Chapter 1

INTRODUCTION

1.1.Motivation and Background

The current technological era has brought rise to several innovations one of which is automation. Automation is the application of computers and controllers in order to control appliances without the need for human intervention. By having all our mundane tasks handled by a system, it will leave people with more room to focus on other aspects of life. The applications of such systems can see benefits in class, work, and home setups. Automation systems work based on embedded systems and are used in several industries for a variety of purposes. In fact, systems requiring multifaceted dynamic complex control, such as factories, air planes, and ships typically use this technique. The benefits of these type of systems is innumerable but to shed light on the most common ones; manpower savings, electricity cost savings, material cost savings, improvement in accuracy and precision, and also decrease the time taken to do the job. It is highly possible to integrate it into such systems in order to increase its flexibility to a new level.

The world today is well into the technological age where everything is constantly being made “smart”. The technological advancements in the last 20 years have caused several devices to become indispensable. Doing so has made life easier by having everything at the touch of a finger. This has resulted in the creation of several new industries, which utilize this technology.

The last decade has brought rise to IoT (Internet of Things) and the cloud, which can be used to store and access files. IoT is used to connect several devices to the internet, thus information can be stored collectively in a location that can be accessed from anywhere. As all these devices are linked, they can also communicate with one another.

Another reason for development is comfort. We as human beings flourish in an environment in which we are comfortable. Employees in an office, or students in a college, will work better if they are in a comfortable environment.

Being students, we noticed the number of fans and lights that were left on or were not closed when everyone left the room. This amount of energy wastage got us thinking as to whether or not we could do something to change this.

Automation is nothing but the application of computers and embedded systems in order to easily control appliances without any human intervention. Such systems provide a variety of functions such as remote control of lighting to complex systems based on micro-controllers.

The Automation technique is becoming quite popular nowadays and is emerging quickly in the market. With the help of embedded systems, the concept of Automation can be illustrated and then can used as a daily driver not only in homes but also in offices and many other places. The benefits of these type of systems is innumerable but to shed a light on the most common ones, we have labor savings, electricity cost savings, material cost savings and improvement in accuracy, precision and also decrement in time taken to do the job.

1.2. Objective

The idea of home automation has been existence for a while now. Our Home Automation system will consist primarily of two parts: first will include sensors and analogue values which will be taken from the surrounding and will primarily focus on switching on and off appliances on detecting a person entering the room. This can be implemented with the help of Laser based cut-in system. The second part of this system consists of a camera module which would capture a picture of any person who is standing outside the door/system and send that snap to the recipient's mail. If the persons face is already on the cloud server then it would detect them, if not it would give the option to add the person's name. HAS will also include IoT using an app which can control appliances from anywhere conveniently. One of our main objective is to make this system as compact as possible so that it can be marketable.

1.3.Time Plan

	Start (Date)	Aug	Sept	Oct	Jan	Feb	Mar
Selection of Topic	26/07						
Literature Survey	20/07						
Abstract	25/07						
Implementation I	5/08						
Report I (End of Sem VII)	21/09						
Implementation II	21/01						
Implementation III	28/02						
Report II	28/02						
Final Report (Proof Reading and Binding)	26/04						

Table 1.1Time plan

1.4 Outline

Chapter 2 gives Literature survey of different automation systems.

Chapter 3 gives the Design and Methodology used.

Chapter 4 gives the Implementation of the project.

Chapter 5 gives the Results.

Chapter 6 gives the Conclusion.

Chapter 7 gives the Advantages and Future scope.

Chapter 2

LITERATURE REVIEW

2.1 Technical Paper Review

2.1.1 Home Automation System using Raspberry Pi by Chirag Atha et.al. [1]

This paper implicates the complete automation of the home appliances by reducing the flaws such as wide range connectivity, convenient user interface, energy efficient system, cost effective installation, and efficiency. These flaws can be overtaken by using a Raspberry Pi as a system processor; Android based application as a user interface, Internet as the mode of connection between Home environment and a Remote environment. Wi-Fi will be used as a mode for accessing Internet, Relay circuit is used to connect the Home appliances like lights, fans etc. and sensors like heat sensor, light sensor etc. to the Raspberry Pi.

The main objective is to control the power switch of basic appliances using an android application. In which the Raspberry Pi will play as the main interface provider between the hardware and the application. One of the main aspect of this paper that caught our eye was the energy saving mode that is implemented is to be introduced on just one click in the application.

If all light traffic servers are changed into Raspberry Pi, it can certainly minimize an enterprise's budget. Even though Raspberry Pi can perform different tasks, there are some limitations due to its hardware.

2.1.2 Design and implementation of Smart Office System by Renuka Bhuyar et.al [2]

The system they have used is based on subsystems like lighting, heating. Security and alarming systems are also present. The sensors are used to extract the real time data from environment. Sensors are connected to the ARM 11 Controller. The sensor's data is continuously recorded. Fingerprint Identification module is used for security

purpose. Fire alarm and emergency call is given to the service room. This data is stored in PC. This data can be viewed on other PC's through Network switch. The data can be seen on the webpage and on GUI..

This review case is based on ARM11 controller which incorporates different sensors such as motion, biometric, light, temperature and smoke sensors. Motion sensor will detect the presence of any person. A GUI (Graphical User Interface) system is used instead of a HTML based one in which a .COM port is selected and it shows the related information on the system page. It can be attached to other PC's in the service room. This data can be viewed as it is on mobile screen also.

2.1.3 Energy efficient Smart Automation System by Abhay Kumar et.al [3]

In this review paper, Abhay Kumar et.al have developed a simple home automation system using 16F877A PIC controller. This is a simple automation project wherein the IR sensors are used to detect whether a person has entered the room or not. When the person enters the room, the IR is triggered and thus it signals the raspberry pi and the raspberry pi turns on the Fans and lights.

Similarly, when the person exits the room the raspberry pi turns of all the lights and fans. Hence, even if the person forgets to close the appliances, it automatically shuts off and hence helps to save power.

From this paper, we gained the basic idea of the working of infrared sensors and the logic behind detection of human presence. They were successfully able to read sensor data and turn on the lights when a person has entered the room.

2.1.4 Home Automation System using Raspberry Pi controlled via Android App by Kalyani Pampattiwar et.al [4]

In this review paper, they were able to develop a smart home system using raspberry pi. The appliances is controlled remotely using an Android Application.

They were able to implement features like:

- Smart Doorbell
- Appliance Control
- Setting Reminders/Alarms

The Smart Doorbell system sends a photo of the person at your door when he/she rings the bell and the owner of the house is not at home. This happens through the cloud. The Intensity of lights and fans are varied remotely using a Smartphone. They also have the function of setting reminders and alarms according the users preference. This all can be done remotely from anywhere around the world provided the smartphone is connected to the internet.

