A PROJECT REPORT

**"AWS BASED SMART HOME USING TELEGRAM CHATBOT"**
**UNDER THE GUIDANCE OF**
**PROF. PRATIKSHA PATIL**

**SUBMITTED BY**

| | |
|---|---|
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**IN COMPLETE FULFILLMENT OF THE REQUIREMENTS**

**FOR THE DEGREE OF**

**BACHELOR OF ENGINEERING**



**DEPARTMENT OF**

**ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

**SHALAKA FOUNDATION**

**KEYSTONE SCHOOL OF ENGINEERING**

**(2022-2023)**

**SHALAKA FOUNDATION'S**

**KEYSTONE SCHOOL OF ENGINEERING**

**CERTIFICATE**

**This to certify that Project entitles**

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Is a record of the bonafide work carried out under the supervision of Prof. Pratiksha patil and is approved as the complete fulfillment of the requirement for the award of degree in Electronics and Telecommunication Engineering University of Pune.

_____          _____          _____

**Prof. Pratiksha patil**          **Prof. R.A Barapte**          **Principle**

**Guide**                          **Head of Department**

**Department of E&TC**             **Department of E&TC**

**Place: Pune**

**Date:**

# **ABSTRACT**

In today's world IOT is a fast growing and interesting field. IOT has sufficient intelligence to cover the maximum aspects of smart world. And as the application we are going to perform is security and air quality monitoring.

So, Advancements made through years led us to work smarter in our day-to-day life and with help of applications on mobile and chatbots to command for operation of sensors have become easier.

In this project, we have utilized AWS service Rekognition for security purpose which will be connected with Raspberry Pi and will intake commands through Telegram Chatbot. We have decided to implement Air Quality Monitoring Mechanism known as Ionizer which will improve the quality of the air through telegram chatbot.

# **ACKNOWLEDEMENT**

# INDEX

**CHAPTER 1:**

**INTRODUCTION**

# __INTRODUCTION__

Now day's many industries are using robots due to their high level of performance andreliability and which is a great help for human beings.

AWS is known Amazon Web Service and Amazon Rekognition Video can detect objects, scenes, faces, celebrities, text, and inappropriate content in videos. You can also search for faces appearing in a video using your own repository or collection of face images.

Rekognition provides a number of computer vision capabilities, which can be divided into two categories: Algorithms that are pre-trained on data collected by Amazon or its partners, and algorithms that a user can train on a custom dataset which will be used as Security Measures.

Raspberry Pi is a microcomputer development board that can be used to make Do It Yourself (DIY) projects on the Internet of Things (IoT). Over here, we are using a Raspberry Pi board along with the relevant modules and switches to create a smart home automation project.

Air Quality Monitoring and Improvements is necessary as degrading air quality has been a matter of concern nowadays and real time monitoring of air quality helps us to keep a check on it and improve it using Ionizer.

Through Telegram bot we fire a command and get the desired output to make it simple in Telegram bot is also developed where we can ON and OFF light through this messenger. To make it user friendly Telegram bot is used.

**CHAPTER 2**

**LITERATURE SURVEY**

# **LITERATURE SURVEY**

I.    PAPER 1: (2018) Somphop Chanthakit and Choopan Rattanapoka published and presented an implementation of MQTT based air quality monitoring system. The air quality measurement device is a hardware using ESP8266 NodeMCU that connects to sensors for measuring temperature, humidity, concentration of carbon monoxide (CO), ozone gas (O3), and PM2.5. The firmware of device makes the device act as a publisher that reads the sensor data and sends them to MQTT Broker. Node-RED is used to be a subscriber that subscribes to receive data from MQTT Broker. With Node-RED, we can easily make a flow to manage and handle received data. Then, Node-RED will send data to the air quality monitoring dashboard which is a responsive web application to display data in gauge, text and chart user interface. In addition, when the value of some data exceed the configured range, Node-RED will send an alarm message via LINE Notify to notify users.

II.    PAPER II: - (2020) Dhiraj Sunehra and G. Venkat Ramana presented paper where IoT refers to the devices or things connected to the Internet, so that one or more devices can share or monitor the data to another over the internet. With the rapid improvements, in the field of Internet of Things (IoT), home automation and security systems are gaining high popularity. In this paper, an Internet of Things (IoT) based Home automation system is implemented using Raspberry Pi3 processor that can be controlled using the developed web page and the telegram bot. User can access to the household devices anytime by connecting to the network and can control them using webpage and telegram bot. Devices such as lights, fans, door lock are used in this system. The web page allows user to control the home appliances through any internet enabled device such as smart phone or laptop. The access to the control webpage is secured by providing a login for access. The proposed system also provides home security using a passive infrared (PIR) sensor that detects any intrusion when nobody is at home. The system sends an e-mail alert to the user on intruder detection.

