MINI PROJECT

(2021-22)

SMART CAP FOR BLIND PERSON

FINAL REPORT

GLA UNIVERSITY ,MATHURA

SUBMITTED BY:-

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Technical Trainer

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Chaumuha, Mathura – 281406 U.P (India)

DECLARATION

I/we hereby declare that the work which is being presented in the Bachelor of technology. Project **"Smart Cap for Blind Person"**, in partial fulfillment of the requirements for the award of the Bachelor of Technology in Computer Science and Engineering and submitted to the Department of Computer Engineering and Applications of GLA University, Mathura, is an authentic record of my/our own work carried under the supervision of **Asst.prof. Manoj Vashney, Technical Trainer, Dept. of CEA,GLA University.**

The contents of this project report, in full or in parts, have not been submitted to any other Institute or University for the award of any degree.

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Certificate

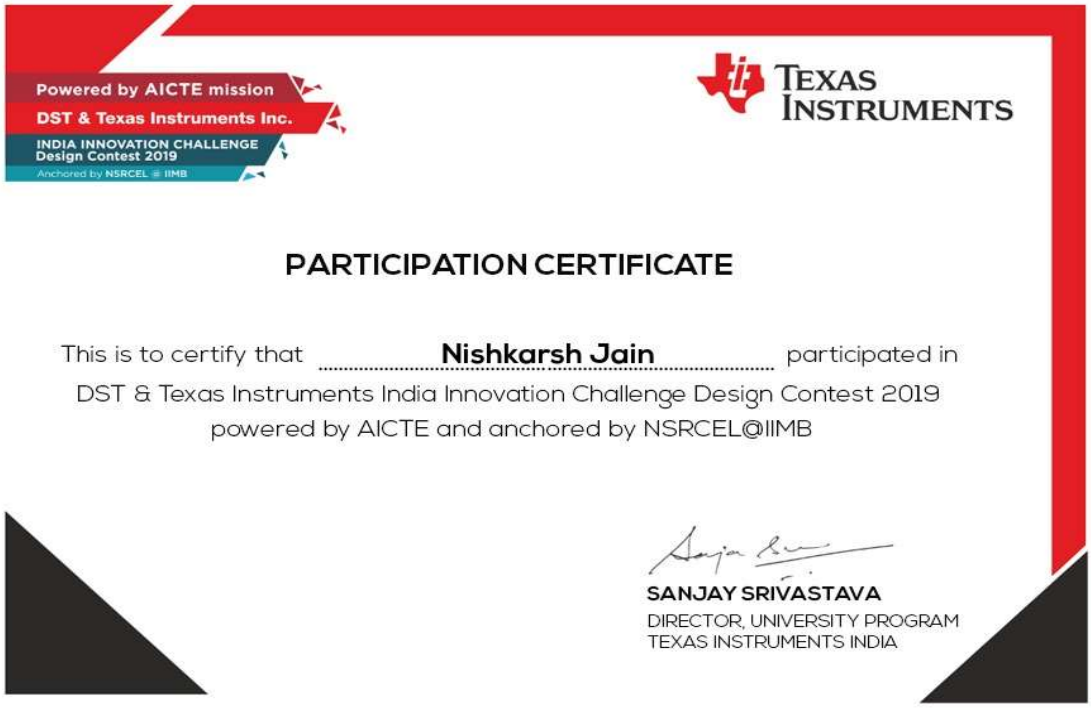
This is to certify that the project entitled "Smart Cap for ", carried out in Mini Project – I Lab, is a bonafide work by Ashita Goyal, Bharti Gautam, Janvi Pangoriya, Naina Agrawal and Nidhi Gupta and is submitted in partial fulfillment of the requirements for the award of the degree Bachelor of Technology (Computer Science & Engineering).

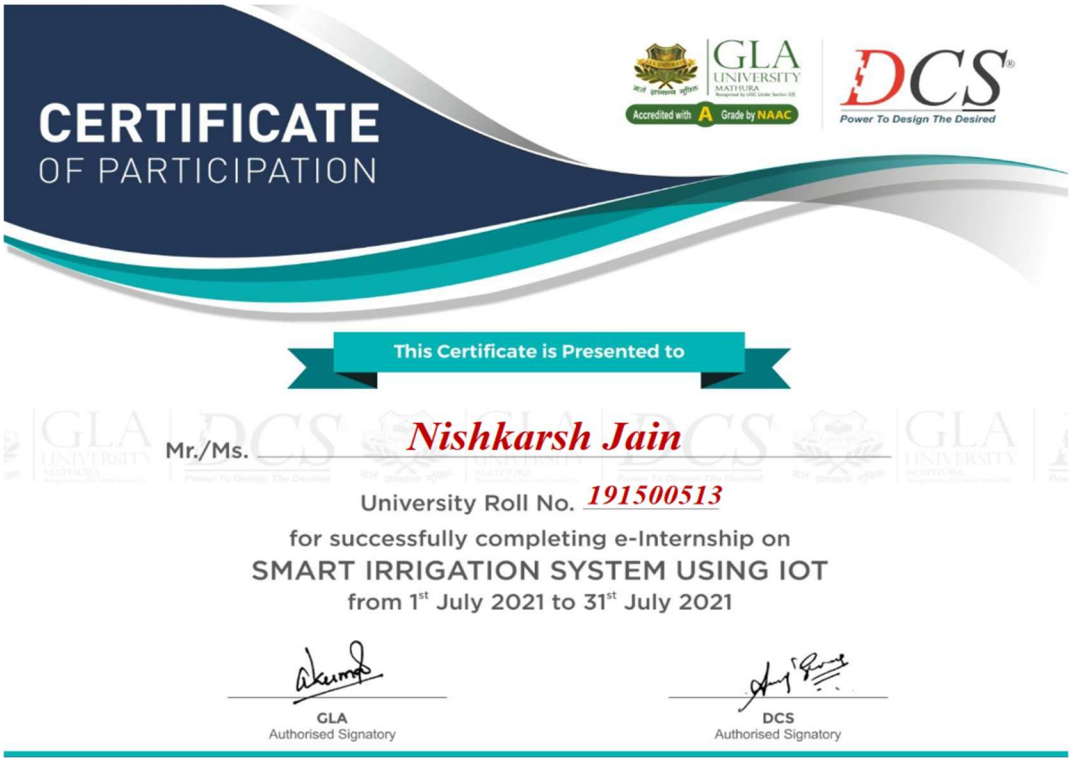
Signature of Supervisor:
Name of Supervisor: MR.Manoj Varshney
Date:

Training Certificate

Ashish Soni

Nishkarsh jain




CERTIFICATE
OF PARTICIPATION
GLA UNIVERSITY MATHURA
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DCS
Power To Design The Desired
This Certificate is Presented to
Mr./Ms. Nishkarsh Jain
University Roll No. 191500513
for successfully completing e-Internship on
SMART IRRIGATION SYSTEM USING IOT
from 1st July 2021 to 31st July 2021
GLA
Authorised Signatory
DCS
Authorised Signatory


CERTIFICATE
OF PARTICIPATION
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Accredited with A Grade by NAAC
DCS
Power To Design The Desired
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SMART WATER MANAGEMENT USING IOT
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ACKNOWLEDGEMENT

Presenting the ascribed project paper report in this very simple and official form, we would like to place my deep gratitude to **GLA University** for providing us the instructor **Mr Manoj Vashney,** our technical trainer and supervisor.
He has been helping us since Day 1 in this project. He provided us with the roadmap, the basic guidelines explaining on how to work on the project. He has been conducting regular meeting to check the progress of the project and providing us with the resources related to the project. Without his help, we wouldn't have been able to complete this project.

And at last but not the least we would like to thank our dear parents for helping us to grab this opportunity to get trained and also my colleagues who helped me find resources during the training.

Thanking You

ABSTRACT

According to the world health organization, 2.2 billion people globally have a vision impairment or blindness. Blindness can be two types: some are fully blind and some people are partially blind. A fully blind person needs a person who can help to provide the right direction and tell them about the object that comes in front of him/her.

This is a basic problem faced by a blind person. As per today's time, IOT(INTERNET OF THINGS) technology helps to solve such kinds of problems.

So, we made a Smart Cap which consists of a camera, ultrasonic sensors, microcontroller, speaker, GPS, etc. This cap helps blind people to know which object comes in front of him/them and the speaker tells how far an object is.By this a person blind person moves independently on the road.This cap act like a supportive person which always there for him/her

And GPS helps to send their location to their family members. For object detection, we will use the amazon image recognition API for image detection.

Content

Chapter 5.Result Discussion

CHAPTER-1

INTRODUCTION

1.1 Overview

According to the world health organization, 2.2 billion people globally have a vision impairment or blindness. Blindness can be two types: some are fully blind and some people are partially blind. A fully blind person needs a person who can help to provide the right direction and tell them about the object that comes in front of him/her.

This is a basic problem faced by a blind person. As per today's time, IOT(INTERNET OF THINGS) technology helps to solve such kinds of problems.

So, we made a Smart Cap which consists of a camera, ultrasonic sensors, microcontroller, speaker, GPS, etc. This cap helps blind people to know which object comes in front of him/them and the speaker tells how far an object is.

And GPS helps to send their location to their family members. For object detection, we will use the amazon image recognition API for image detection.

1.2 IOT in Smart Vision

Smart Vision delivers live surveillance in the most challenging environments through a range of cutting-edge IoT (Internet of Things) solutions. This provides real-time visibility and improves employee safety, all without substantial network costs.

1.3 Smart Cap for blind person

The Smart Cap aims to bring the world as a narrative to the visually impaired. This narrative is generated by converting the scenes in front of the person to text, which describes the important objects in the scene. This project helps a lot to blind people, having GPS technology in the cap, family members of the person can track their location which reduces the possibility of loss. This cap gives an alert to blind people when a sudden object comes near him/her so this cap helps in multiple ways.

1.4 Motivation

We got the motivation for this project from various reasons.This project is very useful for blind person . This project act as a friend of blind person which told the person which object will comes in front of the person and how far it is.

1.5 Objectives

For the physically impaired it is very difficult to survive in such situations, like while walking, so the most significant part of this project is to detect the obstacle around the user.
All about our research, we take care of one problem that is a visual disability. To make a solution we did this low-cost project.
We believe that this project will spread all around society and convert the disabled to able. This is our hope, to consider this cap as a smart eye for visual impairments and also reduce the dependency on others.

CHAPTER-2

Proposed Work

2.1 Component Required

sr.no	Name	Image
1.	Raspberry pi-3	
2.	Ultrasonic Sensor	
3.	Web camera	

4.	cap	
5.	Jumper wires	
6.	Gps Module	

2.2 Description of Sensors

a.Raspberry pi-3

The Raspberry Pi is a low cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. It is a capable little device that enables people of all ages to explore computing, and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.

b.Web Camera

Features Raspberry Pi Camera, supports all revisions of the Pi Fisheye Lens, offers wider field of view 5 megapixel OV5647 sensor Adjustable focus distance Camera Specifications CCD size : 1/4inch Aperture (F) : 2.35 Focal Length : 3.15mm Angle of View (diagonal) : 160 degree (while other normal cameras are typically 72 degree) Sensor best resolution : 1080p 4 screw holes Used for attachment Provides 3.3V power output Supports connecting fill flash LED.

c.Ultrasonic Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: 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).

d.Cap

Here cap is used to fit every sensor and controller .This is the main component of this project.