2.1.5 Raspberry Pi Home Automation Using Android App by Himani Singh Dhami et.al [5]

The brain of the system is the Raspberry Pi, there is a client server model is used in this to achieve the outcome. There is an app used to interface human need and the execution. The desired action is conveyed to the raspberry Pi via that app and server, Raspberry Pi senses, analyses the request and after processing takes the necessary action, which is triggering the respective relay to take the respective action (turning on or off). The unique thing about this project is, they haves SSR (solid state relays). These relays are purely electrical, they don't have mechanical contacts or in involvement in them, thus avoiding wear and tear and extending the shelf life of the system.

2.1.6 Smart Home Automation System by Prof. H.B. Shinde et.al [6]

It uses IOT data that can be used to analyze and take required actions. The data collected on a daily basis can be obtained via sensors later on analyzed and automatic execution when required, does not require human triggering, these all are done using old data. Relays are used as an interface between the 5V DC and 220V AC. The relays used by them are normal, magnetism based relays. The different action which they performed were electrical triggering, dc motor based curtains and windows. The relays make sure the AC and Raspberry Pi don't come in contact with each other because it will just damage the Raspberry Pi.

2.1.7 Automatic Door Locking by Neelam Majgoankar et.al [7]

Here an automatic locking system was developed for a door using a Bluetooth module and a microcontroller. It operates by having the door lock open and close using servo motors which are controlled by the microcontroller. The blotch module connects

to the phone on which a password and username must first be entered if when correct will grant access to the user by opening the door lock. The phone must connect to the Bluetooth module after which one must enter the mobile application to enter the details for entry.

2.1.8 Smart Locks: Lessons for Securing Commodity Internet of Things Devices by Grant Ho et.al [8]

In this paper the authors studied the security of commodity home smart locks with the goal of informing the design of future Internet of Things devices. They presented two classes of attacks and showed that existing smart locks are vulnerable to many of these attacks, enabling adversaries to gain unauthorized home access and learn private information about the user's household.

For one of these attack categories, they presented defenses that can be implemented today without any hardware changes to existing devices. The second class of attacks is more challenging to stop without sacrificing usability, and no existing system provides an adequate defense. Two approaches to defend against this final class of attacks were explored. One of these builds upon a novel mechanism introduced, a bone conduction channel, which was implemented and evaluated, demonstrating its ability to achieve our security and usability goals. Ultimately, it concludes by saying that if smart locks were to adopt the defenses suggested, they could provide both better convenience and better security than their mechanical counterparts.

2.2 Problem Formulation

2.2.1 Problem Statement

The systems used in the review case are advanced and far more capable than what we are planning to do and we are more or so positive about including the systems such as IoT for further enhancements.

Some other technical problems of Raspberry Pi is that it because of its processor, it cannot run X86 operating systems. Some common ones like Windows and Linux are not compatible although the upcoming models are in line with the operating system. In ARM11 system that are compact and uses low power are ideal for sensors but the down-side about this is that even though the clock speeds are good but in comparison with the latest processors, it is behind.

These identification technologies include ATM and other intelligent cards, user password-based systems, and many other. But unfortunately, these systems are unsecure due to hacker attacks, thefts, and forgotten passwords. RFID is also been used in security purpose. But the disadvantage of RFID is that it can be stolen or some other person can also use that ID and enter. In spite of all these shortcomings and malfunctions the most efficient and reliable solution for security is the biometric or fingerprint authentication-based identification.

Another problem would be the use of inaccurate sensors which are not able to detect the number of people in the room. Lasers can be used at the door to actually count the number of people that entered and exited the room.

Systems don't usually incorporate security and authentication which we plan to do in ours. This makes it more robust and relevant to situations wherein no people are present.

Chapter 3

Design and Methodology

3.1 AWS- Amazon Web Services

The part of our system dealing with a smart locking system uses Amazon Web Services as its foundation. We made use of the multiple services provided on the platform to create a system that works efficiently and has a low overall cost. The reason for choosing this platform is due to the flexibility of it and the scope for constructing a system uniquely customized for a particular application. The services used by our project are:

3.1.1 Amazon Dynamo DB - Amazon DynamoDB is a key-value and document database that delivers single-digit millisecond performance at any scale. It's a fully managed, multiregion, multimaster database with built-in security, backup and restore, and in-memory caching for internet-scale applications. DynamoDB can handle more than 10 trillion requests per day and support peaks of more than 20 million requests per second.

Many of the world's fastest growing businesses such as Lyft, Airbnb, and Redfin as well as enterprises such as Samsung, Toyota, and Capital One depend on the scale and performance of DynamoDB to support their mission-critical workloads.

3.1.2 Amazon Lambda - AWS Lambda is a compute service that lets you run code without provisioning or managing servers. AWS Lambda executes your code only when needed and scales automatically, from a few requests per day to thousands per second. You pay only for the compute time you consume - there is no charge when your code is not running. With AWS Lambda, you can run code for virtually any type of application or backend service - all with zero administration. AWS Lambda runs your code on a high-availability compute infrastructure and performs all of the administration of the compute resources, including server and operating system maintenance, capacity provisioning and automatic scaling, code monitoring and logging.

3.1.3 Amazon Polly - Amazon Polly is a service that turns text into lifelike speech, allowing you to create applications that talk, and build entirely new categories of speech-enabled products. Amazon Polly is a text-to-speech service that uses advanced deep learning technologies to synthesize speech that sounds like a human voice.

3.1.4 Amazon Reckognition - Amazon Rekognition makes it easy to add image and video analysis to your applications.You just provide an image or video to the Rekognition API, and the service can identify the objects, people, text, scenes, and activities, as well as detect any inappropriate content. Amazon Rekognition also provides highly accurate facial analysis and facial recognition on images and video that you provide. You can detect, analyze, and compare faces for a wide variety of user verification, people counting, and public safety use cases.

3.1.5 Amazon S3 - Amazon Simple Storage Service (Amazon S3) is an object storage service that offers industry-leading scalability, data availability, security, and performance. This means customers of all sizes and industries can use it to store and protect any amount of data for a range of use cases, such as websites, mobile applications, backup and restore, archive, enterprise applications, IoT devices, and big data analytics. Amazon S3 provides easy-to-use management features so you can organize your data and configure finely-tuned access controls to meet your specific business, organizational, and compliance requirements

3.1.6 Amazon SNS - Amazon Simple Notification Service (SNS) is a highly available, durable, secure, fully managed pub/sub messaging service that enables you to decouple micro services, distributed systems, and server less applications. It can handle many-to-many messaging predominantly to mobile users.

