Original Article

A Different Vision Of Automated Door System Based On Smartphone Apps And Voice-Controlled

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Abstract

The mobile phones Operating System like android and IOS finds wide use in smartphones and tablets and is thus suitable for home controllers. This project presents a smart home controller that uses WIFI in smartphone devices to control the operation of an automated security door system. The system idea is to use an Android or IOS app that sends commands to Electronic Relay-connected to home WIFI or internet- to control the opening of the door connected to an electric intercom. The Relay module is installed on the Intercom phone and the intercom phone connected to an electric lock which is installed on the door, the Relay Module receives the commands from the smartphone through WIFI, and passes these commands to the microcontroller that controls the opening of the door. The system can be used in various situations where access to an enclosure, doors, or any other thing needs to be open electronically. With the help of smartphone apps that will illustrate later, we can use smartphones to open the door using a smartphone voice assistant.

Keywords—IOT, WIFI, Arduino, android, IOS, SIRI, google assistant.

INTRODUCTION

Background

Technology came and created to make life easier and smoother in most of our life areas and fields, one of the most important system created by technology is IoT (Internet of things) it's the network of physical objects— "things"—that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet (Margaret, 2019).

After carefully analyzing different ideas for the project proposal, I came across with one of the interesting and indeed the most emerging ideas that would really cause a huge impact on the people interacting with the objects. It took me a while to go through various literature reviews and methodologies to bring up with something that could be much more efficient and of course sustainable. So, to accomplish my motivation I came up with the project proposal based on IoT, in which I have used 'Door Automated System ', in other words, this is a practice-based project in which I am coming up with a physical object. This IoT technology will result in controlling the home door with the voice command produced by the user on its Smartphone which will

contain that software application. Here another point of interest to be noted. My project implementation could cause a big change in the way of using facilities, which normally would have been difficult or maybe impossible at a certain level. The ease of using the facility is now just waiting for the voice order to perform the action.

Problem

If we look around the literature review of various IoT technologies, it will be clearly concluded that there is no doubt the way IoT has changed the way people behave towards the things they normally encounter in their daily life. As long as we are going further, things around us are getting easier and more convenient to interact and use them. But as the World is going into a much better time since history, there are also several difficulties and challenges that are coming up on the way. One of the major challenges that have been faced by home automation is its cost. Although home automation gives the best ultimate user experience, sometimes the affordability factor comes up in the middle. The cost of home automation arises from the several levels starting from the manufacturing cost, second major is the cost that is involved in the development process of the system. Later installation cost and further support and service could come up with the requirement of a big budget to maintain the affordability. Lack of required standards is also being one of the challenges that come on the way. As IoT is one of the emerging technologies, so while implementing it on the commercial basis user unfamiliarity with the interface is also great difficulty. Lack of awareness and lack of motivation needs to be updated to tackle these problems (Elshafi, 2012)

Objectives

Automated door system-based smartphone for controlling the home door has certainly an incredible effect on the society, where it can also cause the elimination of discrimination towards the daily life objects when all people will get the ease when come back to home.

If we put the things in more short and logical form, following are some of the major aims and objectives of my project:

- preparing a system opening building doors using smartphone apps and voice assistants (google assistant, Apple Siri) without changing their locks and with easy access tools to everyone.
- Using smartphones apps and voice assistants to open your doors from any place in the world.
- Using this idea to upgrade any device with manual switch to electronic switch.
- This project is designed to use voice Controlled technology to control home utilities door as example.
- Its implementation especially focuses on the needs of disabled people.
- Google Assistant voice service or apple SIRI facility will be utilized to input voice.
- smartphones will be used for the application software which will be connected to the voice-controlled command input.
- Ultimately Smartphone application will transfer voice command in to the microcontroller Smart Switch Relay using Wi-Fi module
- The aim is to use this IoT technology for the people of all ages, gender and even with some disability to enjoy life in a more pleasant way.