e.Jumper wires

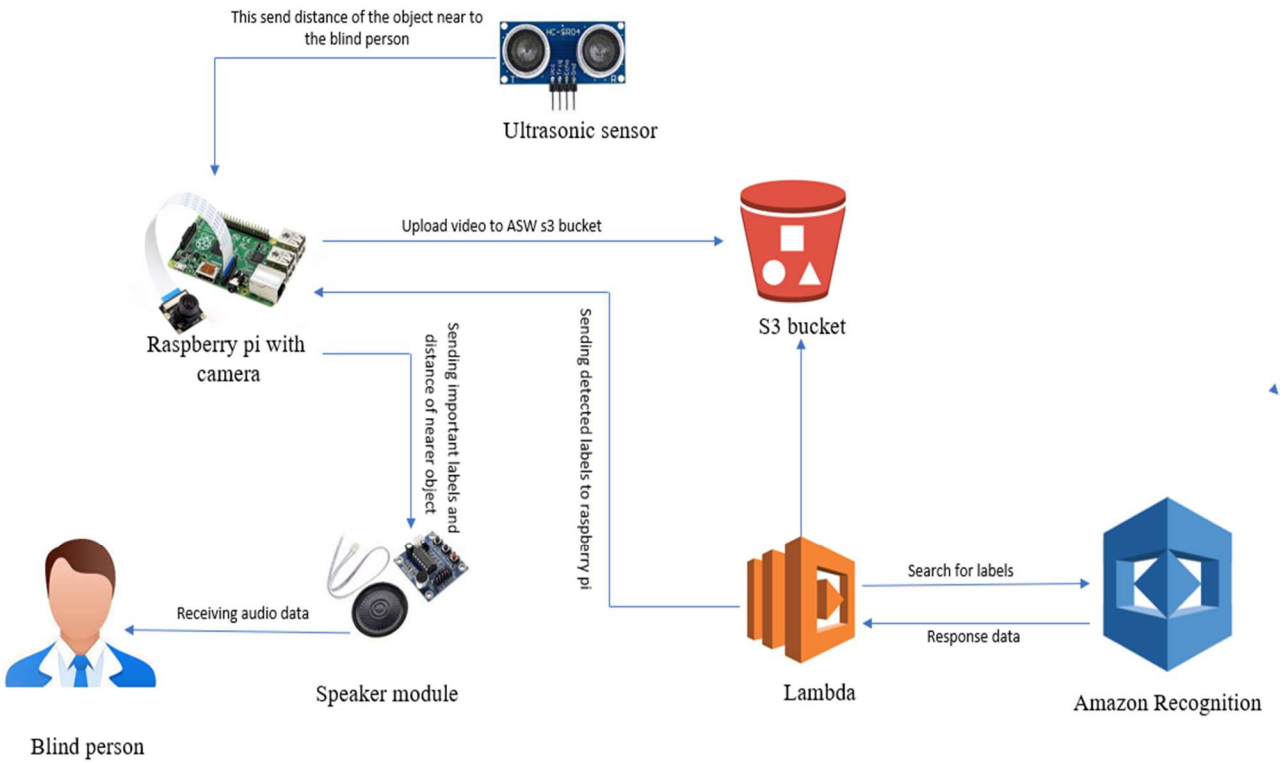
Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple. In fact, it doesn't get much more basic than jumper wires.

f.GPS Module

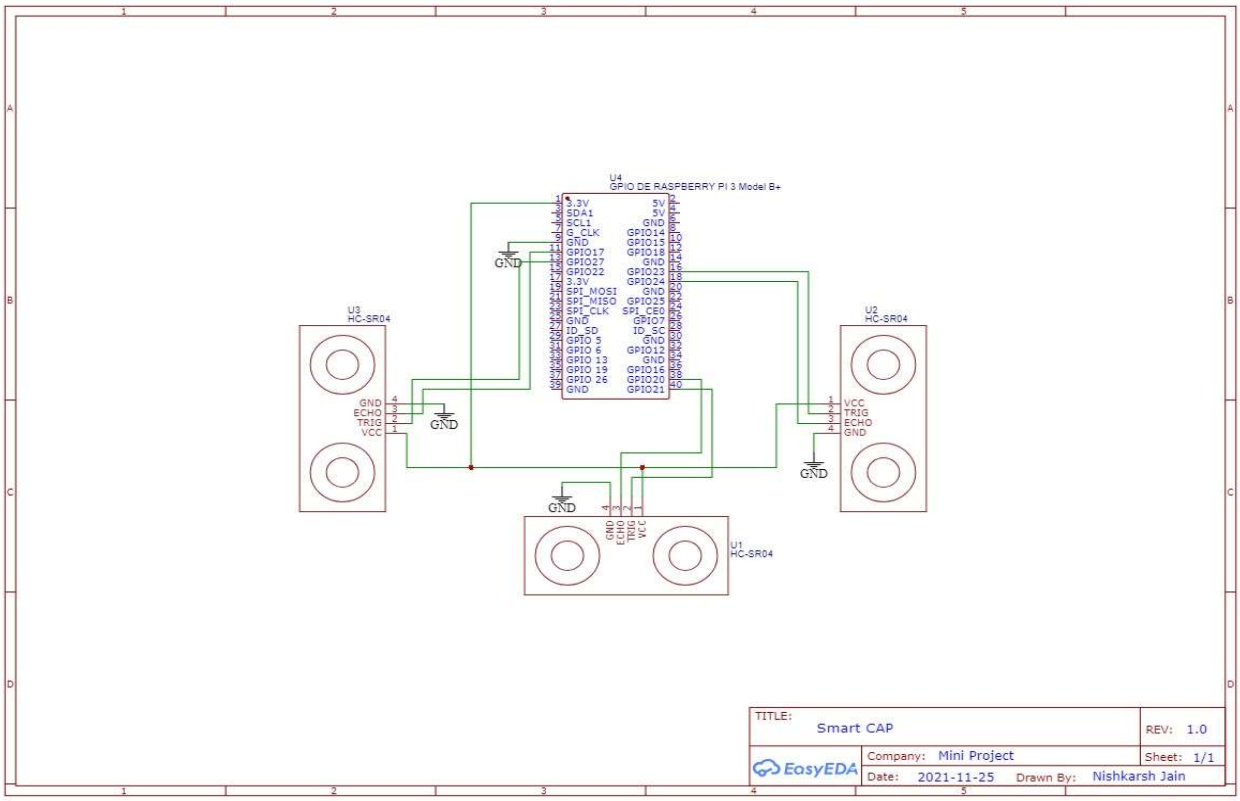
One of the global positioning system (GPS) devices ultilizes data from satellites to locate a specific point on the Earth in a process named trilateration. Meanwhile, a GPS receiver measures the distances to satellites using radio signals to trilaterate. And trilateration is similar to triangulation, which measures angles, depicted in this illustration (Tim Gunther, 2020). GPS modules