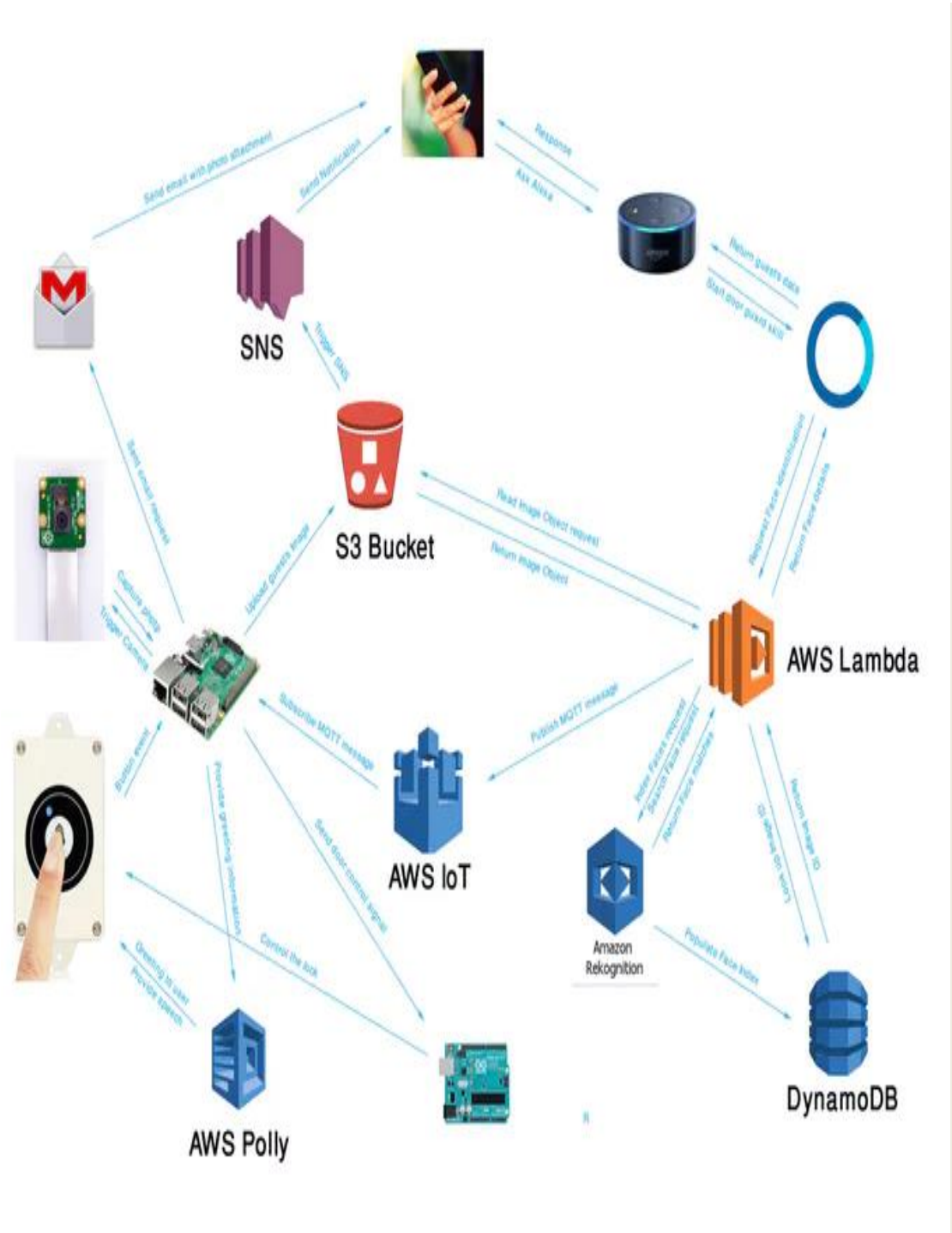

Fig 3.1 Amazon Web services

3.2 Component description

3.2.1 Hardware

- Raspberry Pi: We will be using a raspberry pie 3b model. It has 1 GB RAM, 1.4GHz 64-bit quad-core processor, dual-band wireless LAN, Bluetooth 4.2/BLE, faster Ethernet, and Power-over-Ethernet support (with separate PoE HAT).

  The dual-band wireless LAN comes with modular compliance certification, allowing the board to be designed into end products with significantly reduced wireless LAN compliance testing, improving both cost and time to market.
  The Raspberry Pi 3 Model B+ maintains the same mechanical footprint as both the Raspberry Pi 2 Model B and the Raspberry Pi 3 Model B.

Fig. 3.2 Raspberry Pi 3b+

- Sensors: We will be using Lasers to detect when a person is entering in or out which can be enhanced with a combination of lasers and PIR sensors. Other sensors like temperature sensor and further can be added later.

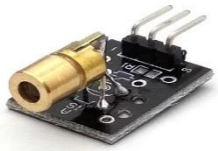

Fig. 3.3 Laser sensor

- Appliance: These could be anything ranging from Fans and lights to ACs and TVs. The can be either automated based on if there is someone in the room or they can be controlled remotely by the user.
- Relays: These will be used to control the Fans and lights that work on 220V AC using the GPIO pins of the raspberry PI that work on 3.3V. Relays are nothing but electromagnetic switches.

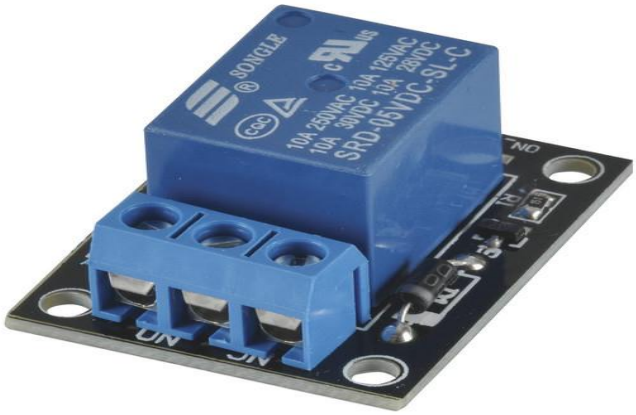

Fig. 3.4 Relay

- Stepper Motor: It is used to control the speed of the fan by connecting the motor to the fan regulator.

- Electronic lock: The electronic lock has a 12V DC input. This is a basic electronic lock which would be connected to a relay to meet the voltage requirements.

Fig 3.5 Electronic lock

- Camera: We would be using a simple 14ogitech web camera as our camera to capture people in the door lock system. It has a fixed aperture and no optical zoom. The use of a basic camera is sufficient for this project and will also cut costs.

Fig.3.6 Camera

3.2.2 Software

- Python is a programming language that lets you work more quickly and integrate your systems more effectively. It is far more easy to operate and hassle free and user friendly
- Blynk App -Blynk is a Platform with iOS and Android apps to control Arduino, Raspberry Pi and the likes over the Internet. It's a digital dashboard where you can build a graphic interface for your project by simply dragging and dropping widgets. How does the blynk work just imagine: every time you press a Button in the Blynk app, the message travels to space the Blynk Cloud, where it magically finds its way

to your hardware. It works the same in the opposite direction and everything happens in a blynk of an eye.