III.    PAPER III: - (2020) Rohan Kumar Jha presented in this paper is an advanced real time air quality reporting system supported with Internet Of things (IOT) architecture. Degrading air quality has been a matter of concern nowadays and real time monitoring of air quality helps us to keep a check on it. Air Quality Index(AQI) is the scale to measure how polluted the air is. Greater AQI indicates more dangerous air is for human health. The model presented here uses a combination of the Arduino UNO software and hardware along with a Gas sensors - MQ135, MQ7 and dust sensor GP2Y1010AU0F which help in detecting gases like NO2, CO and PM2.5 while measuring their amount decently. Further, this research work monitor the Air Quality over an IOT analytics platform - ThingSpeak using internet connected with the hardware via the Wi-Fi module ESP8266. It can also integrate the real time data into our mobile phone app which is specifically created for this purpose using Android Studio. The circuit finally displays the PPM values as well as Air Quality level of gases on an Android application which fetches data from ThingSpeak.

IV.    PAPER IV: - (2017) Neha Patil, Shrikant Ambatkar and Sandeep Kakde presented paper where Communication mainly is the transfer of whatever thing or exchanging of data, so that the Internet of things is naught but the transferring or exchanging of anything with several other things. The using of internet authorized system or devices roughly calculated as that by 2020 there will be nearly about billions. The purpose of the paper is to define a safekeeping alert device spending little handling power by Internet of things which help out to observer plus alerts when gestures or else motion are there then send images to a cloud server. Besides, internet of things centered use can be used tenuously to observe the action as well as acquire warning when gestures or else indication are there. The images are showed straight to a cloud attendant, when the cloud attendant is not accessible at that time the records are put in storage close by on a Raspberry Pi. A credit card size Raspberry Pi with a advantage of Open Source Computer Vision (Open-CV) software knobs the image processing, control algorithms used for the attentiveness then shows taken images to concern persons email by the use of Wi- Fi module. The system uses ordinary webcam.

# CHAPTER 3:

# PROBLEM STATEMENT & OBJECTIVE

# PROBLEM STATEMENT & OBJECTIVE

PROBLEM STATEMENT:

To implement the smart home using AWS and Telegram Bot.

OBJECTIVE:

1. To build a door lock system using AWS
2. To monitor air quality and air quality improvement
3. To build a telegram bot for managing smart home

# CHAPTER 4:

# SPECIFICATIONS

# **SPECIFICATIONS**

HARDWARE:

1. RASPBERRY PI
2. ESP32 CAM
3. DHT 22
4. MQ 7
5. ZERO PCB
6. RELAY
7. CAPACITORS 0.1uf
8. DIODES
9. RESISTORS
10. LED
11. PIR SENSOR
12. LCD
13. BUZZER
14. JUMPER WIRES

SOFTWARE:

1. AWS FACE REKOGNITION
2. PYTHON
3. RASPBIAN

**CHAPTER 5:**

**BLOCK  DIAGRAM & DESCRIPTION**

# BLOCK DIAGRAM & DESCRIPTIONS

amazon Rekognition

| PIR | → | ESP32 CAM |
|---|---|---|

Solenoid Lock

DHT22

MQ7

Raspberr y Pi 3B+

IONIZER

LCD
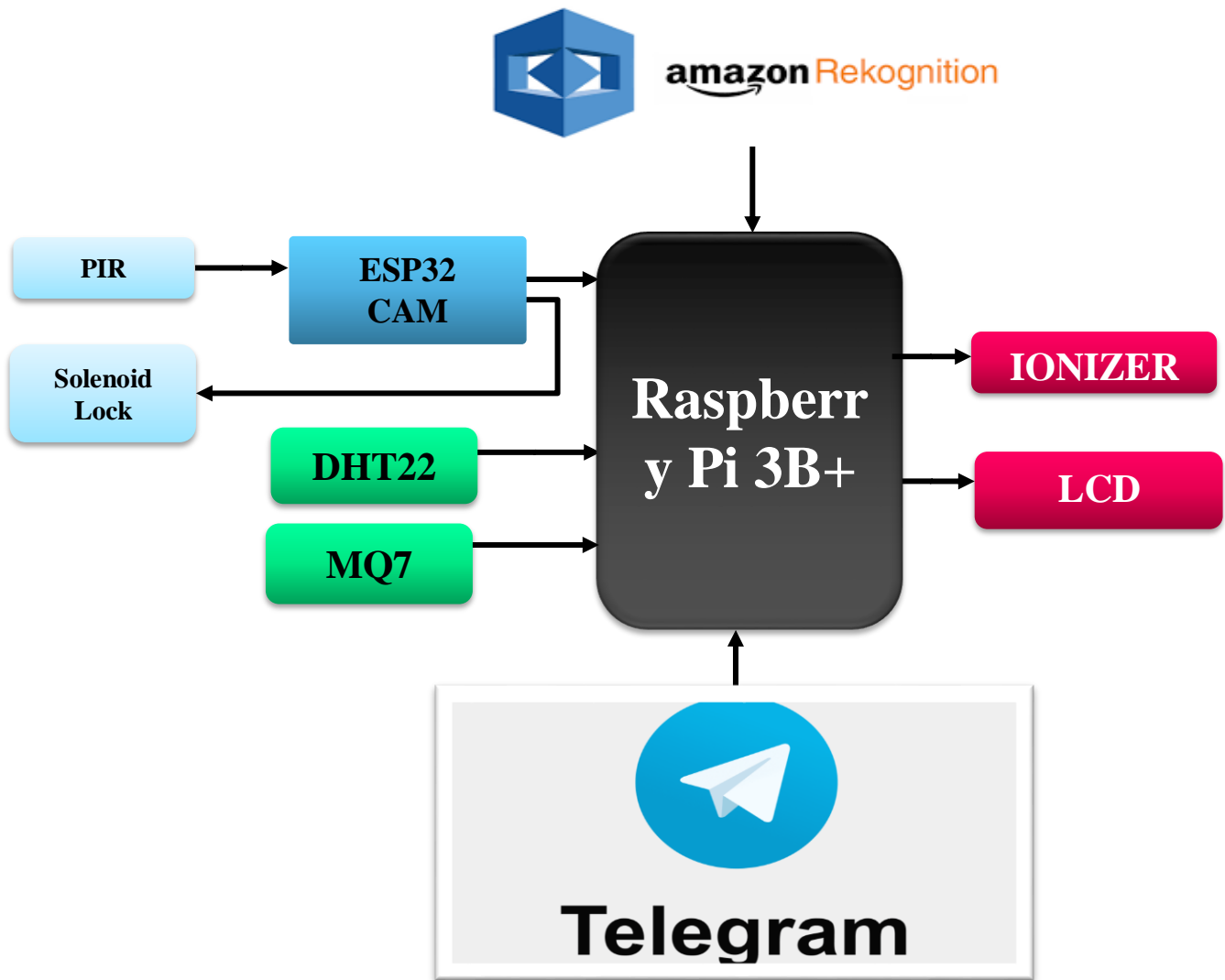
Telegram

## 1. Raspberry Pi

SD Card Slot is used to install OS/booting/long term storage. The total memory SD card is about 2GB.

1GB RAM.

Micro USB Power Port provides 700mA at 5A.

RCA Video Out is connected to display if HDMI output.

Ethernet Port is used to connect to the Internet.

HDMI OUT (High-Definition Multimedia Interface) is used with HDTVs as well as monitors with HDMI input.

GPIO 20 pin interface allows us to control and interact with real world.



## 2. PIR Sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors PIR sensors are commonly used in security alarms and automatic lighting applications.

PIR sensors detect general movement, but do not give information on who or what moved. For that purpose, an imaging IR sensor is required.

A PIR sensor can detect changes in the amount of infrared radiation impinging upon it, which varies depending on the temperature and surface characteristics of the objects in front of the sensor.[



## 3.ESP 32 CAM

The smallest 802.11b/g/n Wi-Fi BT SoC module
Low power 32-bit CPU, can also serve the application processor
Up to 160MHz clock speed, summary computing power up to 600 DMIPS
Built-in 520 KB SRAM, external 2MPSRAM
Supports UART/SPI/I2C/PWM/ADC/DAC
Support OV2620 and OV7670 cameras, built-in flash lamp
Support image WIFI upload



4.DHT 22
The DHT 22 is a low-cost temperature and humidity sensor. It uses a capacitive humidity sensor and a thermistor to measure the surrounding area and spits out a digital signal on data pin.
3 to 5V power and I/O 2.5mA max current use during conversion (while requesting data)

Good for 0-100% humidity readings with 2-5% accuracy



5.MQ7

This is a simple to use Carbon Monoxide sensor, suitable for sensing CO concentrations in air.

MQ7 can detect CO gas concentrations anywhere from 10 to 500ppm

This sensor has a high sensitivity and fast response time.

The sensor's output is an analogy resistance.



6.IONIZER CIRCUIT

An air ionizer or as some may refer it as a room ionizer is basically a device or electronic circuit which is designed for generating voltage at the level of kilovolts for implementing the said ionizing effects.

The high voltage that is generated from an ionizer is tuned for generating a negative voltage, at around minus 2 kV. This high negative voltage is allowed to get terminated over an open-ended sharp conductor tip or point that is sharply carved.

