A MINI- PROJECT REPORT ON

"SMART HELMET"

SUBMITTED BY

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CERTIFICATE

This is to certify that the project entitled **'Smart Helmet'** being submitted by, **Jitesh Gharat** to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of **'T. E. I. T'** in **"IOT (Mini Project) Lab"**.

 Project Guide   External Examiner   Head of Department

(Dr. Nikita Kulkarni) `   (   )   (Dr. Ashish Jadhav)

DECLARATION

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the

original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

Name and Roll No. of Student: **Signature:**

1. JITESH GHARAT (17IT2014)   (   )

DATE:

PLACE:

ACKNOWLEDGEMENT

The project "**Smart Helmet**" is creative work of many minds. A proper synchronization between individual it must for any project to be completed successfully. One cannot imagine the power of the force that guides us all and neither can we succeed without acknowledging it. We would like to express our gratitude to principal **Dr. Mukesh D. Patil** and **Dr. Ashish Jadhav,** our Head of the department, Information Technology Engineering for encouraging and inspiring us to carry out the project in the department lab. We would also like to thank

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PREFACE

We take great opportunity to present this mini project report on "**SMART HELMET**" and put before readers some useful information regarding our project.

We have made sincere attempts and taken every care to present this matter in precise and compact form, the language being as simple as possible. We are sure that the information contained in this volume certainly prove useful for better insight in the scope and dimension of this project in it true perspective.

The task of the completion of the project though being difficult was made quite simple, interesting and successful due to deep involvement and complete dedication of our group members.

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ABSTRACT

The main cause of death in two-wheeler drivers is over-speeding, drunken driving and careless driving. Numerous lives could have been saved if emergency medical service could get accident information and reach in time to the scene. To resolve these current issues we are developing a helmet which gives best solution. These main issues motivates us for developing this project. The objective of our project is to design a low-cost intelligent helmet that is capable of identifying alcohol consumption and preventing road accidents. The main purpose of this smart helmet to provide safety for rider. This is implemented by using advance features like alcohol detection, accident identification, location tracking, used as a

handsfree device, solar powered, fall detection. In our project, its compulsory to wear helmet, without helmet ignition switch cannot ON. If rider is drunk or if accident takes place, then automatically ignition switch is locked, and a message will be send automatically to their registered number with their current location. It provides a feature to receive a call while driving by using Bluetooth.

1. Introduction to IOT :

The IOT concept was coined by a member of the Radio Frequency Identification (RFID) development community in 1999, and it has recently become more relevant to the practical world largely because of the growth of mobile devices, embedded and ubiquitous communication, cloud computing and data analytics. Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network

without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.

Internet of Things can connect devices embedded in various systems to the internet, When devices/objects can represent themselves digitally, they can be controlled from anywhere.

 The connectivity then helps us capture more data from more places, ensuring more ways of increasing efficiency and improving safety and IoT security.

 IoT is a transformational force that can help companies improve performance through IoT analytics and IoT Security to deliver better results. Businesses in the utilities, oil &amp gas, insurance manufacturing, transportation, infrastructure and retail sectors can reap the benefits of IoT by making more informed decisions, aided by the torrent of interactional and transactional data at their disposal.

1.1 Characteristics of IoT:

INTELLIGENCE :

Together algorithms and compute (i e. software & amp: hardware) provide the "intelligent spark" that makes a product experience smart Consider Misfit Shine, a fitness tracker, compared to Nest's intelligent thermostat. The Shine experience distributes compute tasks between a smartphone and the cloud. The Nest thermostat has more compute horsepower for the Al that make them smart.

CONNECTIVITY:

Connectivity in the IoT is more than slapping on a Wi-Fi module and calling it a day, Connectivity enables network accessibility and compatibility. Accessibility is getting on a network while compatibility provides the common ability to consume and produce data. If this sounds familiar, that's because it is Metcalfe's Law and it rings true for IoT.

SENSING:

We tend to take for granted our senses and ability to understand the physical world and people around us. Sensing technologies provide us with the means to create experiences that reflect a true awareness of the physical world and the people in it.

EXPRESSING:

Expressing enables interactivity with people and the physical world. Whether it is a smart home or a farm with smart agriculture technology, expressing provides us with a means to create products that interact intelligently with the real world. This means more than just rendering beautiful UIs to a screen Expressing allows us to output into the real world and directly interact with people and environment.