LITERATURE REVIEW

Many automated advanced door locking systems have been developed and it's popularly used in many places like commercial buildings and organizations. Some of these automated doors locking systems are based on RFID (Radiofrequency identification), passwords or fingerprints, and other automated doors systems controllable via Bluetooth or WIFI with the help of smartphone apps or smartphone voice assistants or both of them.

RFID Based Systems:

The RFID technology can be used for many purposes such as tracking of people, tracking of inventory, control of applications, security etc. Verma &Tripathi (2010) in their study implemented a system for opening and closing of the door using RFID technology to validate the user to unlock the door. This process involved the contact of users' tags to the RFID reader. The developed system is also able to maintain a log containing check-in and check-out of each user along with basic information of the users.

These types of security systems used for digital door lock are utilizing inactive RFID tags (passive). With the help of this, it ensures that only valid people can get entry. Such systems are working in real time basic for opening the door in which users have to place the tag in contact with the RFID detector, then the entryway opens and in the central server the registration data is stored with necessary data of the users. Attendance and person tracking are possible by using such a system. RFID Based Gate Access Security System which points out authorized peoples and permits just them was effectively created by Ravi, Varun, Vamsi and Pratyusha (2013). This system ought to have the capacity to minimize the trained or specialized human error during secured door access. Latest RFID based door lock security systems are based on Arduino platform by Mishra, Marwah, Verma

(2015) with audio acknowledgement at the point when the card is put close to the RFID module, it peruses the card data and it matches with the data stored in the program memory and shows authorize/unauthorized entry. Arduino is also used by many other applications for example A specific Arduino ATMEL processor can be used for sensing and recognition of a person (Nikumbh, Chaudhari and Rane, 2016). Another example is ECG Parameter Identification and Monitoring as they have an open-source platform (Singh & Vishwakarma, 2016).

Password Based Systems

According to Oke Alice, Adigun, Falohun, and Alamu (2013), The programmable electronic code lock device is programmed in such a way that it will operate only with the correct entry of predefined digits. It is also called an integrated combinational type lock. The programmable code lock is shown in Figure 1 as below.

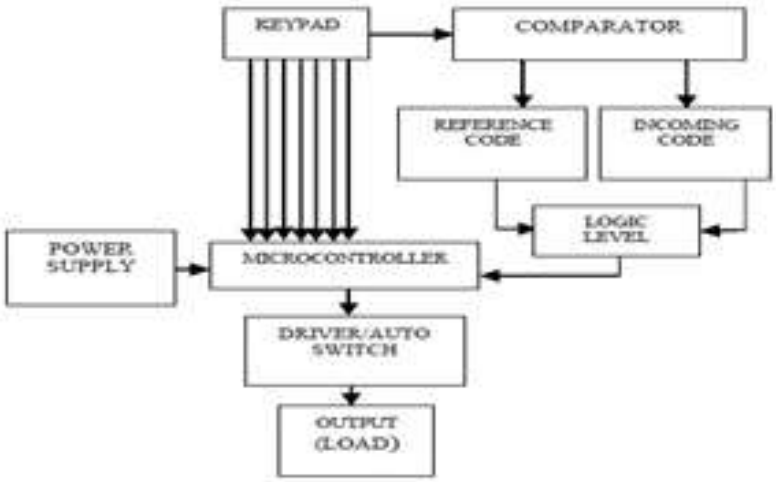


Figure 1: Programmable Electronic Code Lock by Oke Alice et al (2013)

Electronics safe is its example. Based on the programmable electronic code lock, the reprogrammable digital door locks were invented in that the password can change any time as it is stored in PROM. For operating the device, a GSM/CDMA module can be used. When any person calls up from his phone, the call will be received by the system. And the door will open only if the call is from a specified user (Amanullah, 2013).

A cell phone-controlled password protected door lock system by Jadhav, Kumbhar and Walunjkar (2013) is as shown in Fig 2 which was proposed to open the door with the help of cell phone devices by entering a specific code. The user can make a call to a system's number. This call is responsible for opening or closing of the entry with the use of the correct password.