When the voltage reaches at this sharp point, it tends to continue its forward motion and gets shot or released into the air in the form of negatively charged ions.
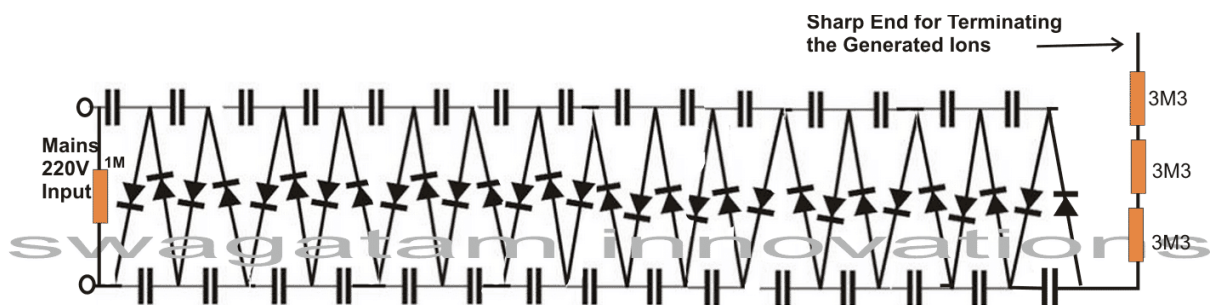


**All Capacitors are 0.01uF/600V PP, All diodes are 1N4007**
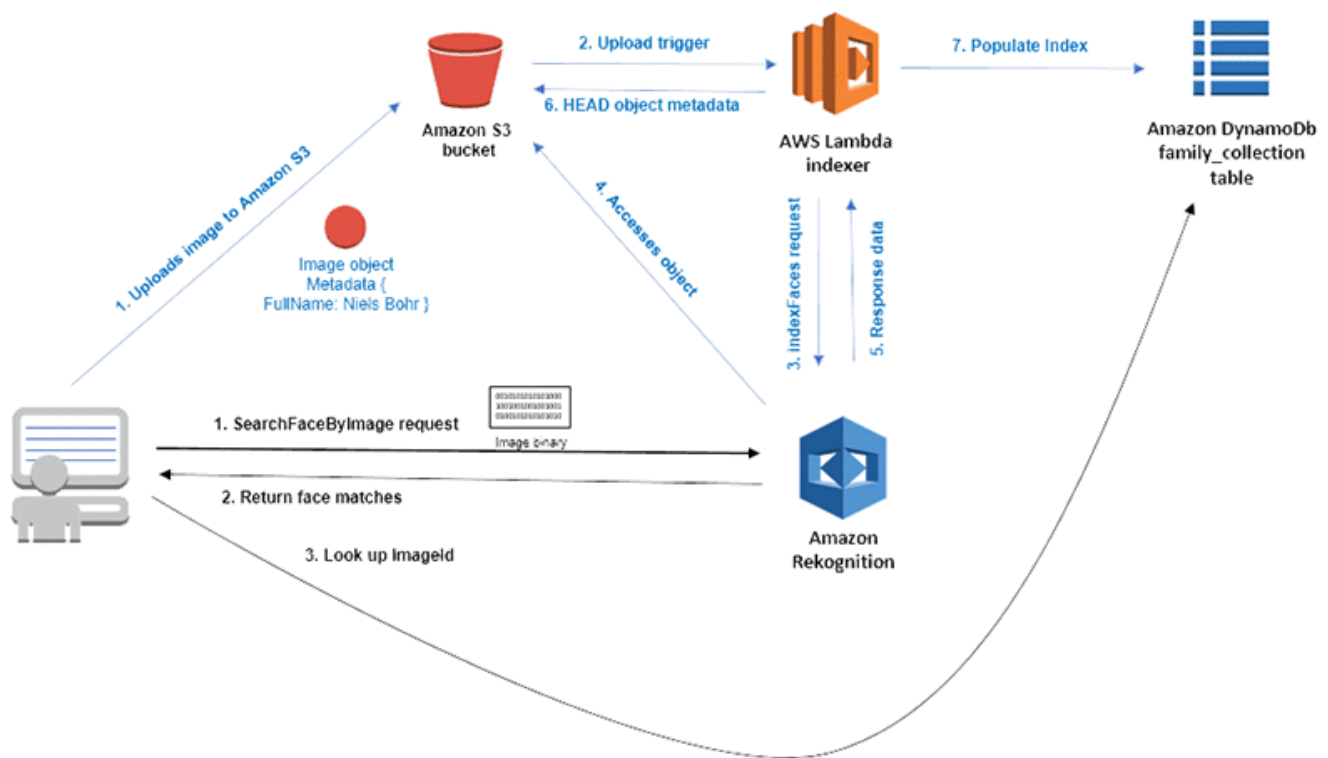
**CHAPTER 6:**

**SOFTWARE IMPLEMENTATION**

SOFTWARE:

1. AWS FACE REKOGNITION

The following figure shows the application workflow. It's separated into two main parts:

- Indexing (blue flow) is the process of importing images of faces into the collection for later analysis.
- Analysis (black flow) is the process of querying the collection of faces for matches within the index.