ENERGY:

Without energy we can't bring our creations to life. The problem is we can't create billions of things that all run on batteries. Energy harvesting, power efficiency, and charging infrastructure are necessary parts a power intelligent ecosystem that we must design. Today, it is woefully inadequate and lacks the focus of many product teams.

SAFETY:

As we gain efficiencies, novel experiences, and other benefits from the IoT, we must not forget about safety. As both the creators and recipients of the IoT, we must design for safety. This includes safety of our personal data and the safety of our physical well-being. Securing the endpoints, the networks and the data moving across all of it means creating a security paradigm that will scale.

ARCHITECTURE:

The Internet of Things is considered as the third wave of the World Wide Web (WWW) after static web pages and social networking based web. The IOT is a worldwide network that connects different type of objects at anytime and anywhere via a popular internet protocol named Internet Protocol (IP). According to most of the researcher's opinions about conventional IoT architecture, it is considered as three layers: - 1) Perception Layer 2) Network Layer 3) Application Layer In other aspects, some researchers analyzed one more layer which is also included in IoT's latest architecturethat is a support layer that lies between the application layer and network layer. The support layer consists of fog computing and cloud computing. The cloud computing is also the hottest topic today in research. The perception layer is also called the recognition layer. The perception layer is the lowest layer of the conventional architecture of IoT. This layer's main responsibility is to collect useful information/data from things or the environment (such as WSN, heterogeneous devices, sensors type real world objects, humidity, and temperature etc.) and transform them in a digital setup. The main purpose of objects is unique address identification and communication between short-range technologies such as RFID, Bluetooth. Near-FieldCommunication (NFC), 6LOWPAN (Low Power Personal Area Network This layer is the brain of conventional IoT architecture This layer's main responsibility is to help and secure data transmission between the application and perception layer of IoT architecture. This layer mainly collects information and delivers to the perception layer toward several applications and servers. Basically, this layer is a convergence of internet and communication- based networks. According to a current study performed on several communication - based technologies researchers concluded that the network layer is the most developed layer of conventional IOT architecture.
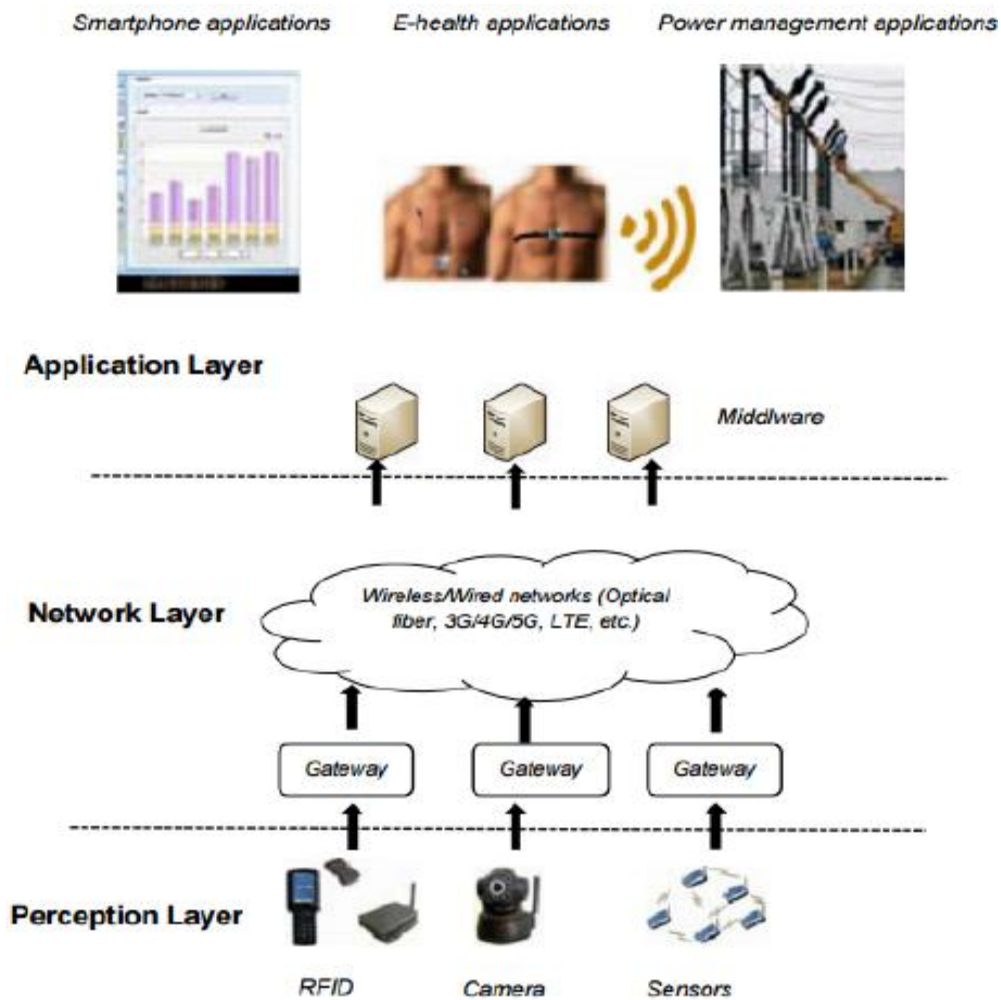
Fig : IOT Architecture

