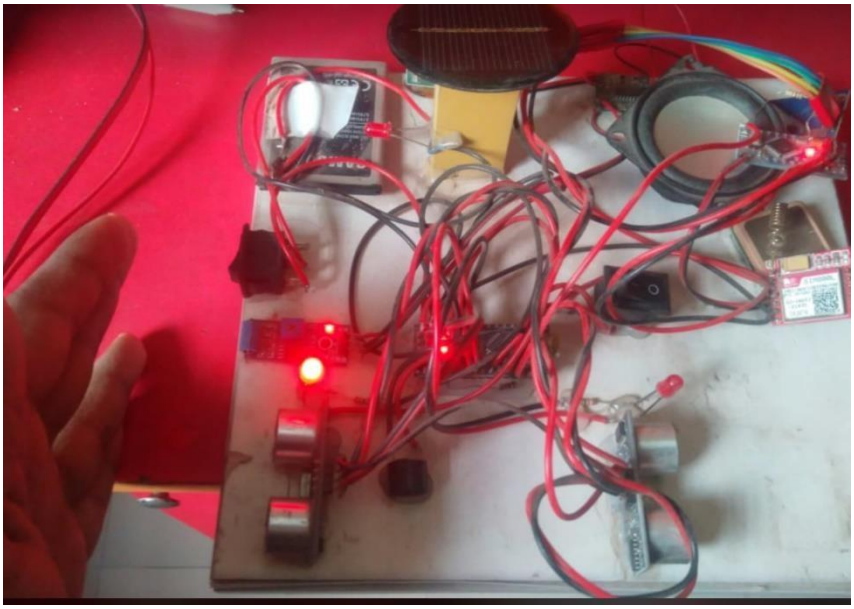

Figure 6.7: Blind point detection system with left indicator

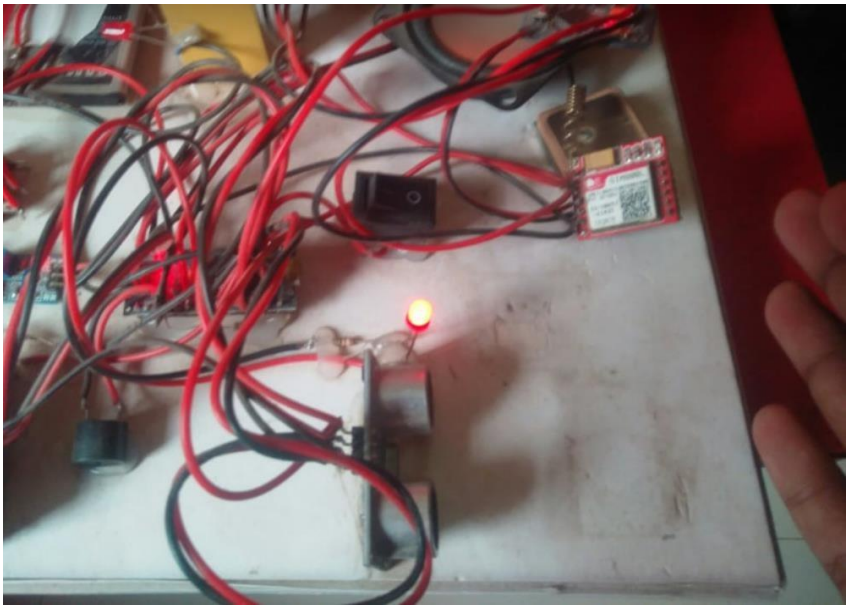

Figure 6.8: Blind point detection system with Right indicator

In figure 6.7, if any object come to set range at left side. Ultrasonic sensor detects that and turn on the LED. Same process goes for right side in figure 6.8

6.3. Summary

Bicycle accident rate in Bangladesh is expanding on the off chance that we consider with different nations accident rate. By considering the entirety of this, this smart helmet project is being implemented. It can safe rider from serious injury and make the ride more agreeable. In this section all outcomes are been shown part by part. All the simulation and hardware result match one another. In equipment part every one of the segments are working appropriately. Likewise, Global System for Mobile Communication (GSM) module, Global Positioning System (GPS) are work all the while by the assistance of Arduino ace scaled down. The system reduces the accident rate. This set up was carried out using Arduino Mega and Arduino UNO, Bluetooth module, ultrasonic sensor, Global System for Mobile Communication (GSM) module, Global Positioning System (GPS) module & vibration sensor.[17]

Mainly this project is especially useful for bicycle riders. There is no requirement for outside power sources to work it. Likewise, it is less expensive in cost and devours less power.