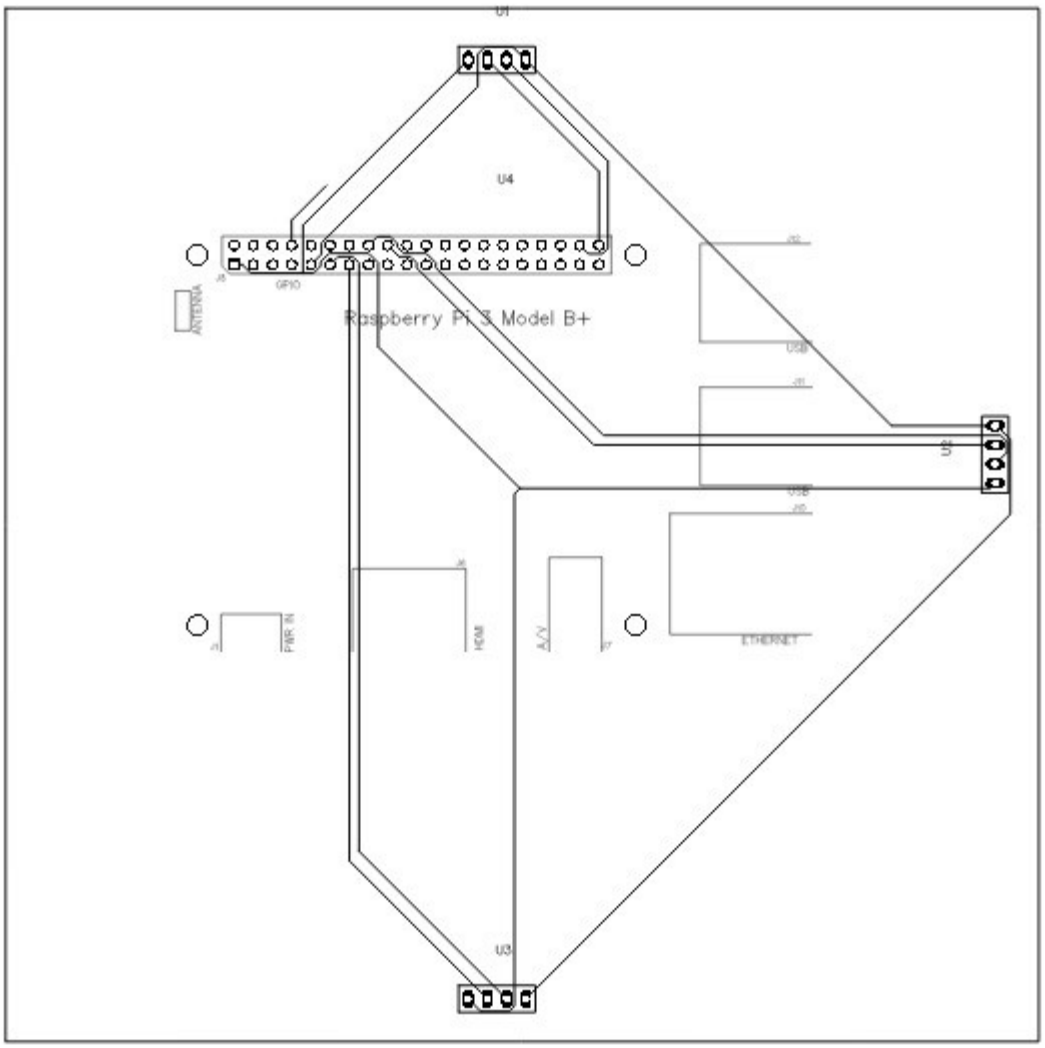
contain tiny processors and antennas that directly receive data sent by satellites through dedicated RF frequencies.

2.3 WORK FLOW


This send distance of the object near to the blind person
Ultrasonic sensor
Upload video to ASW s3 bucket
S3 bucket
Raspberry pi with camera
Sending important labels and distance of nearer object
Sending detected labels to raspberry pi
Search for labels
Response data
Receiving audio data
Speaker module
Lambda
Amazon Recognition
Blind person

2.4 Circuit Diagram



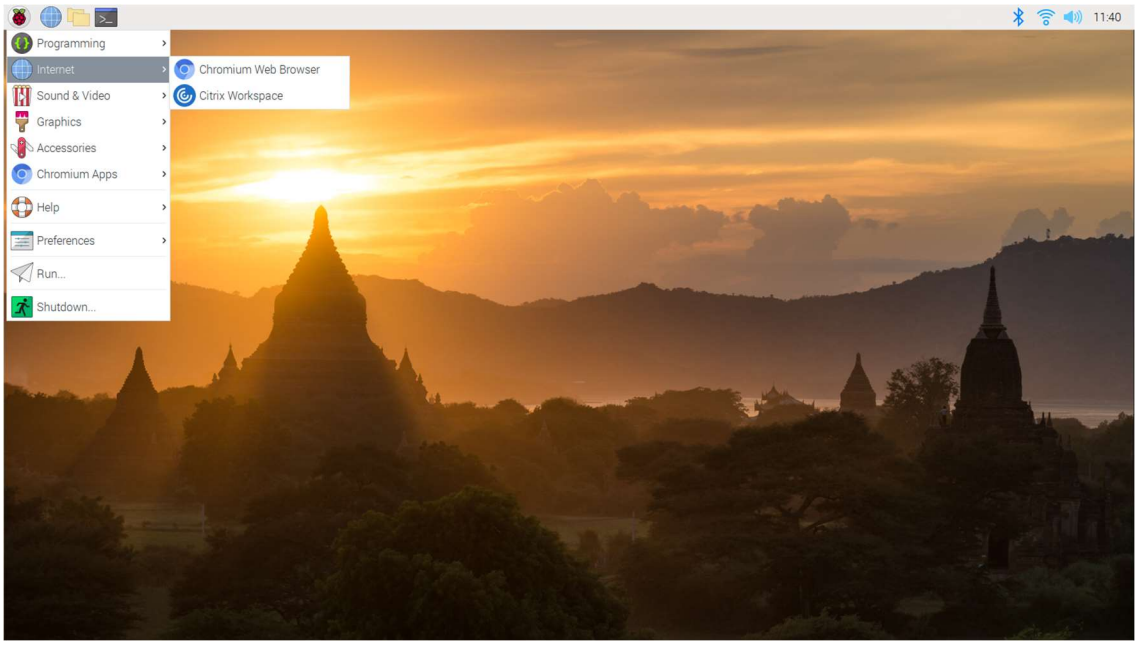

U1
U4
GPIO
ANTENNA
Raspberry Pi 3 Model B+
USB
USB
U2
USB
HDMI
PWR IN
A/V
ETHERNET
U3