1.2   Problem Statement :

Development of an economical, convenient, and reliable Wi-Fi based automated smart helmet system for remotely alerting accidents to the nearest hospital or updated contacts quickly by sending notifications. Smart helmet are integrated with IOT platform. It can detect high pressure conditions and alerts the nearby hospital through Wi-Fi to generate needful instructions for the actuators. A message is sent on the registered phone if the accident happens. Another important feature of the smart helmet is that if we do not wear the helmet then the vehicle won't turn on. So, here we are introducing an IOT Based Smart Helmet project.

1.3   Objective:

- To avoid major loss of life and property.
- To design an intelligent analysis of smart helmet for accident prevention.
- To develop a smart system for alerting the people about the accident as early as possible.
- To make people safe and aware about the accident as early as possible using faster communication techniques.
- To Save person as soon as possible.

2. Literature Survey :

[1] SMART HELMET AND INTELLIGENT BIKE SYSTEM Prajitha Prasad , Reshma Mohan, S Lekshmi Raj, Sreelekshmi , Divya R Pillai. [2]

A traffic accident is defined as any vehicle accident occurring on public highway roads .The thought of developing this project comes to do some good things towards the society. Two wheeler accidents are increasing day by day and lead to loss of many lives. The main aim of our project is to build a safety system which is integrated with the smart helmet and intelligent bike to reduce the probability of two-wheeler accidents. If any accident occurs no persons at place where to give information to the ambulance or parents. This is a situation we observe our day to day life, a thought of finding some solution to resolve this problem come up with this idea of giving the information about accident as soon as possible and in time.

Advantages :

- Accidents can be detected in accident prone zones easily and thus medical services can be provided easily.
- Easy to implement.
- Cost effective and efficient.
- By the usage of various sensors, it is easily replaceable.

Drawbacks :

- The added weight of helmet can cause a more heavy blow to result in server damage to neck.

[2] SMART HELMET - INTELLIGENT SAFETY FOR MOTORCYCLIST USING RASPBERRY PI AND OPEN CV Shabrin1, Bhagyashree Jagadish Nikharge, Maithri M Poojary, T Pooja, Sadhana B.[3]

A motorcycle's helmet is a type of protective headgear used by the motorcyclist. The main purpose is for safety, which is to protect the rider's head from the impact during an accident. It protects the rider's head as the helmet provides ventilation system. Speeding and not wearing a helmet are the main reasons of fatalities and injuries. Here we are implementing a model with raspberry pi, Vibration sensor, IR sensor and LED.

Advantages :

- The project is expected to improve safety and reduce accidents, especially fatal to the motorcyclist.
- Reduce workload of Traffic Policemen.

Drawbacks :

- When the helmet is dropped down accidentally, the system treats it as an accident.

[3] Smart Helmet used for Avoiding Accident Saravanan S, Swathiakshaya M, Syed Ishaq I, Yuvalakshmi K, Mohanraj S.[5]

Around 18% of the casualties from street related passing's are walkers in India where when contrasted with 17% of mischance's from traveler autos and taxis and 29% from riders of mechanized a few wheelers. The head protector depicted here once introduced with any bicycle compels the rider to wear it while riding so law or no law the biker should wear the cap guaranteeing his/her own particular wellbeing. The system makes it mandatory for the rider to wear helmet before starting the vehicle and also he shouldn't have consumed alcohol. If the rider fails to do so then the vehicle cannot be started.