Implementation

Before we can start to index the faces of our existing images, we need to prepare a couple of resources.

We start by creating a collection within Amazon Rekognition. A collection is a container for persisting faces detected by the IndexFaces API. You might choose to create one container to store all faces or create multiple containers to store faces in groups.

Your use case will determine the indexing strategy for your collection, as follows:

- Face match: You might want to find a match for a face within a collection of faces (as in our current example). Face match can support a variety of use cases. For example, whitelisting a group of people for a VIP experience, blacklisting to identify bad actors, or supporting logging scenarios. In those cases, you would create a single collection that contains a large number of faces or, in the case of the logging scenario, one collection for a certain time period, such as a day.

- Face verification: In cases where a person claims to be of a certain identity, and you are using face recognition to verify the identity (for example, for access control or authentication), you would actually create one collection per person. You would store a variety of face samples per person to improve the match rate. This also enables you to extend the recognition model with samples of different appearances, for example, where a person has grown a beard.

- Social tagging: In cases where you might like to automatically tag friends within a social network, you would employ one collection per application user.

### 2. PYTHON

Python language is used to run the functions for all sensor.

### 3. RASPBIAN

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

**CHAPTER 7:**

**CIRCUIT DIAGRAM**
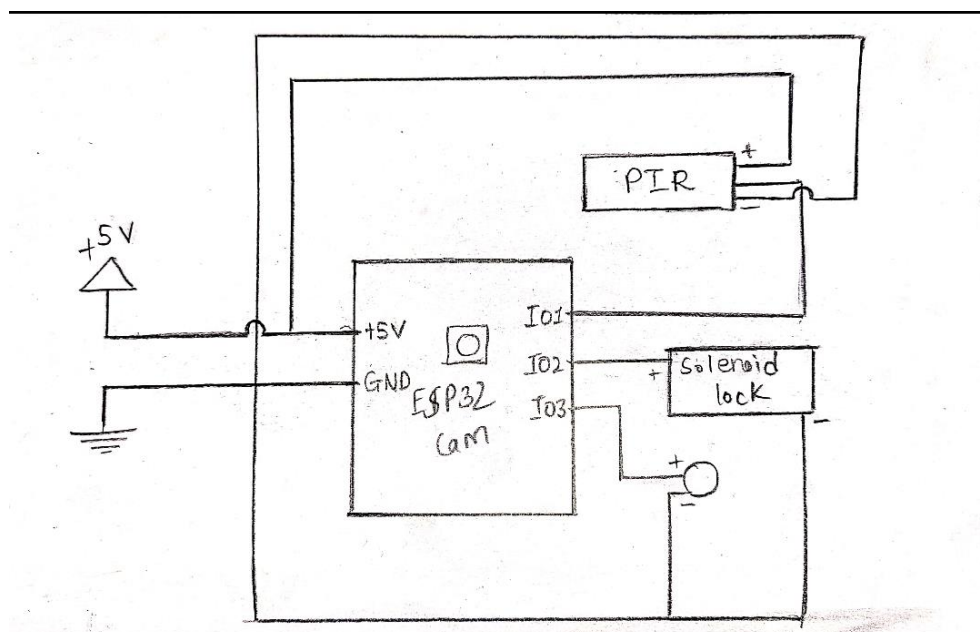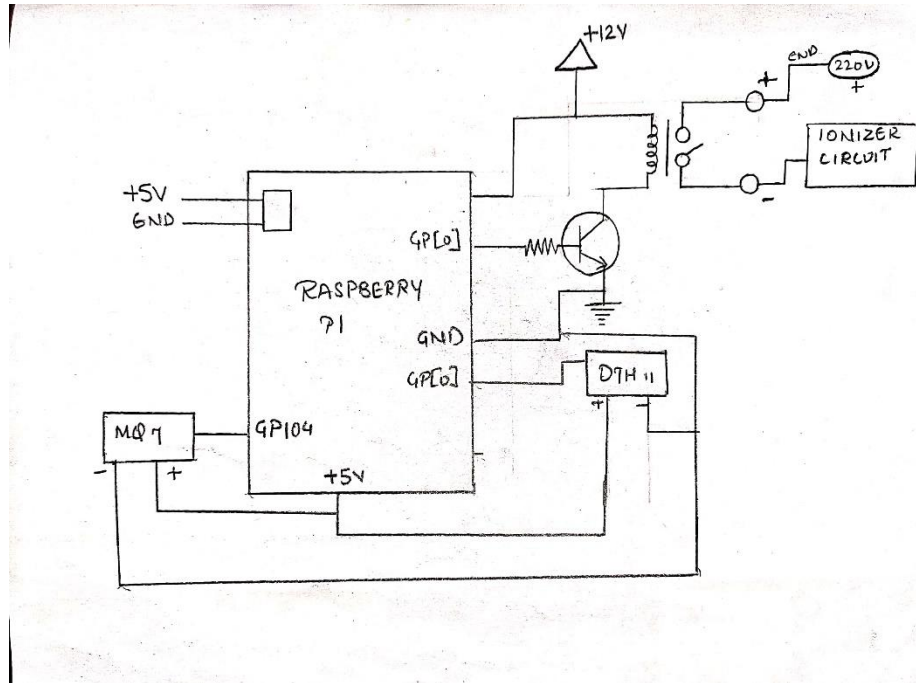
# CIRCUIT DIAGRAM

# CHAPTER 8:

# FLOWCHART

# **FLOWCHART**

```
                    START
                      │
                      ▼
              INITIALIZTION
                      │
                      ▼
              ┌──────────────┐           NO
              │  PIR SENSOR  │──────────────────►
              └──────────────┘
                      │ YES                      ALERT ON TELEGRAM
                      ▼                              CHAT BOT
            CAMERA ACTIVATION                          │
                      │                                ▼
                      ▼                           ┌──────────┐
         CAPTURE IMAGE N                          │  USER    │
         SENDS TO AWS                             │  CHOICE  │────► LOCK DOOR
                      │                           └──────────┘
                      ▼                          NO   │
              ┌──────────────┐                        │
              │   COMPARE    │────────────────────────┘
              └──────────────┘
              YES   │
                    ▼
         DOOR UNLOCK
         AND MSG TO
         TELEGRAM
         CHATBOT
```