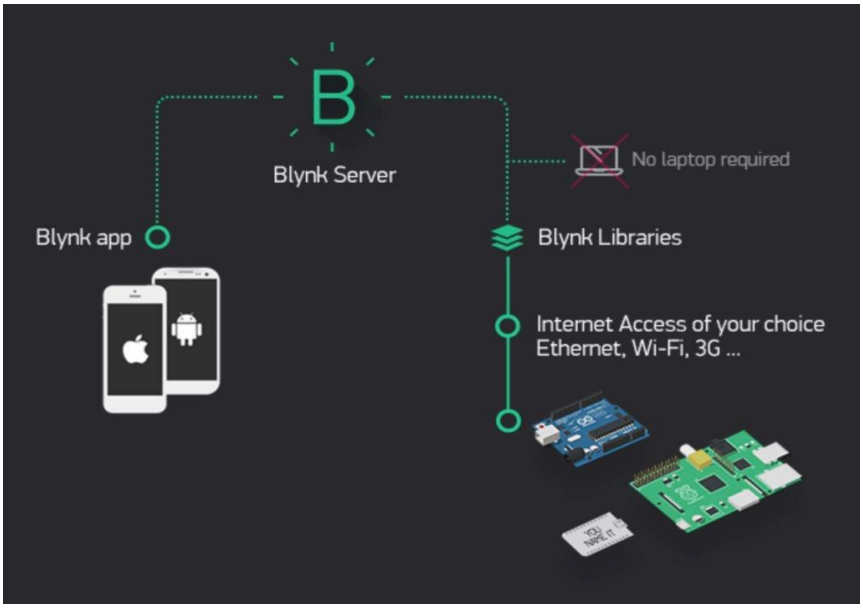

Fig. 3.7 BLYNK app

3.3 Block Diagram

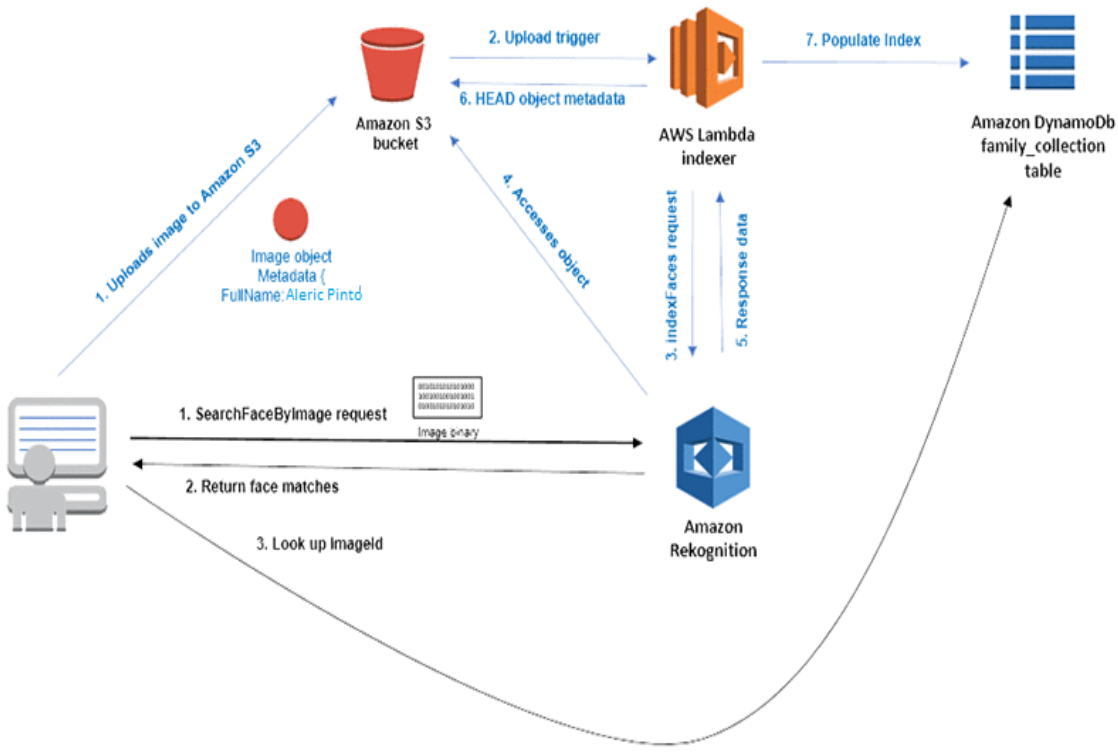

Fig. 3.8 Block Diagram

3.4 Design of Locking system

The main logic of this project is in the cloud which acts like the brain of the system while the hardware acts like the legs. At the center of the hardware is the electronic lock, which is to be configured in a pull up state, and the relay.

3.4.1 Switch: The switch being used is a basic button which will be representing a doorbell. The switch consists of a simple 1 kilo ohm resistor and normal spring which used in a pulled on condition Pull Down basically means that by default state/rest state is logic 0 in bracket ground and when the button is pressed that is the connection is completed the sense part gets connected to the logic one which is VCC activating the interrupt.

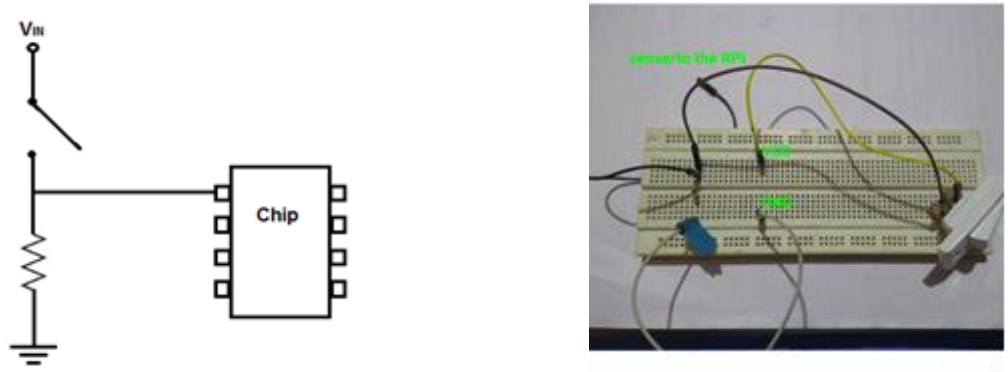

Fig. 3.9 Switch

3.4.2 The relay: This is a single pole double throw (SPDT) relay basically on one side of the delay is the triggering part which consists of a transistor a diode connected to a coil the coil is connected at the collector of the transistor. There are three terminals we have to give the first is VCC, second is trigger and third is ground, other power supply for the transistor the 'tri0gger pin' to the base of the transistor, as the as the trigger goes logic 1 it turns on the transistor which then pulls down on all the current in the coil making the coil and Electromagnet the work of the diode is there is a flywheel /freewheel (ask which one it is) to neutralize the back EMF generated by the coil, on the triggered part of the relay there are three points normally open normally closed and common is a given to the one part/line of the output circuit or device, the normally

closed is kept open that is nothing is connected to it and normally open has the other end of the circuit of the device so when the coil is activated and arm is pulled or it switches partition the normally open gets connected to the common and thus completing the circuit and activating the part of the circuit we need to use relay as rpi is a 3.3v working microprocessor but the lock has a high current requirement and any pin of rpi single handedly is not able to provide that much current and if we directly connect it will damage the ports of the rpi by which is not affordable or acceptable so what we do to make sure that they are electrically connected but physically isolated first we use a relay by virtue of which we can run both the circuits in their respective power supply domains as well as safely.