Advantages :

- Stable and long life.
- Fast response and High sensitivity.

Drawbacks :

- When the helmet is dropped down accidentally, the system treats it as an accident.

[4] Intelligent System For Helmet Detection Using Raspberry Pi Athuljith MK, Biren Patel, Sourabh Pardeshi, Vivien Rajguru, Nitin More.[6]

Each year there are 1.4 million traumatic brain injuries (TBI's) in the INDIA. About 300,000 of these individuals suffer sports related brain injuries annually. Up to 90,000 of the people having experienced a traumatic brain injury have long-term or lifelong disabilities. About $76.5 billion dollars is spent in treatment related to these injuries. More than 50,000 individuals die from TBI. This proposal aims at the security and safety of motorcyclist against road accident while also providing them with a luxurious comfortable two wheeler experience. Each smart vehicle has built in a circuit and various functions. The circuit of each vehicle is designed in such a manner that the bike won't start unless the rider wears the helmet.

Advantages :

- Smart Vehicle Detection Systems.
- Safeguarding the bike riders from accidents.

Drawbacks :

- If the helmet is lost then the bike will not start.
- Accidents due phone calls as helmet do not contain Bluetooth speakers.

[5] INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY SMART HELMET Mr. G. V Vinod1 & Mr. K. Sai Krishna.[8]

Helmets for riders are extremely important and many lives can be saved by the use of these Helmets in the event of accidents. Motorcyclists have a perception that wearing a helmet causes discomfort and they do not appreciate its importance, especially the youth. And perhaps the most misleading idea is that short trips do not involve any risk. Smart helmet helps to curb „riding without helmet" by ensuring that the rider mandatorily wears the Helmet while driving. The Major goal of this project is accident detection , prevention and notification. This will be done by The High Security Smart Helmet System. Most of the accidents are due to rash driving, drunk and drive, using mobile phones while driving ,violating traffic rules and regulations.

Advantages :

- Detection will be provided if he met with an accidents.
- Notifications will be given to safeguard him as soon as possible.

Drawbacks :

- More complexity.

2.1 Motivation

The major characteristics of accident is that it can happen anywhere and anytime. Hence, timely detection of accident is critical for avoiding a major incident. Hence, the essence of having a sophisticated smart helmet and monitoring system is quite obvious. The information generated by the sensors need to be conveyed a long distance, may be through transmission line followed by instrumental amplifiers. Some places, the deployment of such lines are not feasible. The minima cost solution to such problem is to introduce wireless link. The present development of IOT platform would best suit for it. IOT is a complete embedded system where sensors and actuator are being monitored and controlled remotely across existing network infrastructure. It allows sophisticated computer-based control for more efficient and accurate operation. This paper has proposed an internet of things (loT) based smart helmet and monitoring system best suited for accident prevention.