CHAPTER -3

Software Architecture

3.1 Raspberry pi OS

Raspberry Pi OS is a free, open-source Debian Linux-based operating system engineered for use on Pi boards. Additionally, several ARM-based single-board computers also run Raspberry Pi OS. The first version, then known as Raspbian, debuted in 2013, and from 2015 onwards the Raspberry Pi Foundation offered it as an officially-sanctioned Pi distro. Developers Peter Green and Mike Thompson are responsible for creating Raspbian, initially an independent endeavor.



3.2 AWS

Amazon Web Services (AWS) is the world's most comprehensive and broadly adopted cloud platform, offering over 200 fully featured services from data centers globally. Millions of customers—including the fastest-growing startups, largest enterprises, and leading government agencies—are using AWS to lower costs, become more agile, and innovate faster.

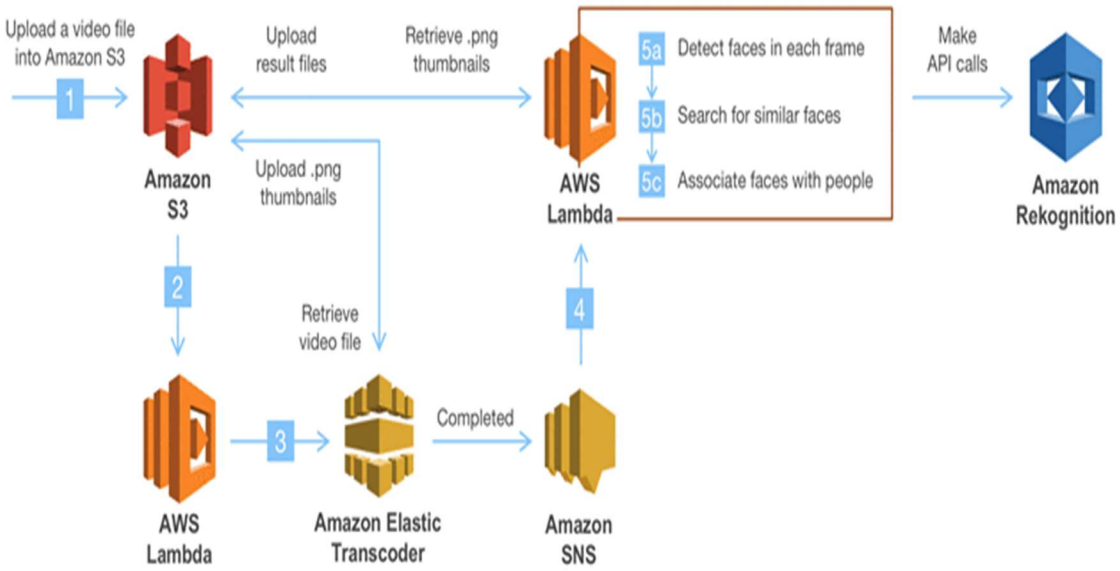
a.Different aws services are:-

- Amazon S3
- Amazon EC2 [Elastic Compute Cloud]
- AWS Lambda
- Amazon Glacier
- Amazon SNS
- Amazon CloudFront
- Amazon EBS [Elastic Block Store]
- Amazon Kinesis
- Amazon Rekognition Video

b.Amazon Rekognition Video

Amazon Rekognition Video is a machine learning powered video analysis service that detects objects, scenes, celebrities, text, activities, and any inappropriate content from your videos stored in Amazon S3. Rekognition Video also provides highly accurate facial analysis and facial search capabilities to detect, analyze, and compare faces, and helps understands the movement of people in your videos.

Amazon Rekognition Video automatically identifies thousands of objects such as vehicles or pets, scenes like a city, beach, or wedding, and activities such as delivering a package or dancing. For each label detected, you get a confidence score. For common objects such as 'Person' or 'Car', you also get object bounding boxes to enable counting and object localization. Amazon Rekognition Video relies on motion in the video to accurately identify complex activities, such as “blowing out a candle” or “extinguishing fire”. Using this rich metadata, you can make your content searchable or serve advertisements that best match the context of the content preceding it.