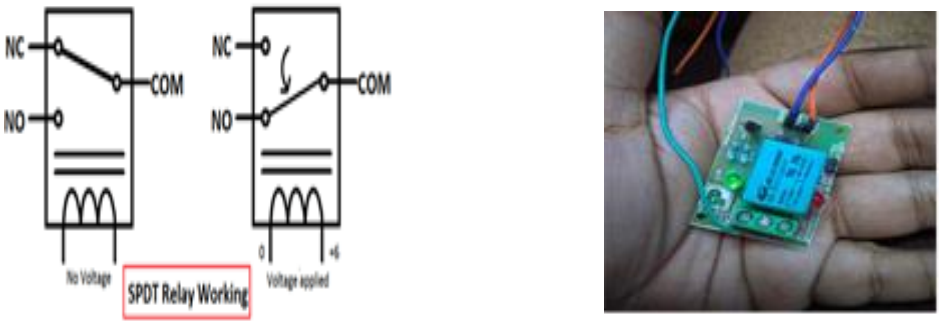

Fig. 3.10 Relay

3.4.3 The Lock: The lock works using electromagnetism. The lock contains a solenoid which is a metal rod within a coil carrying current. The moment the lock gets a trigger the coil becomes magnetic and pulls the rod in the opposite direction causing the lock to retract inwards. This constant supply of current can cause this lock to become very hot.

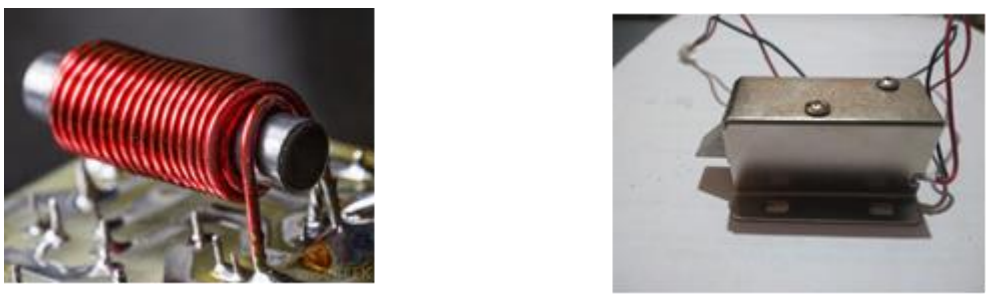

Fig. 3.11 Lock system

This is the lock we have used its electronic lock when it gets the trigger or the trigger current the shaft goes inside the lock body , so the by default the first state is it that the shaft is out and it is locked it is basically a Electromagnet working on a trigger. To run the lock we have used an adaptor as a lock is current base and R-pi cannot provide that much amount of current so we have to use an adaptor which is a 12 volt 1 amp adaptor providing 1 ampere output current.

The lock as it has been mentioned before it is the electromagnetism based lock it's a coil with the shaft of metal kept between a coil so initially when nothing is there other shaft remains outside the moment of the lock get set Trigger the coil becomes magnetic and pulls the shaft in the opposite direction, because of which the shaft moves inside lock structure or skeleton and the unlocking action happens this lock is connected with an adaptor in a series circuit on the on the output and of the relay when the rpi gives a signal of opening the lock the signal is received by the relay and the action taken the output side.

Chapter 4

IMPLEMENTATION

The implementation of the project can be divided into two modules. The first part consists of the sensors and occupancy detector coupled with the blink application. The second consists of the smart door locking system. Each of the modules can be further divided into the hardware and software required to construct it.

4.1 Module 1

4.1.1 Hardware

- First part of the implementation is the count of people entering in and out for this implementation we needed to assess each and every advantage and draw-back that would arise based on the number of people entering.

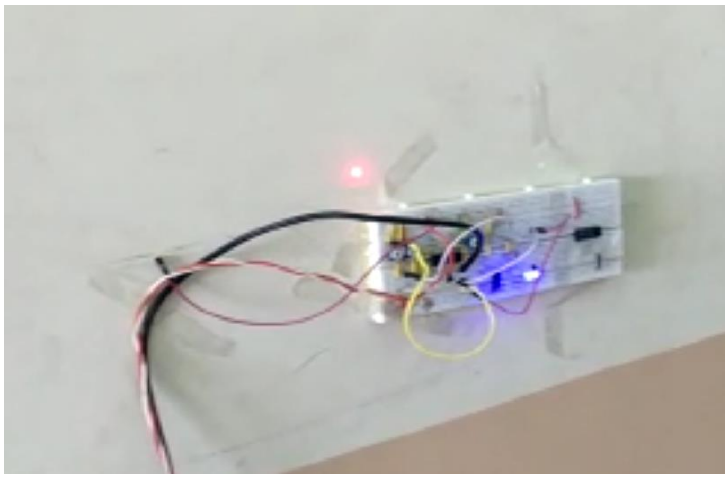

Fig.4.1 Laser in/out module

- Count in/out module- A laser is used to check the person cutting in and this system is connected to a bulb via a relay so when initially no one is present all the appliances are in the 'off' state. As soon as a person cuts the laser, the bulb is turned on. Based on the number of people entering, the count keeps on incre-menting and the lights/fans will once again switch off only if the same number of people exited.

Fig. 4.2 Person cutting in lights on

- This module was tested using a Laser module and a button wherein cutting one with laser and other by button manually and the bulb connected through relay did turn On and Off as the person cutting through and out.
- Then we implemented the same procedure with the help of two lasers and calibrated it properly to get the precise results of people cutting in/out. The test was successful and the bulb was turned on when person cut through the laser and turned off when they exited.

Fig. 4.3 Person cutting out lights off

Fig. 4.4 System implemented on door

4.1.2 Software

- Next we implemented remote access using IoT. Here, a person will be able to control the appliances from anywhere in the world and also he can see how many people are currently in the room. We did this using a web server provided by Blynk. This is a web server that provides services for IoT and other applications on the internet for free. It also has an application which is available on android and iOS for mobile devices.