3. Proposed System :

3.1 Introduction of propose system and architecture

Our smart helmet system will be advanced than other ordinary systems,in case of accident, the message will be sent to the registered mobile phone and also the notification will be immediately sent to the nearest hospital,due to which help will reach quickly and situation can be handled.The hospital will also receive the exact location of the accident as soon as possible.
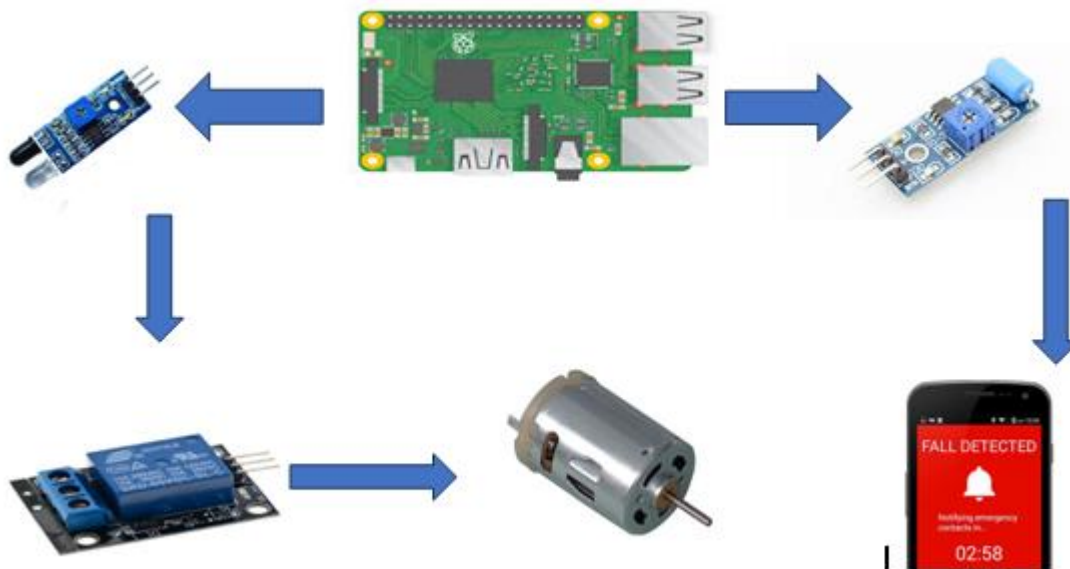
Fig 3.1 Architecture
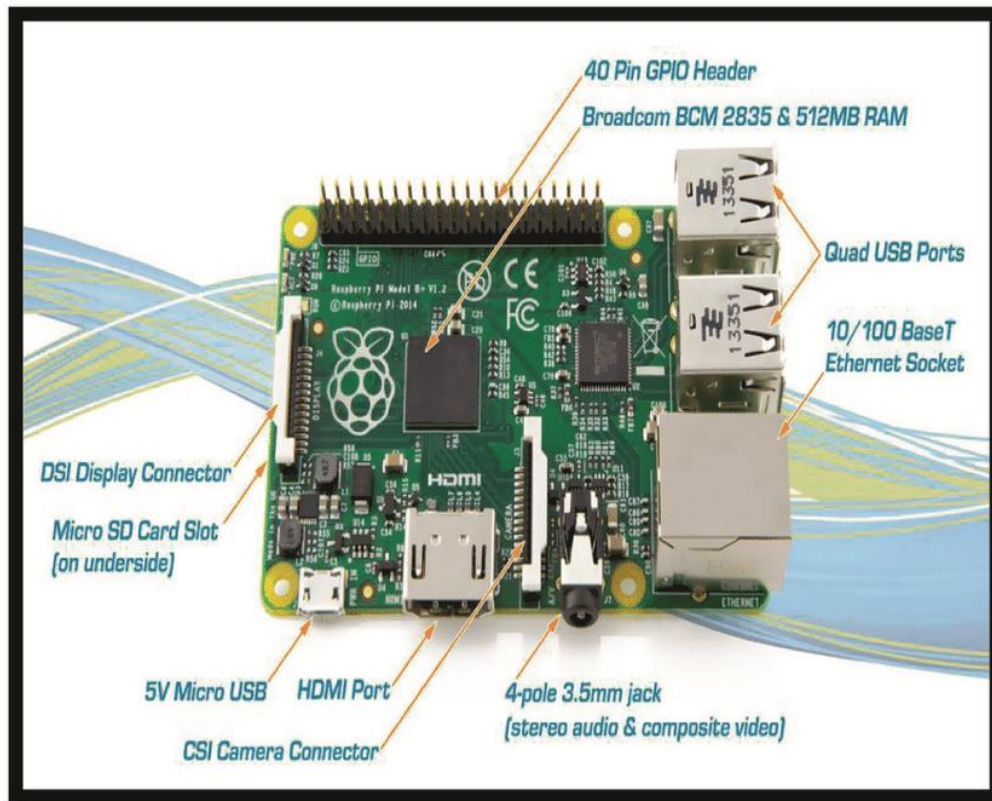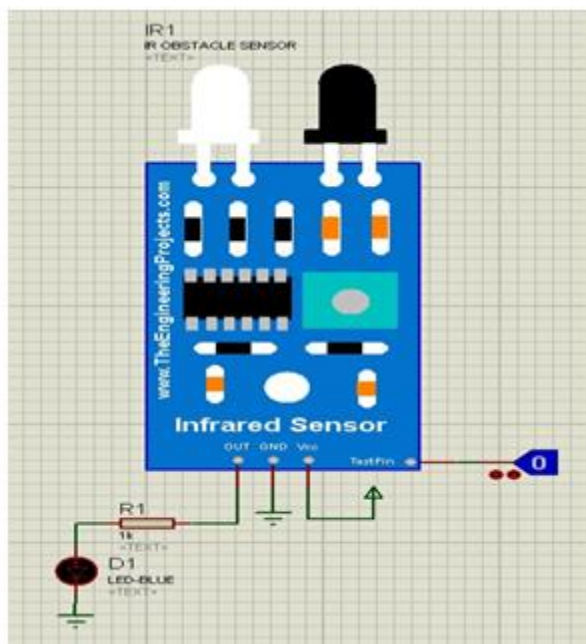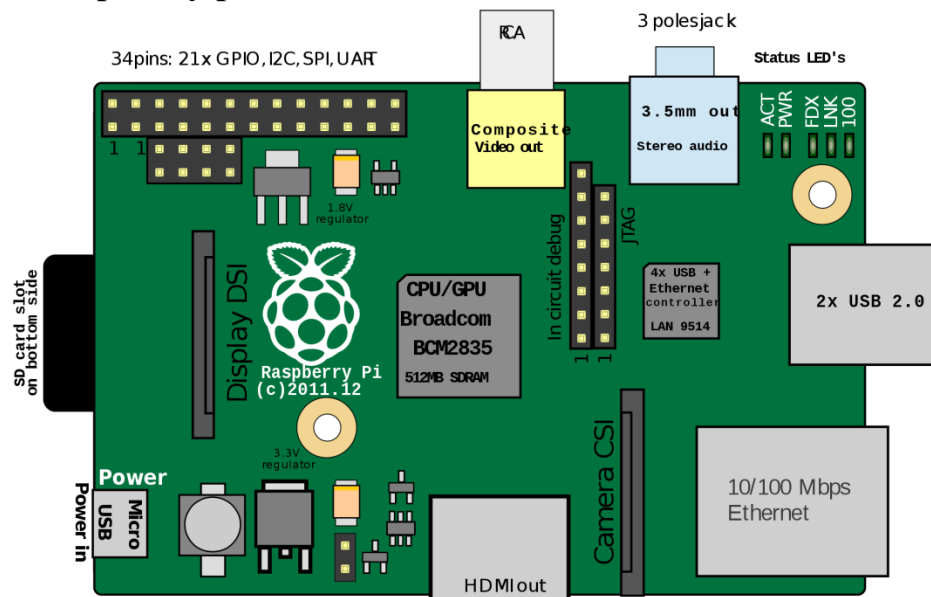
Architecture