START

INITIALIZE

INPUT FROM
DHT11 AND MQ7

LCD DISPLAY

THRESHOLD LIMIT

IONIZATION
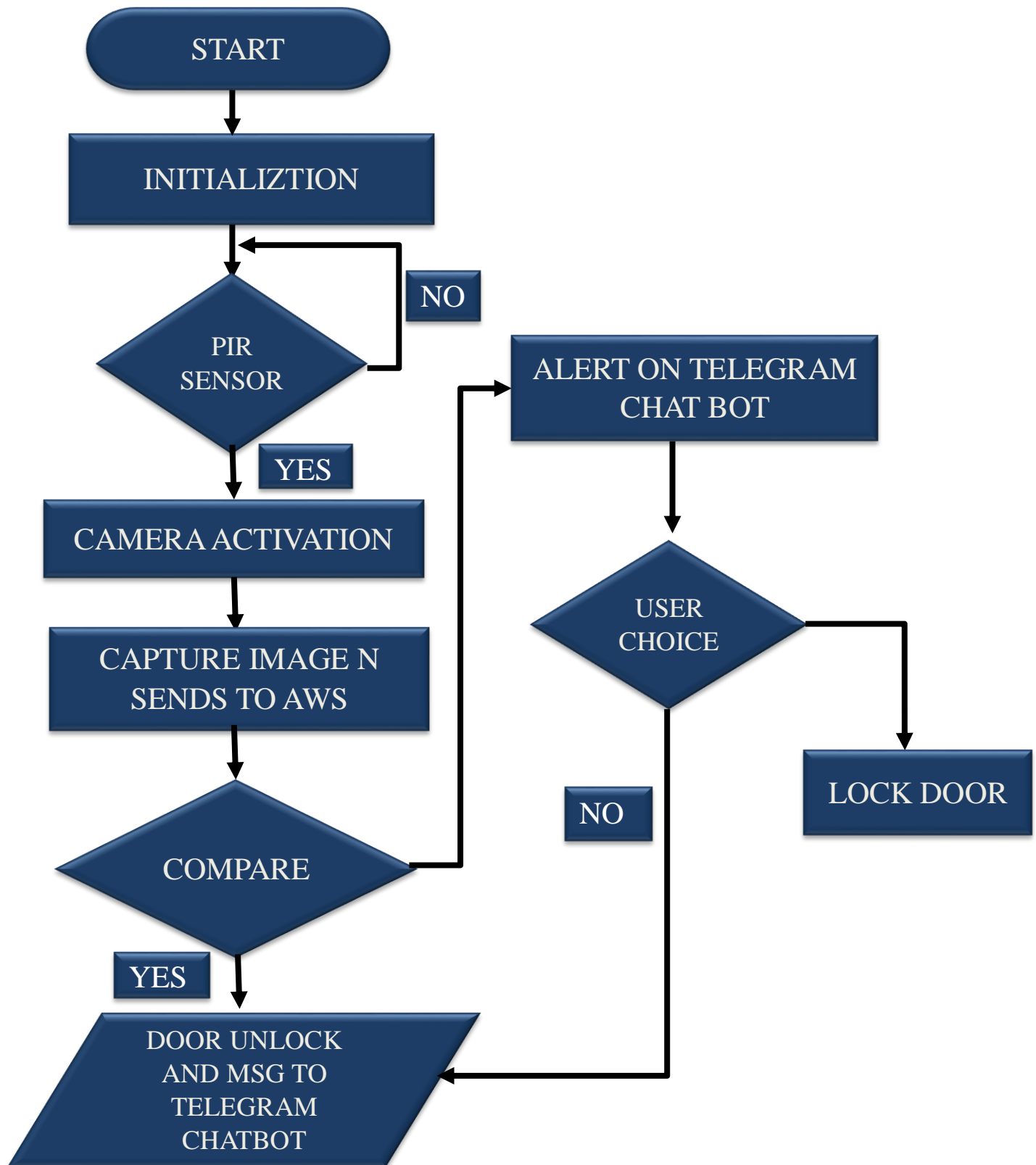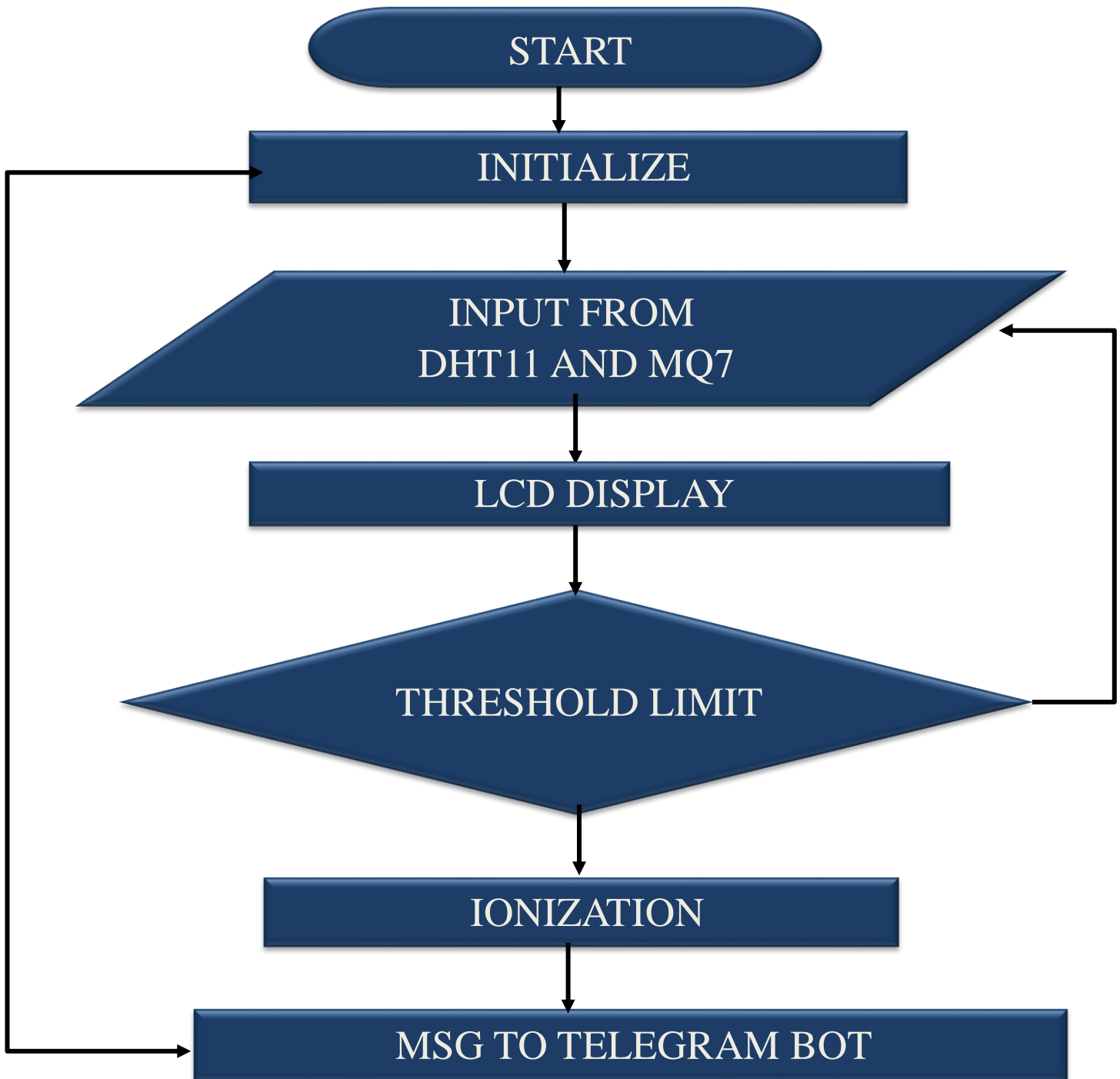
MSG TO TELEGRAM BOT