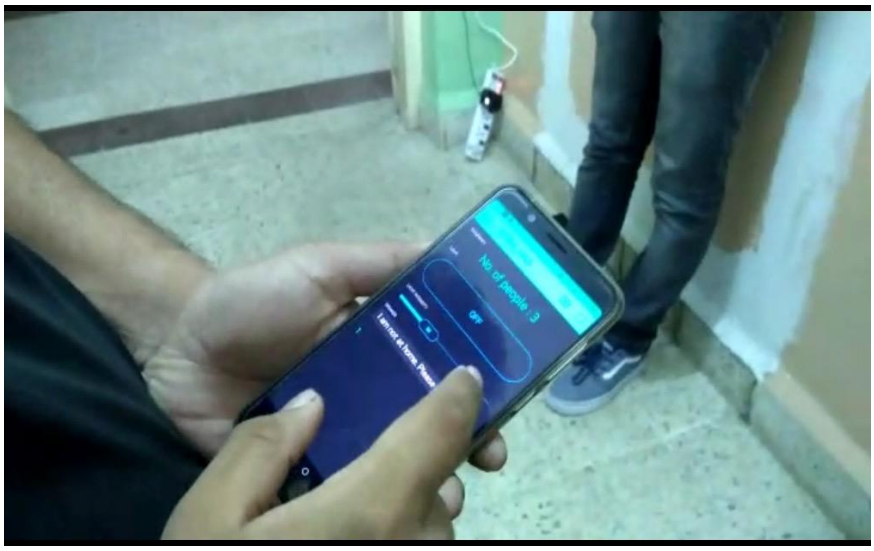

Fig. 4.5 Turning off lights with the help of Blynk

- The lights can be turned on and off using Blynk only, when the person has entered the room else it cannot be turned on if no one is present.

Fig. 4.6 Turning ON lights with Blynk

- Hence we successfully programmed and configured the raspberry pi and the app, we were able to implement remote access and hence we created the app which can be used to control the lights/fans and also vary the intensity. It is also possible to know the number of people currently in the room.

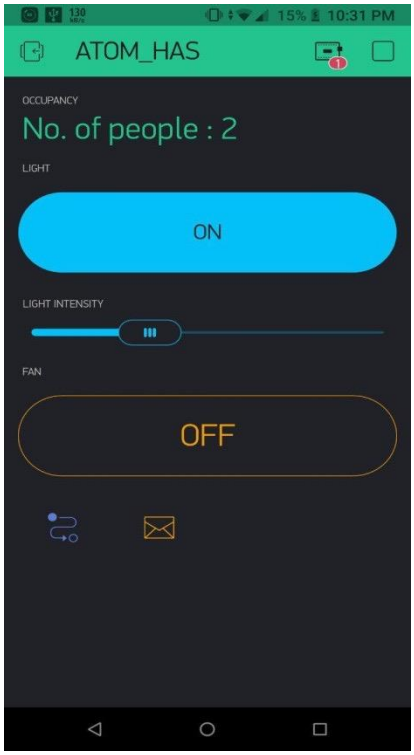

Fig. 4.7 App for Home Control

- The next step would be to try to add a feature where in the user receives an email whenever someone enters or exits the room. This also has been successfully implemented using the same Blynk application and a bit of python code.

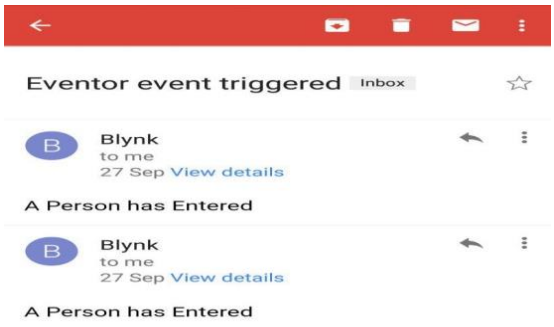

Fig. 4.8 Email received when person enters

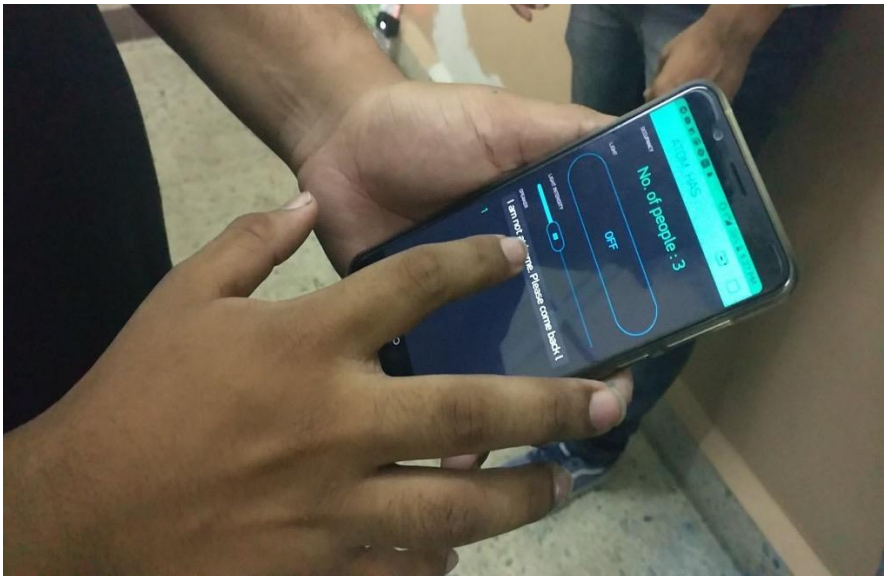

Fig. 4.9 Text to speech

We also implemented the voice message with the help of google text to speech service here a when a person enters into a lobby and no one is present the owner can send the text via the blynk app and this text is converted into audio form and can be listened through a speaker to the person entering.

Fig. 4.10 Audio through speakers

4.2 Module 2

The hardware primarily consists of a raspberry-pi connected to a relay which in turn is connected to an electronic lock. It operates by having a camera that is placed in the center to click a picture of the person when the doorbell is pressed. The camera takes a picture and sends it to the raspberry-pi which in turn is connected to the AWS server. Here it stores the image while at the same time also checks the server to find if the face already exists in the database.

This entire process takes only a few seconds making the system very efficient.