Fig 3.1.1 : Architecture of RPI

3.2 Hardware and Software Requirement

Raspberry pi 3b

INFRARED   SENSOR

Software:

Raspbian OS
Blynk
VNC Viewer

4. Implementation
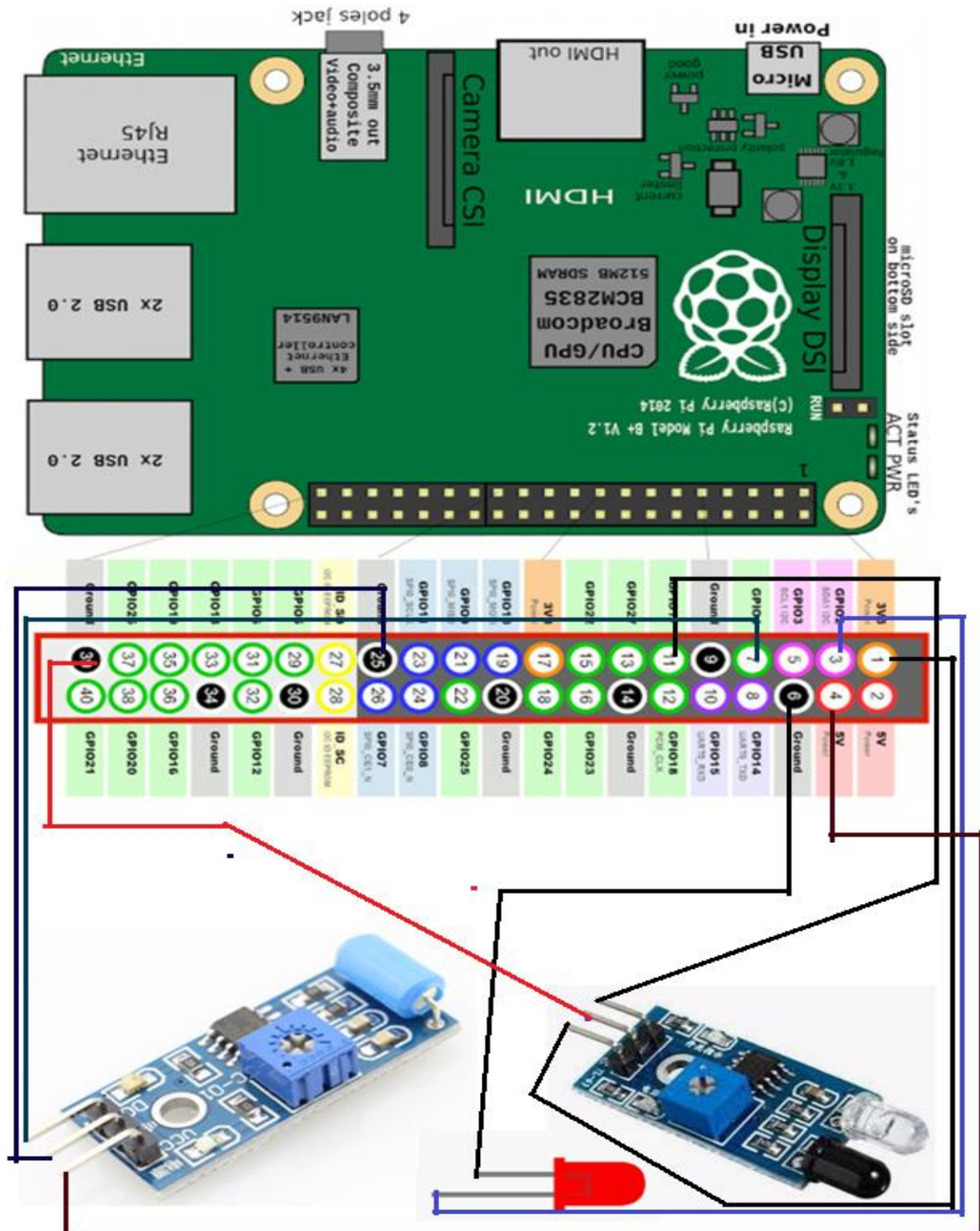
4.1 Circuit Design using simulator

Fig 4.1: Circuit Design

4.2 Connection Details

Vibration sensor is connected to Raspberry Pi. The vibration sensor will detect the pressure or vibration from the helmet This input from the vibration sensor will be sent to Raspberry Pi. If high pressure is observed then accident will be detected. This message will be sent to the user and location will be sent to the nearest hospital via Blynk app.

4.3 Code

```python
import RPi.GPIO as GPIO
import time
import blynklib
GPIO.setmode(GPIO.BCM)          # for GPIO numbering, choose BCM
GPIO.setwarnings(False)
GPIO.setup(17,GPIO.IN)
GPIO.setup(22,GPIO.OUT)
GPIO.setup(2,GPIO.OUT)
channel = 4                     # Vibration Sensor Input #
GPIO.setmode(GPIO.BCM)
GPIO.setup(channel, GPIO.IN)
BLYNK_AUTH='_Vm3RzK-XFLX7DgpgV7SNdGhn2xDDT3V'
blynk=blynklib.Blynk(BLYNK_AUTH)
while(True):
blynk.run()
    x=GPIO.input(17)            # IR Sensor Input #
    if x==0:
        print("Power on")
        GPIO.output(2,GPIO.HIGH)        # LED #
        blynk.notify("Bike is initiated.")
    def callback(channel):
                if GPIO.input(channel):
        blynk.notify("Accident Occurred !!")
                    print "MOVEMENT DETECTED!"
```

```
                    else:
                        print "MOVEMENT NOT DETECTED!"
    GPIO.add_event_detect(channel,GPIO.BOTH, bouncetime=300) #let
    us know when the pin goes HIGH or LOW
    GPIO.add_event_callback(channel, callback) #assign function to
    GPIO PIN ,Run funtion on change
         else:
                    print("Power off")
    GPIO.output(2,GPIO.LOW)
```