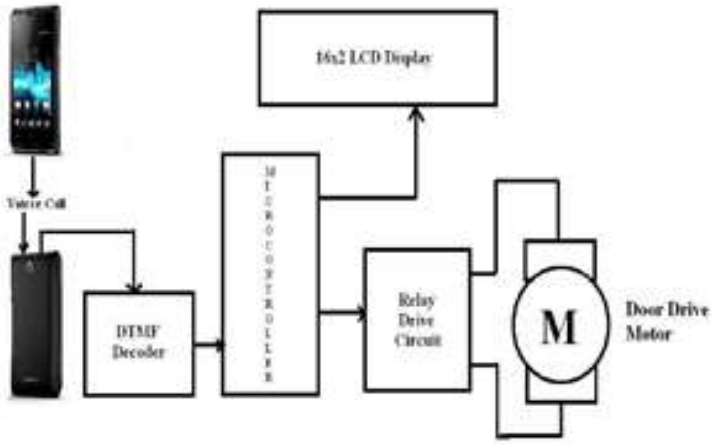


Fig 2: Password Protected Door Locking System based on Cell Phone by Jadhav et al (2013)

In the latest password-based system, a more advanced system by Gaikwad (2013) develops which communicates the owner of the office or house, when any unauthorized person tries to open the code, by giving correct code as well. While closing the door of the office/home, the owner has to press the „0" key available on the hex keypad and leave the system. The system developed by Annie, Rahul, Pranav, Ponni, Nadeshan (2014) allows for changing the password. To open the lock, the entered password must match with the changed one.

In another system by Mishra, Sharma, Dubey (2014) the security dial-up enables through the GSM modem when the unauthorized person enters an invalid password then the controller informs the owner through GSM modem.

Latest security system is designed where the locking security system can be enhanced with the help of RF and GSM wireless technology by using a 4-digit password which provides the authentication (Supraja, Goutham, Subramanyam, Dasthagiraiah, Prasad,2014).

Richard Hoptroff (2004) developed an access control system in which each user has a separate password, and a log is kept of time and person accordingly. No custom transmitter is needed but any suitable mobile phone or handhelds would do. Relay is used to provide an isolated switch for opening the electric lock. Relay and electric lock usually require high voltage to operate which make the system require supply from the main or socket outlet. During electrical blackouts, the system becomes easily vulnerable and a user will be trapped until the supply is restored. This system is low cost, easy to implement and use for home security.

Arpita Mishra, Siddharth Sharma, Sachin Dubey, S. K. Dubey (2014) has implemented a "Password Based Security Lock Proposed Methodology System" The system works using a keypad to enter a password to the system. If the entered password is correct then the door is opened by a motor which is used to rotate the handle of the door lock. System also includes extra features like adding new users and changing old passwords etc.

Bluetooth Based Systems

Bluetooth based systems are a bit like sarvy house innovations that utilizes Bluetooth function available in smart devices. The framework using Bluetooth turns out to be simpler and more productive for proper utilization. Such systems are generally based on the Arduino platform. The hardware of such a framework is the combo of android smart phone and Bluetooth module. Arduino microcontroller here is acting as a controller and solenoid can be acting as output of the locking system.

Kamelia, Alfin, Mada and Mulyana (2014) has implemented a "Door – Automation System Using Bluetooth", the implementation was on Android platform. So, the implementation cost is less and affordable by a common user. With the use of wireless Bluetooth connection, the system installation in an easier way.

The Bluetooth communication link was between two laptops with Bluetooth stack resident on the Laptop connected with the Ericsson ROK 101007 Bluetooth module via the Universal Serial Bus (USB). The motion detector was connected to one of the laptops via the serial link (serial cable between the motion detector and the laptop) and the status of the system, connection and detection was monitored directly on the computer screen. This project had more focus on a PIR sensor where the distance of detection is configured and monitored in real time. In spite of having Bluetooth technology, the system's drawback is that it is not portable since it uses two laptops.