4.2.1 Hardware

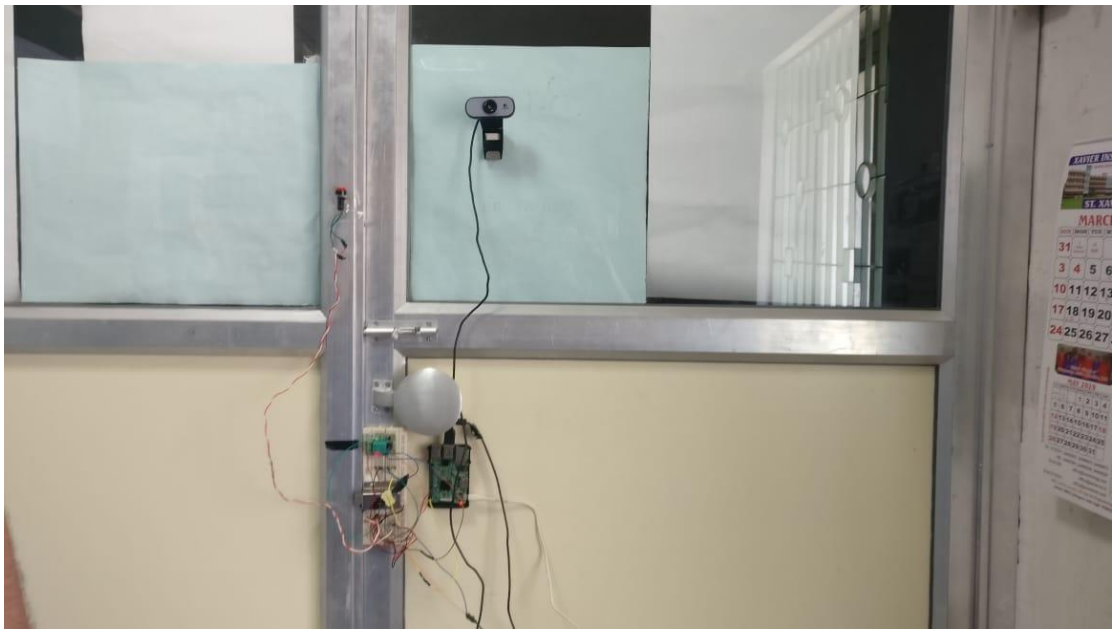

Fig. 4.11 Door locking system

Attached above is a picture of how the door locking system looks. The camera is placed at a height of 155 cm from the ground and can be easily adjusted if taller or shorter people visited. The camera is a basic webcam which is not capable of zooming and has a constant aperture which is sufficient for the projects requirements.

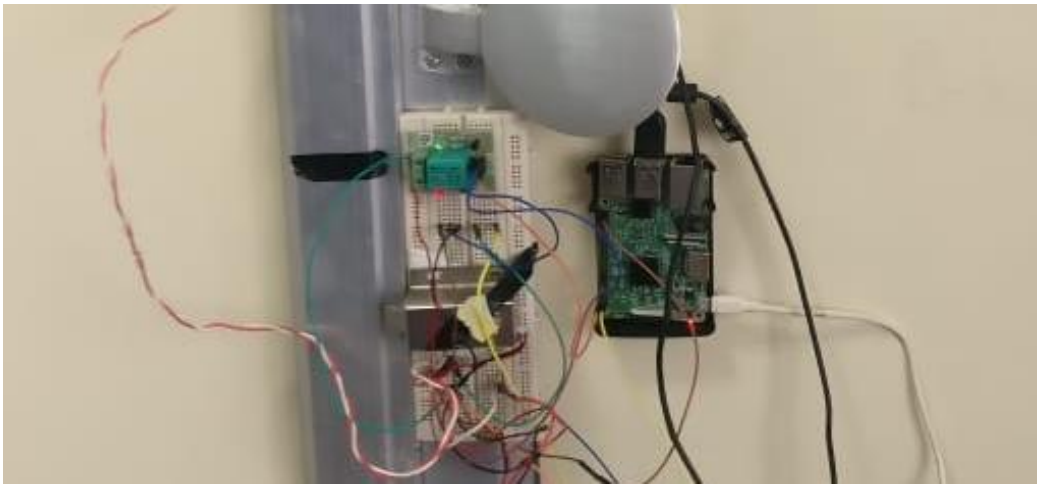

Fig. 4.12 Locking mechanism

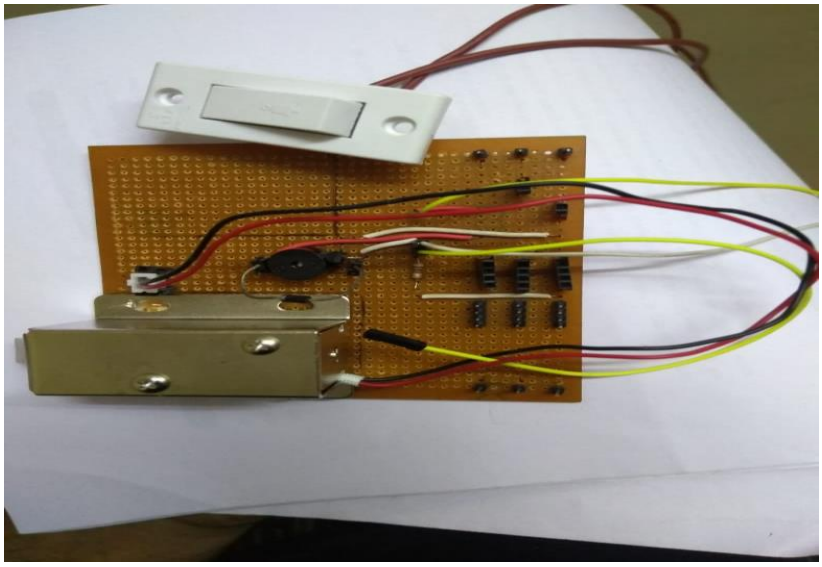

Fig. 4.13 Electronic lock

Working:

When a visitor comes and presses the doorbell, this invokes an interrupt to the RPi which then goes into the service routine executing a set of programs.

The camera is then given the command to capture the person's photo. The camera is connected to the USB port on the RPi, it captures the photo of the person standing in front of the camera (140 frames). This captured image is then stored in the RPi memory which is a 64GB micro SD card.

Fig.4.14 Photo being taken

This captured photo is compared to the ones that are already in the Amazon Web Services (AWS) database. Here if the face already exists then the owner will be sent a mail

saying ‘X’ person is waiting at the door with a photo of the visitor. Once this is done the electronic door will get sent a trigger to unlock granting access to the visitor.
If in the case the visitors face is not registered on the server, the owner will get a mail saying ‘an unknown person is waiting at the door’ with a picture of the unknown visitor. If the owner recognizes the person they grant them access or add their face to the database so if the same person were to visit again they would be granted access.
This entire process takes only a few seconds making the system very efficient.