# **CHAPTER 9:**

# **ADVANTAGES & APPLICATION**

# ADVANTAGES & APPLICATIONS

## ADVANTAGES:

- There is no need of human to human interface .
- Environmental damage from air pollution is reduced.
- Monitoring home security and devices using Telegram  Bot.
- This project helps in understanding of IoT sensors and security purpose.
- Enhanced safety within your business premise.
- Quality monitoring of high areas.
- Need in Health care systems
- Need in Indoor and Outdoor Air quality system.

## APPLICATIONS:

- We can control devices from long distance, thus it gives ease of access.
- Faster operation and efficient.
- This can be used in smart cities, and offices.
- This system can also be used in Hotels, IT parks.
- Air quality monitor uses when dust is generated on jobsites or in the event of a natural disasters.

**CHAPTER 10:**

**CONCLUSION**

## **CONCLUSION**

This project helps to provide better end solution because of AWS and ensures security perfection.

The chatbot is built for Raspberry Pi platform for data processing and its communication with the different sensors to send parameters for specific functions.

Hence, we have set a threshold value for Ionizer circuit, when it crosses the value, it will notify through telegram and improve air quality. Whereas AWS will save data/face recognition of family members and if an outsider wants to enter then he/she will be only allowed in owner lets him in after seeing through Telegram feed(allow permission). The work done in this project can act as a base for further improvements to increase accuracy and adaptability of Smart Home.

# CHAPTER 11:

# FUTURE SCOPE

## **FUTURE SCOPE**

Today we are in the world of robotics. Knowingly or unknowingly, we have been using different types of robots in our daily life. In a intense study of Internet of Things, we came to know that IoT is highly involved for smart applications.

We can extend this project for:
- We can connect it with Home Automation System.
- In future we can connect Alexa with Telegram for more security purpose and including upcoming 5Gs technologies will created more opportunities.
- Hologram can be also induced in this project for wireless communication and high security.
- For security surveillance we can connect it with TV.

**CHAPTER 12:**

**REFERENCES**

# **REFERENCES**

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# CHAPTER 13:

# WORK PLAN AND COMPONENT LIST

## **WORK PLAN**

| S.NO | Activity | Date | Guidelines |
|------|----------|------|------------|
| 1 | Group Formation | 12/08/2022 | Submit domains and confirm groups |
| 2 | Report to guide | 25/08/2022 | Guide Allocation |
| 3 | Title Submission | 23/09/2022 | Submit Project title with guide signature |
| 4 | Review 1 | 27/09/2022 | • Introduction<br>• Literature Survey<br>• Block Diagram<br>• Components<br>• Advantages<br>• Application<br>• Future Scope and Reference |
| 5 | Review 2 | 13/10/2022 | • Literature survey of 8-10 papers<br>• Methodology<br>• Detailed Block diagram<br>• Components Specification |
| 6 | Review 3 | 4/11/2022 | • Complete PPT<br>• Flow chart<br>• Circuit Diagram<br>• Hard copy of Base Paper |
| 7 | Final Submission | Exam Date | |

## **COMPONENT LIST**

| Sr. No | Component Name | Quantity | Price |
|--------|----------------|----------|-------|
| 1. | Raspberry Pi | 1 | 3000 |
| 2. | ESP32 Sensor | 1 | 500 |
| 3. | PIR Sensor | 1 | 75 |
| 4. | MQ 7 | 1 | 125 |
| 5. | DHT 22 | 1 | 400 |
| 6. | I2C Module | 1 | 100 |
| 7. | 16x2 LCD | 1 | 150 |
| 8. | Capacitors 630 volts | 40 | 320 |
| 9. | Diodes | 40 | 28 |
| 10. | Buzzer | 1 | 10 |
| 11. | Jumper wires | 80 | 160 |
| 12. | LED | 15 | 20 |
| 13. | Resistors | 10 | 5 |
|  | Total: |  | 4893/- |