Chapter 7

CONCLUSION

7.1. Summary of Findings

The main objective of the project "Blind Point Detection Digital Safety and Entertainment Helmet based IOT with Isolated Solar Charging Station" is a digital helmet to save a rider's life.

This project will be built primarily for two-wheeled vehicles. Through which it will be possible to reduce accidents easily [17]. This allows the rider to move and enjoy safely. If in any way the rider is the victim of an accident, he or she can easily send the accident site to his or her family via SMS. It will not harm the body or the environment in any way. In a word, this project will be implemented in helmets for developing the previous helmets to protect the rider's life.

First a model created using proteus & Arduino IDE software and the simulation was successfully complete. A 3D model is then designed using Tinkercad. Then the work of hardware is proceeded. Here HC-SR04 model ultrasonic sensor is used which detect any object come to set range. Also used GPS & GSM module which this feature helps to rider's family to track the location when rides are injured. Successfully placed according to the circuit diagram. So that, the whole thing working perfectly and showing the result successfully. Therefore, the project was executed successfully.

7.2. Project Finance

The following table shows the analysis of project financing.

Table 7.1 - Project Finance

Serial	Name of Components	Quantity	Price in TK	Total
01	Arduino Nano	1	480	480
02	Arduino pro mini	1	320	320
03	Bluetooth module	1	1580	1580
04	Ultrasonic	2	195	390
05	Solar	1	590	590
06	Vibration Sensor	1	280	280
07	Buzzer	1	15	15
08	GSM	1	590	590
09	GPS	1	890	890
10	Jumper Wire	3 set	94	280

11	Battery	1	590	590
12	Switch	4	10	40
13	LED	5	3	15
14	Solar controller	1	490	490
15	PVC Board	1 Sheet	790	790
16	Glue Stick	5	20	100
17	Vero Board	1	80	80
18	Lead	1	180	180
20	Other			200
			Total Cost	7,900

7.3. Novelty of the work

This project was designed with Arduino based. Also, a Bluetooth Device is being used because when traveling long distance, rider can connect his mobile phone to listen to music and talk if he wishes. But must use this feature by following traffic rules. Then GPS (Global Positioning System) & GSM (Global System for Mobile Communication) model is being used. This feature helps to rider's family to track his location when rides are injured. Also, Vibration Sensor is been used in this project. Because this sensor scenes vibration. If any accident occurs, there must be a vibration which senses by this sensor. A solar charging system is also being used. Solar can generate electricity directly from sunlight. It absorbs sunlight as a source of energy. That's why the rider does not have to worry about charging the battery.

7.4. Final Impact of This Project

The main purpose of this project is to use a digital helmet to protect the head of riders from serious injuries, and the helmet has unique features such as multi-media, GPS model, blind point detection, e. t. c. It will not only make you safe, but also your journey enjoyable.

7.4.1. Survey on Environmental Impact

This project will be bringing about a major change in the mode of transportation. The rider will be able to use it easily and simply. Here used Solar power which is 100% green energy and environment friendly. Here a summery is presented based on Environmental Impact of our project. There are few questions and 56 people responded to the survey. As far as the environmental impact is concerned, there are some questions related to sustainability and environmental improvisation.

Let see the graphical analysis of the survey.