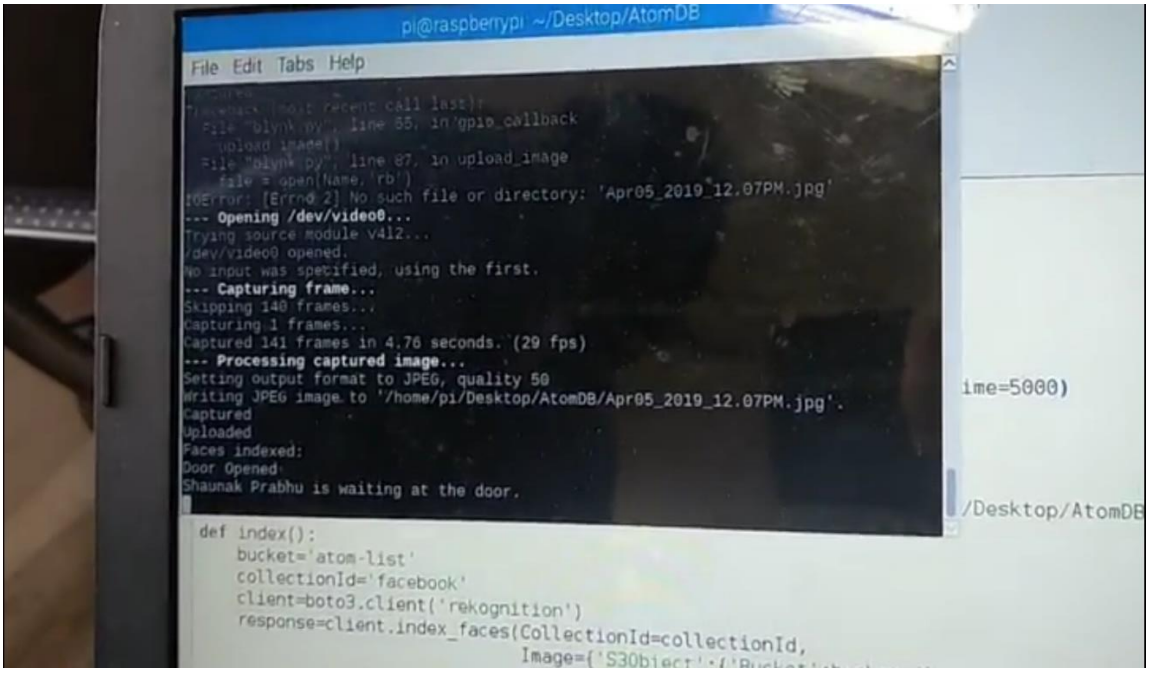

Fig. 4.15 Person is waiting at the door

You can tell how exactly this execution happens step 1 the person comes and click the button which is the doorbell representation that invokes and interrupt the rpi the moment the RPi is interrupted it goes into the service routine and executes a set of codes. Step 2 the command goes to the camera to capture the photo the camera is connected to the USB port on the RPI this further has two cases. Case (a) the person's face matches with the database for the people in the database in this case, what happens as soon as the match is found by default it triggers that it is ok to open as the person’s name is in database and that photo the attached to the body with the text the name of the person has arrived at your door and this email is sent to the owner of the house for the registered email id.

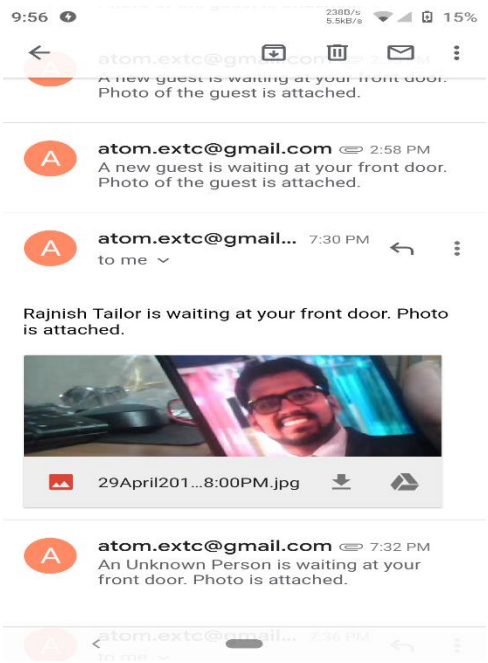

Fig. 4.16 Mail received stating person has arrived

If a person's name is not in the database the image is attached to the body of an email with the text ‘unknown person has arrived at your door’ and that email is sent to the owner of the registered email id over there when the person open the email he or she can see the photo of the person standing in front of his or her door then he or she can decide which whether or not they want to let the person in.

We can add a person’s name that is not present in the database then they can easily add that person's face along with the name using a option in the Blynk app where the image of which we have received can be attached to and that thing will be stored in AWS database next time if the same person comes the checking happens but this time it opens the lock because this time the person's face is inside the database.

4.2.2 Software

To effectively use all of the services we first needed to create an AWS account. Once done we created an S3 bucket to store all the images. We are able to store up to 20 GB for free every month in this bucket. Once done we used unique programming lines to make use of each of the services stated above such as amazon rekognition. Each time the doorbell is pressed the photo is clicked and saves with the time and date to make it convenient for the home owner when accessing the database in the future.

Chapter 5

RESULTS

5.1 Results

The Home automation system consists of several modules which perform as intended when testing separately. The occupancy detector module switches on and off appliances using a laser diode and presents the drawback of not being able to count multiple people entering the room.

Using the Blynk application we can also successfully switch on and off lights and fans as well adjust the intensity using a mobile. Therefore, lights switch on when a person enters the room or can be switched on using the Blynk application on the mobile. The locking system has the drawback of not being able to take photos or recognize visitors in situations where light exposure is either too low or too high. The components used have helped in creating a cost efficient system that performs basic automation functions effectively.

The output we obtained from this project mainly includes the smart door locking system that improves the security with the help of detection system that detects the faces that is there on the AWS database and states whether a known or unknown person has arrived.

Chapter 6

CONCLUSION

The project started in semester 7 with Laser based mechanism and Blynk app to have a count of people and trigger the electrical switch, then in semester 8 we up-graded to Amazon Web service based system. Face identification was the backbone of this project are the main aim or motto of this project is to basically develop a kind of system or technology that can provide us better security much more secure our environment as well as much more efficient, because we can see who all people get in throughout the day and if, someone we don't know we can avoid them as per our will and convey our message if it requires. Everything goes without an interaction and most of it is wireless, so we need not be present in the house to do this, the benefit of this project is that the presence of AWS and R Pi makes it easier to include other home models hardware or software which require more processing power as well as many other functions. AWS itself is a youth platform where not only this other categories of Automations can be involved and can be calibrated to other big projects.

Chapter 7
Advantages and Future Scope

7.1 Advantages

- Smart automation system reducing the work load of man.
- Count of people entering/exiting
- Cost efficient and Power saving.
- Improved locking mechanism.
- Enhanced security features.
- Alert via mail stating the person has arrived at the door.

7.2 Future Scope

The current system still has areas of improvement such as in the occupancy detector. A camera can be used instead of laser diodes to count the number of people entering or exiting a room. This will provide a more accurate system as it is capable of counting individually the number of faces entering a room which eliminates the problem of the current system of not being able to detect when multiple people are entering the room simultaneously.

New modules can also be added for increased functionality such as a temperature sensor and a variable light detector. A temperature sensor would adjust the room's temperature to have it at comfortable level or maintain it by controlling the air conditioners and fans in the room. A variable light detector would increase or decrease the intensity of the lights in a room by comparing it to the amount of light entering through windows or doors thus saving electricity when sufficient light is already present in the room.

The locking system can be improved by being able to detect faces in the dark. It can be made more efficient by detecting multiple faces so as to record entries of people ion a group.

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