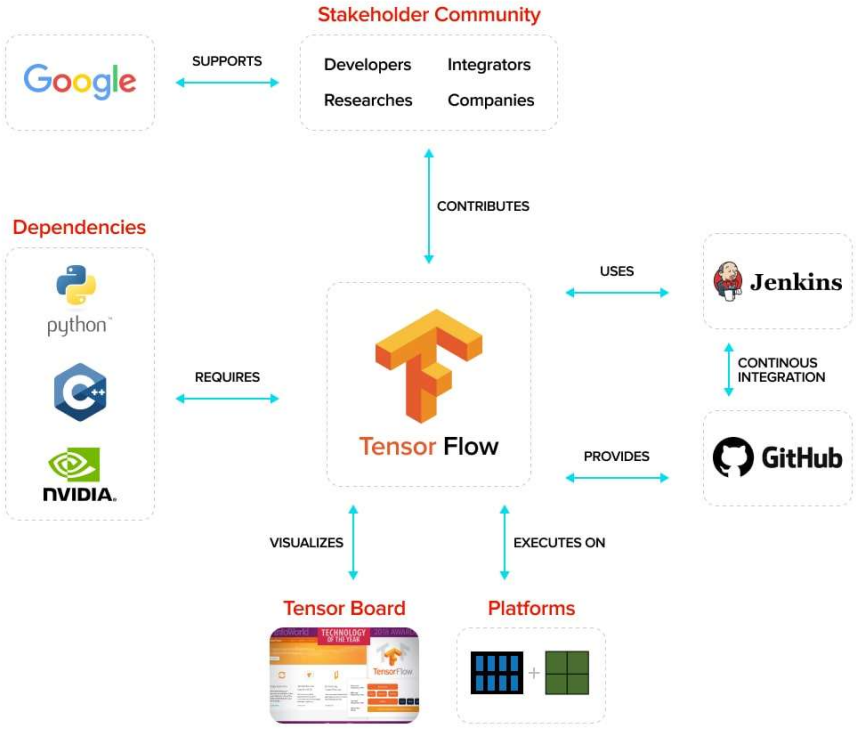
3.3 Vnc Viewer

VNC stands for Virtual Network Computing. It is a cross-platform screen sharing system that was created to remotely control another computer. ... A server component is installed on the remote computer (the one you want to control), and a VNC viewer, or client, is installed on the device you want to control from.

3.4 Tensor flow

TensorFlow is an open-source end-to-end platform for creating MachineLearning applications. It is a symbolic math library that uses dataflow and differentiable programming to perform various tasks focused on training and inference of deep neural networks. It allows developers to create machine learning applications using various tools, libraries, and community resources.

Currently, the most famous deep learning library in the world is Google's TensorFlow. Google product uses machine learning in all of its products to improve the search engine, translation, image captioning or recommendations.

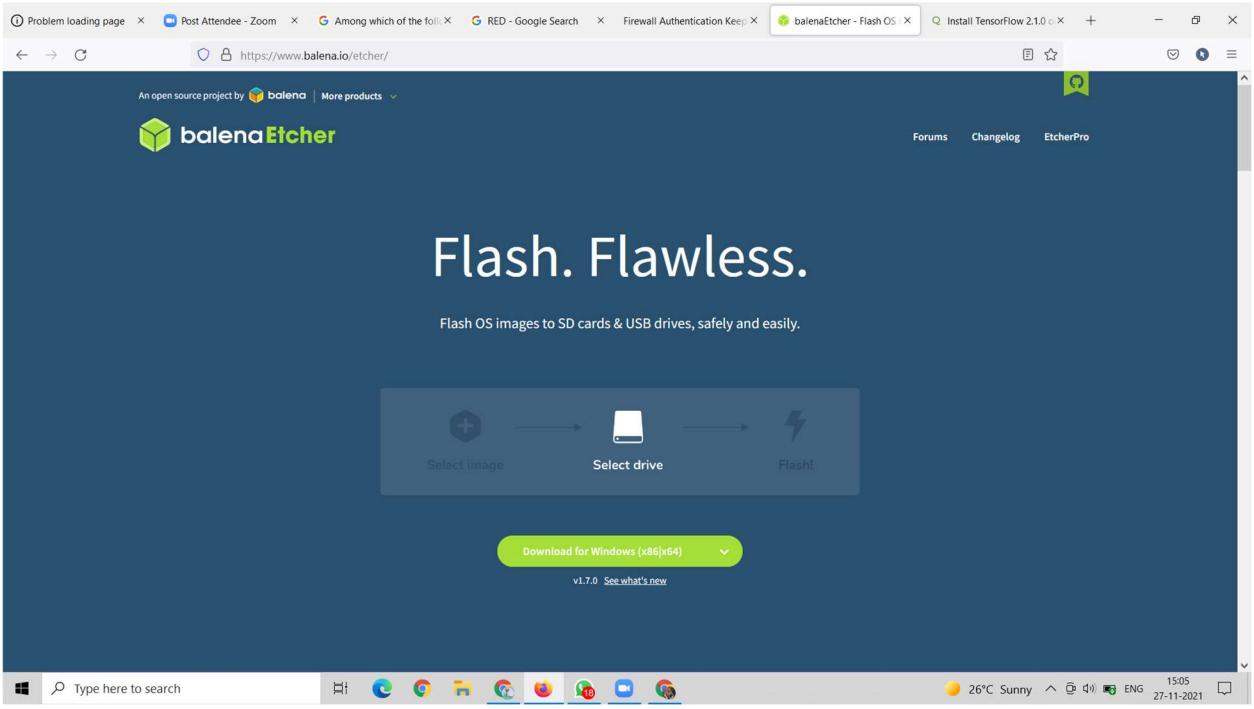


3.5 BOTO 3

Boto3 is the Amazon Web Services (AWS) Software Development Kit (SDK) for Python, which allows Python developers to write software that makes use of services like Amazon S3 and Amazon EC2. You can find the latest, most up to date, documentation at our doc site, including a list of services that are supported.