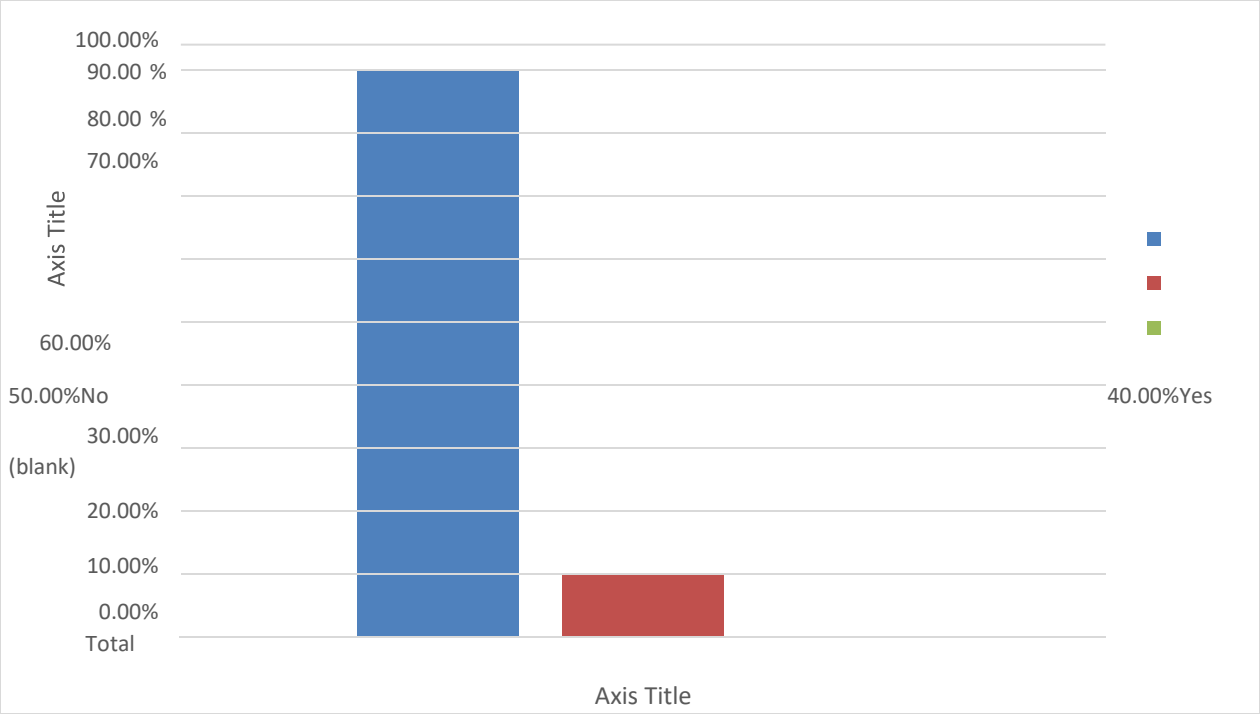

Figure 7.1: Does this project occur any bad effect on the environment

This data showed that 89.3% of people said no, only 10.7% of people said yes.