5. Results:

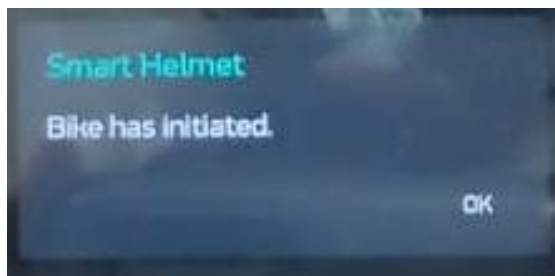Fig 5.1: Back side of helmet

Fig 5.2: Blink of LED

Fig 5.3: Helmet

Fig 5.4: Notification of Bike intiation
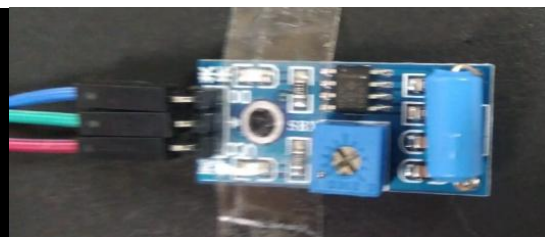

Fig 5.5: Notification of Accident   Fig5.6: Vibration sensor on Helmet

6. Conclusion and Future Scope

6.1 Conclusion

The primary objective of the proposed work was to design an intelligent analysis of smart helmet for accident prevention. Normally, helmet is used to avoid accidents but even though after using helmets accidents happen eventually. But that's not enoughwhen a large fire outbreak happens as it can cause loss of many lives and property.

Thus ,the smart helmet system has been generated. The nearest hospitals and the registered phone numbers will all receive notification when the accident occurs. This will help in reducing the damage to life and property. Implementation of such smart helmet enables us to overcome the drawbacks of the current helmets systems.

In this way, efficient smart helmet system has been developed.

6.2 Future scope

Such System can be used in cars for accident detection .
This project can be enhanced car accident.

6.3 Benefits to the society

Smart Helmet system have a wide range of applications. IOT based Smart Helmet system using raspberry pi can be used in the helmets ,which can save someone's life.

IoT Based smart helmet Notification System using Wifi can be used as a pre-cautionary measure at all the places listed above, which can help in notifying the accident quickly . If appropriate andimmediate action is taken as soon as the buzzer turns ON, it can help in saving life.

7. References :

[1] An Optimal Driving System by Using Wireless Helmet by K. Rambabu1, B.Premalatha and C. Veeranjaneyulu.

[2] Smart Helmet with Sensors for Accident Prevention Mohd Khairul Afiq MohdRasli, Nina Korlina Madzhi, Juliana Johari Faculty of Electrical EngineeringUniversity Technology MARA40450 Shah Alam SelangorMALAYSIAjulia893@salam.uitm.e du.my.

[3] Rattapoom Waranusast, Nannaphat Bundon, Vasan Timtong and Chainaron Tangnoi,"Machine Vision Techniques for Motorcycle Safety Helmet Detection," 2013,28th International Conference on Image and Vision Computing New Zealand.

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[5] Palanivel Rajan S, Sukanesh R, Experimental Studies on Intelligent, Wearable and Automated Wireless Mobile Tele-Alert System for Continuous Cardiac Surveillance, Journal of Applied Research and Technology, 11 (1), 2013, 133-143.

[6] Ashvini M., Revathi G., Yogameena B., Saravanaperumaal S. (2017) View Invariant Motorcycle Detection for Helmet Wear Analysis in Intelligent Traffic Surveillance. In: Raman B., Kumar S., Roy P., Sen D. (eds) Proceedings of International Conference on Computer Vision and Image Processing. Advances in Intelligent Systems and Computing, vol 460. Springer, Singapore.

[7] Mohd Khairul, Afiq Mohd Rasli, Nina Korlina Madzhi, Juliana Johari, "Smart Helmet Sensors for Accident Prevention," 2013 International Conference on Electrical Electronics and System Engineering.

[8] Mrs. Mikhal john (2018)"Comparative study on various system based on raspberry technology" IRJET –Volume:5 , Issue:1.

- `channel` channel/pin to detect events for (see **setmode**)
- `edge` What type of edge to catch events for. Either `RISING`, `FALLING` or `BOTH`.
- `callback` (optional) Callback function to call on the event (a single parameter, the channel number, will be passed to the callback). More can be added using **add_event_callback** .
- `bouncetime` (optional) minimum time between two callbacks in milliseconds (intermediate events will be ignored)