3.6 Balenaetcher

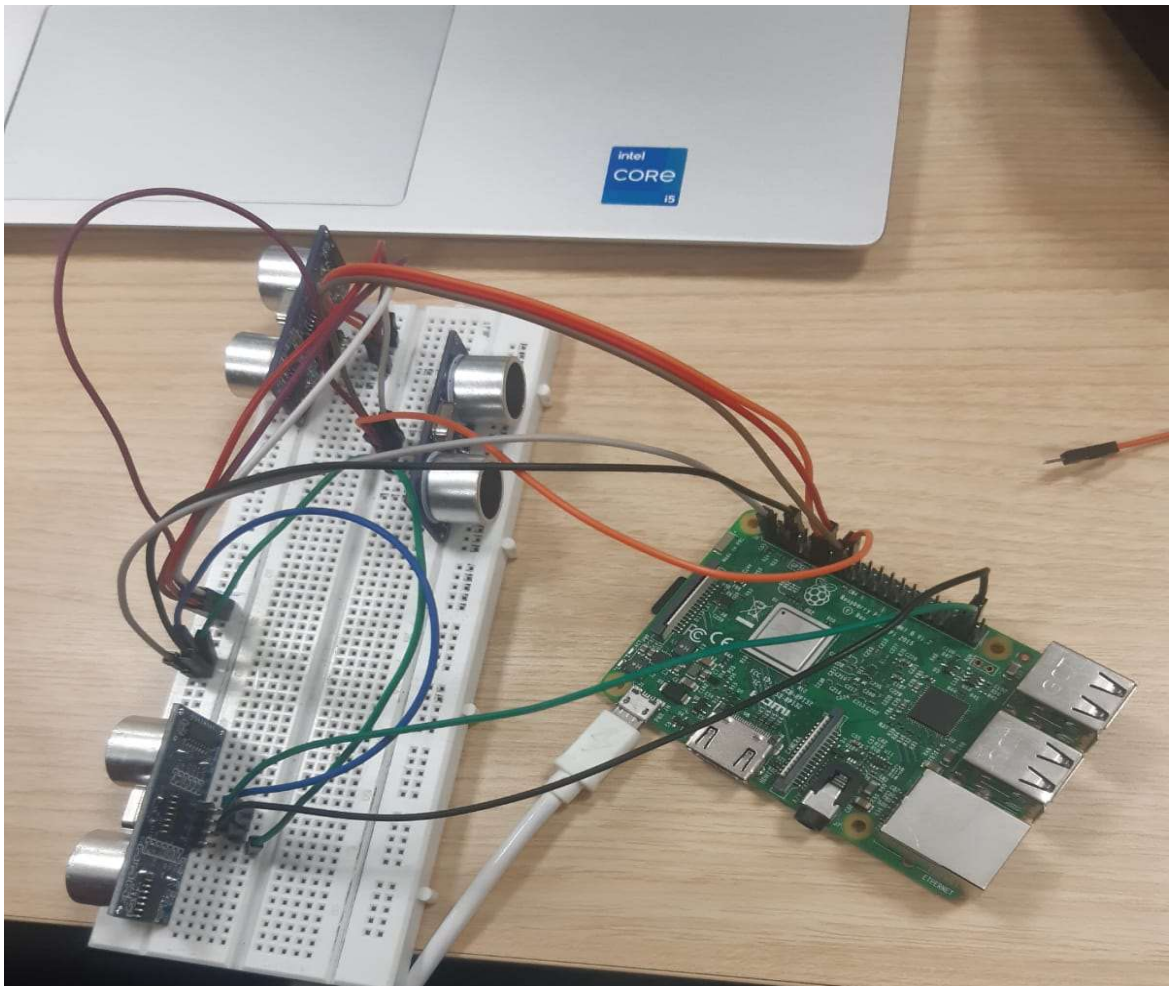
BalenaEtcher (commonly referred to and formerly known as Etcher) is a free and open-source utility used for writing image files such as .iso and .img files, as well as zipped folders onto storage media to create live SD cards and USB flash drives. It is developed by balena, and licensed under Apache License 2.0. Etcher was developed using the Electron framework and supports Windows, macOS and Linux. balenaEtcher was originally called Etcher, but its name was changed on October 29, 2018, when Resin.io changed its name to Balena.