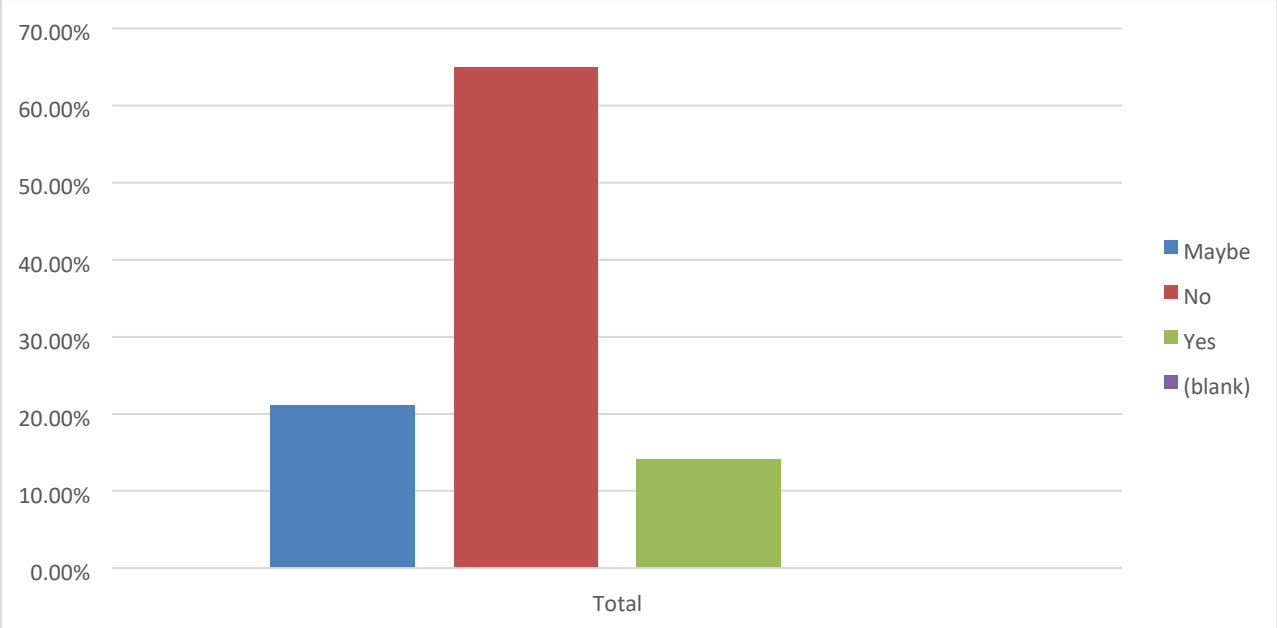

Figure 7.2: Does this project have any impact on human Body

In figure7.2, this data showed that 66.1% of people said no, and 19.6% of people said yes and 14.3% of people said they confused.

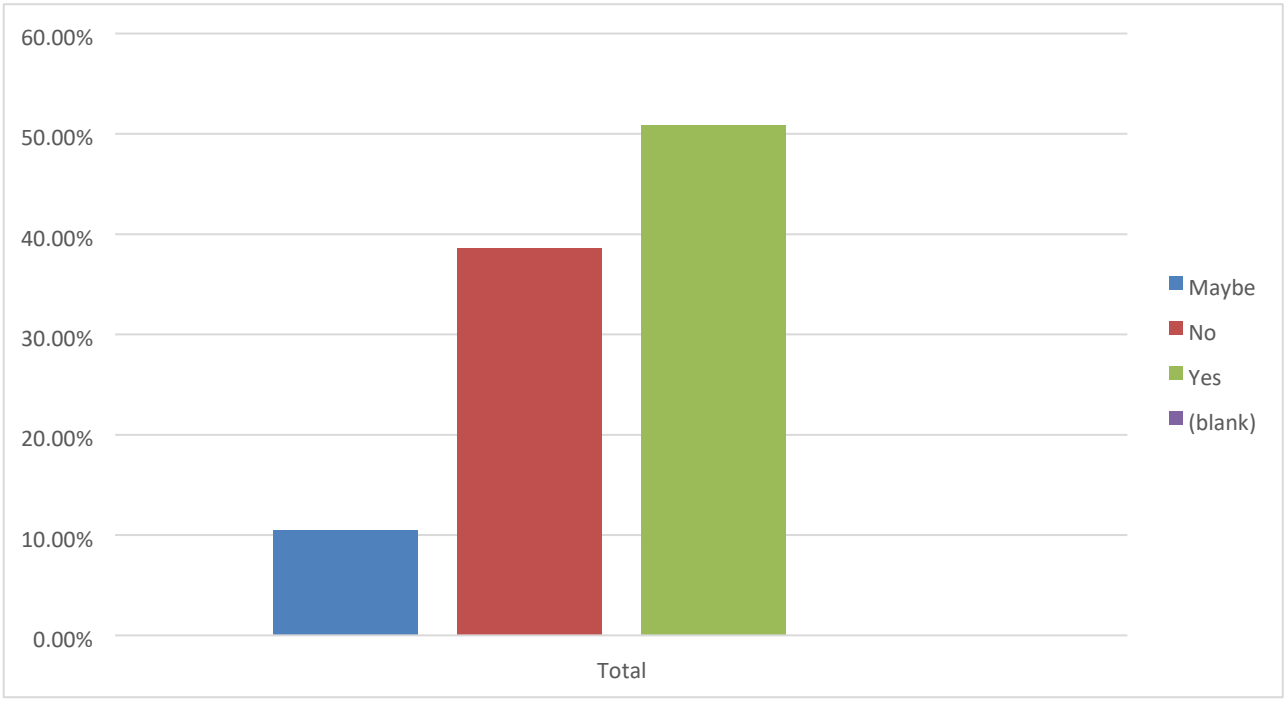

Figure 7.3: Is possible to fewer accidents in this project

This data showed that 50% of people said yes, and 39.3% of people said no and 10.7% of people said they confused.

7.4.2. Project Sustainability and Future Scopes

In this project, Arduino and Ultrasonic play the main Components. Arduino is compatible with the Atmel AVR processor and its built-in I/O and consists of a standard programming language compiler and an onboard boot loader. Also, we used Bluetooth Device, Vibration Sensor, GPS (Global Positioning System), GSM (Global System for Mobile Communication), Solar controller, and solar [18]. Bluetooth is used for multimedia. GPS and GSM are used to track the exact location where the riders will injure. Solar energy generates power to charge the battery. This project can be helpful not only for riders but also for rider's families.

7.4.3. Recommendations on Future Developments

Since this project is made to do complex work and many actuators are used, modification and improvement are always appreciated. In this project, solar charging system has been arranged. The efficiency of this solar

can be increased in future. Technology is God's gifted. It improves day by day. So that, GSM, GPS, ultrasonic sensor and other module can be worked on using more advanced quality.

7.5. Limitations of the Work

Everything has a specific limitation. This project is no exception. There are some limitations here. Those are:

- Riders can't ride a bike/bicycle for a long distance. Because the elements can get hot and have a bad effect on the head.
- If the climate is not healthy, a solar panel will not work well. At that moment too difficult to charge the battery.
- During heavy rain, the maximum range of ultrasonic sensors can be reduced.
- In the summer season, sometimes it can difficult to wear a helmet all day.
- It has not been an implemented on a helmet. It will be done with further modifications. It was not possible to implemented on a helmet because those prototypes components are so big. It could have been possible by using mobile phone GPS and GSM. Due to bugged problem, it was not possible for this implementation.

7.6. Ethical concerns

This project is to maintain the safety, and health of the public. Because at present there are different causes of accidents, such as insufficient driving ability, faulty two-wheelers, drunk driving, etc. The main explanation was that the individual did not have a helmet, which caused immediate death from brain damage. Therefore, the facilities must be available to mitigate the impact after the accident. In this project, it has been ensured that it would prevent brain damage. It has been also ensured to identify the location and emergency message receives when an accident occurs. If the component is implemented within the helmet and inside the wall of the helmet. Then it will work for sure. If it placed externally, on a crash situation every part will be broken.

7.7. Conclusion

This project has been successfully completed. “Blind Point Detection Digital Safety and Entertainment Helmet based IOT with Isolated Solar Charging Station”, This project is very importance because it will reduce road accidents and give the gift of safe travel. Which will play an important role in the transportation system.

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Appendix A

Survey Questionnaire

- **Survey Questions on Impact of Project on Society**

1. Do you think this IOT base helmet helpful for rider?
2. Do you think this IOT base helmet harmful for environment?
3. Do you think this IOT base helmet impact on human body?
4. Do you think this IOT base helmet an innovative idea?
5. Do you think this IOT base helmet can prevent accident?

- **Survey Questions on Environmental Impact:**

1. Does this project occur any bad effect on the environment?
2. Does this project have any impact on human Body?
3. Is possible to fewer accidents in this project?

Appendix B

Datasheet of the ICs used

1. Arduino Nano (ATmega2560) datasheet available online at https://ww1.microchip.com/downloads/en/devicedoc/atmel-2549-8-bit-avr microcontrolleratmega640-1280-1281-2560-2561_datasheet.pdf

2. Arduino Uno (ATmega328) datasheet available online at http://ww1.microchip.com/downloads/en/DeviceDoc/Atmel-7810-AutomotiveMicrocontrollersATmega328P_Datasheet.pdf

3. HC-SR04 datasheet available online at https://lastminuteengineers.com/arduino-sr04-ultrasonic-sensor-tutorial/

Appendix C

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