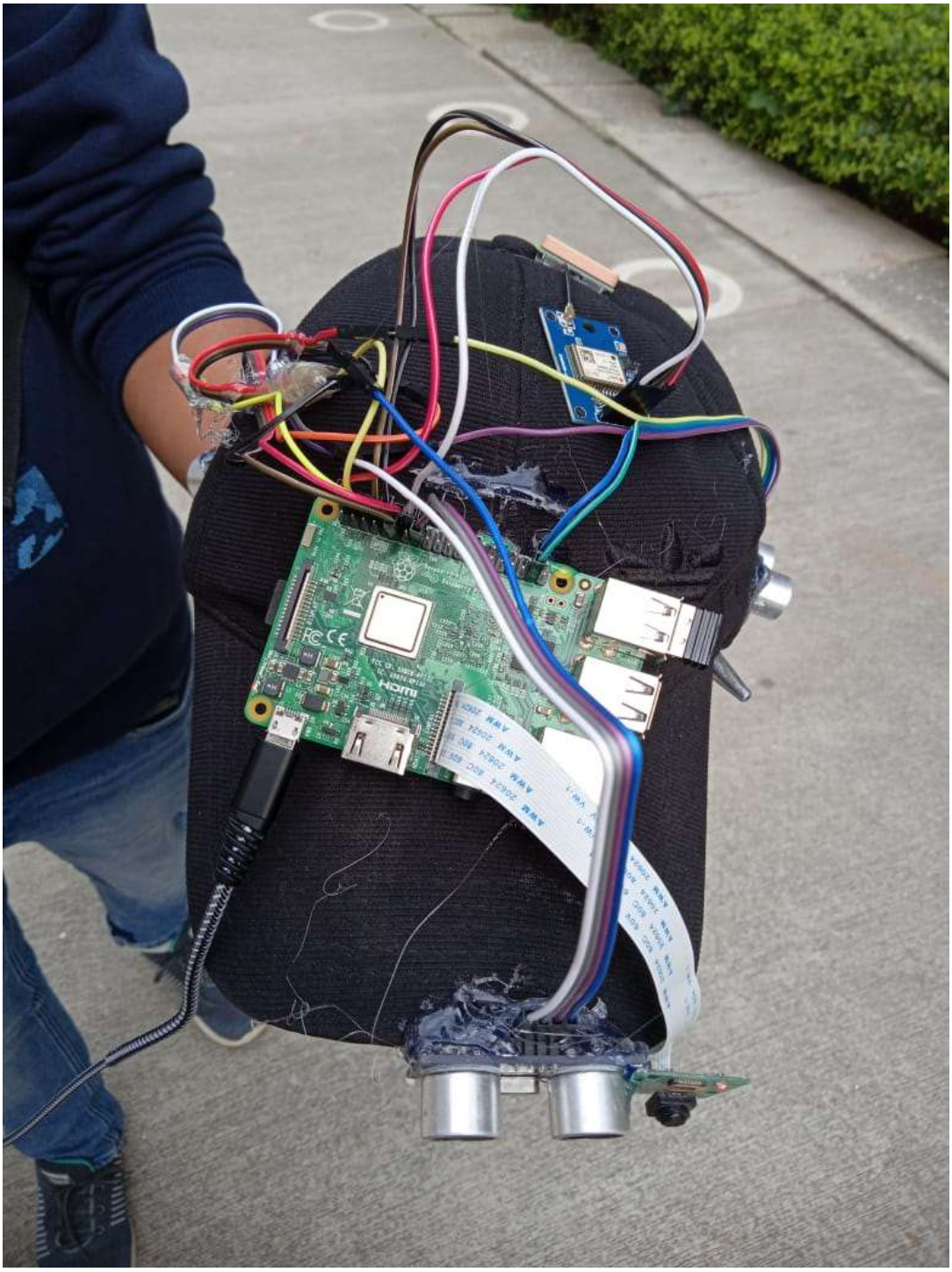
CHAPTER-4

Prototype

4.1Physical Structure



4.2 Final Architecture



CHAPTER -5

5.1 Code

```
#create  a new environment
Python -m venv tfod
#activate it
.\tfod\Scripts\activate
#Update & install dependencies
python -m pip install --upgrade pip
#add it to jupyter kernel
Pip install ipykernel
Python -m ipykernel install --user --name=tfod

pip3 install opencv-python
sudo apt-get install libcblas-dev
sudo apt-get install libhdf5-dev
sudo apt-get install libhdf5-serial-dev
sudo apt-get install libatlas-base-dev
sudo apt-get install libjasper-dev
sudo apt-get install libqtgui4
sudo apt-get install libqt4-testv
echo "deb https://packages.cloud.google.com/apt coral-edgetpu-stable main" | sudo
tee /etc/apt/sources.list.d/coral-edgetpu.list
curl https://packages.cloud.google.com/apt/doc/apt-key.gpg | sudo apt-key add -
sudo apt-get update
sudo apt-get install python3-tflite-runtime
```

a.commands for Install TensorFlow Library

```
$ sudo apt-get update
$ sudo apt-get upgrade
```

```
$ sudo pip uninstall tensorflow
$ sudo pip3 uninstall tensorflow

$ sudo apt-get install gfortran
$ sudo apt-get install libhdf5-dev libc-ares-dev libeigen3-dev
$ sudo apt-get install libatlas-base-dev libopenblas-dev libblas-dev
$ sudo apt-get install openmpi-bin libopenmpi-dev
$ sudo apt-get install liblapack-dev cython
$ sudo pip3 install keras_applications==1.0.8 --no-deps
$ sudo pip3 install keras_preprocessing==1.1.0 --no-deps
$ sudo pip3 install -U --user six wheel mock
$ sudo -H pip3 install pybind11
$ sudo -H pip3 install h5py==2.10.0
# upgrade setuptools 40.8.0 -> 52.0.0
$ sudo -H pip3 install --upgrade setuptools
# download the wheel
$wgethttps://github.com/Qengineering/Tensorflow-Raspberry-Pi/raw/
  master/tensorflow-2.1.0-cp37-cp37m-linux_armv7l.whl

$ sudo -H pip3 install tensorflow-2.1.0-cp37-cp37m-linux_armv7l.whl
# and complete the installation by rebooting
$ sudo reboot
```

Main code

```
import serial            #import serial pacakge
from time import sleep
import sys               #import system package

def GPS_Info():
    global NMEA_buff
    global lat_in_degrees
    global long_in_degrees
```

```
        nmea_time = []
        nmea_latitude = []
        nmea_longitude = []
        nmea_time = NMEA_buff[0]
       #extract time from GPGGA string
        nmea_latitude = NMEA_buff[1]
     #extract latitude from GPGGA string
        nmea_longitude = NMEA_buff[3]
       #extract longitude from GPGGA string


        print("NMEA Time: ", nmea_time,'\n')

        lat = float(nmea_latitude)              #convert string into float for calculation
        longi = float(nmea_longitude)                  #convertr string into float for
calculation

        lat_in_degrees = convert_to_degrees(lat)      #get latitude in degree
decimal format
        long_in_degrees = convert_to_degrees(longi) #get longitude in degree
decimal format

    #convert raw NMEA string into degree decimal format
    def convert_to_degrees(raw_value):
        decimal_value = raw_value/100.00
        degrees = int(decimal_value)
        mm_mmmm = (decimal_value - int(decimal_value))/0.6
        position = degrees + mm_mmmm
        position = "%.4f" %(position)
        return position


    gpgga_info = "$GPGGA,"
    ser = serial.Serial ("/dev/ttyS0")              #Open port with baud rate
    GPGGA_buffer = 0
```

```
    NMEA_buff = 0
    lat_in_degrees = 0
    long_in_degrees = 0

try:
        while True:
            received_data = (str)(ser.readline())                    #read NMEA string
received
            GPGGA_data_available = received_data.find(gpgga_info)    #check
for NMEA GPGGA string
            if (GPGGA_data_available>0):
                GPGGA_buffer = received_data.split("$GPGGA,",1)[1] #store data
coming after "$GPGGA," string
                NMEA_buff = (GPGGA_buffer.split(','))                #store comma
separated data in buffer
                GPS_Info()                                  #get time, latitude, longitude
               print("lat in degrees:", lat_in_degrees," long in degree: ",
long_in_degrees, '\n')


    except KeyboardInterrupt:
        sys.exit(0)
```

5.2Application of Raspberry pi

- Home Automation System
- Miniature Camcorder
- Zero-Powered Smartphone
- XBox Zero
- AI Assistant
- Motion Capture Security Camera
- Computer vision
- Object detection

5.3Conclusion

Proposed Smart cap Solve the problem of blind person who moves independently on the road and facing problem to detect what is the object comes in front of them. And this cap help family members to get the location of blind person.For the physically impaired it is very difficult to survive in such situations, like while walking, so the most significant part of this project is to detect the obstacle around the user.
All about our research, we take care of one problem that is a visual disability.To make a solution we did this low-cost project. We believe that this project will spread all around society and convert the disabled to able. This is our hope, to consider this cap as a smart eye for visual impairments and also reduce the dependency on others.

This AI and IoT-based have a great scope in the future.

5.4References

- **AWS Documentation**
  Amazon WorkDocs - Content Collaboration Service

- **Raspberry pi datasheet**
  static.raspberrypi.org/files/product-briefs/Raspberry-Pi-Model-Bplus-roduct-Brief.pdf

- **Smart vision by aws**
  aws.amazon.com/computer-vision/