Android based control systems providing the safety of the home's main door and car door are presented by Sadeque, Dristy (2015). The systems become accessible after establishing Bluetooth connections and validate the user login details such as username and password. In addition, the systems are also able to control the appliances of a room. The limitation of their work is that they are not providing the option to rest the password. This limitation is addressed by Jain, Anita and Ritu (2016), and the user is allowed to change the current password. In this work Arduino UNO microcontroller and password are used to control the door and appliances of a room. Sriskanthan & Karand (2002) explained the model for home automation using Bluetooth via PC. But unfortunately, the system lacks to support mobile technology.

Biometric Based System

The palmtop recognition is the next step for fingerprint recognition. As Nafi, Shekha and Hoque (2012). It operates on the image of a palmtop. Firstly, the system takes an image of the palmtop then it works on that image by partitioning it and a process is required. At the end, verify the right person. Hence, it reduces the chances of error in other human recognition methods and clarifies the problems which were faced in fingerprint recognition. The biometric technique is very useful in bank lockers. Except fingerprint recognition the vein detector and iris scanner give best and accurate results.

In the bank security system by Ramesh, Hariharan and Arora (2012), microcontroller continuously monitors the Vein Detector and Iris Scanner through keypad authenticated codes. During night the wireless motion detector will be active, if any variation occurs in its output, it will be sensed by the controller and alert sounds will be given by it.

Another fast-based principal component analysis approach is proposed by Yugashini, Vidhyasri, Devi (2013) in which the modification of principal component analysis approach for the face recognition and face detection process is done. The image is captured by the web camera and it gets matched with the image stored in the database.

Gowsalya, Sangeetha,Krishnan,Divya,Devika (2014) proposed advanced door lock security systems are available based on the pattern of the human iris for providing a high level of security. And to make the system more efficient and reliable the simulation is done in MATLAB.

Kartika Wong and Satya (2015) in their final year project at The Hong Kong University of Science and Technology developed a home security system using fingerprint as the method of authentication, the system is connected to a mobile application over the Internet which is allowing users to monitor entrants through camera surveillance and has remote access to the door. This project aimed for improving home security and convenience in accessing doors. The limitation in their work is that the Android smartphone must support fingerprint sensor and internet access, otherwise the door will not be in a position to be accessed.

Other fingerprint-based door locking systems are proposed by Shankar (2015) and Bahatia (2014) The proposed systems are based on existing biometrics systems and stored fingerprints of authorized users. The systems authorize access after confirming matching of collected fingerprints with already stored biometrics in the database.

GSM Based Systems

In many door lock security systems, GSM is used for communication purposes. The purpose of a work cultivated by utilization of a circuit like Khan, Al Mansur, Kabir, Jaman and Chowdhury (2012) GSM module which gets activated by a controller for sending SMS in emergency to proprietor and for sending corresponding services of security at the time of break in. For detecting obstacles, the system requires various sensors. It gathers data from the sensors and settles on a choice. With the help of GSM module, sends SMS to a respective number.

Ogri, Okwong dand Etim (2013) created model for security of door easily controlled like remote control operations by a GSM handset acts as the transmitter and the other GSM phone set with the DTMF associated with the motor attached to door with the use of DTMF decoder, a stepper motor and microcontroller unit. Nowadays people want to be secure though they are away from home, so the work proposed by Bangali & Shaligram (2013). When the owner is not at his home, security of home and important things is the big issue in front of all. Two frameworks were created which depend on GSM based technology. For detection of the gate-crashes, it takes place by capturing images through a web camera. When people are not at their homes, the system sends notification in terms of SMS to the crisis number.

A novel administrator-based system proposed by Satti, Ejaz and Arshad (2015) can login without any stretch to the system and can see guests record and listen to their recorded messages and also automatically lock the door using mobile communication technology.

Social Networking

Sites Based Systems A specific work by Navya and Ramachandran (2015), the digitalization and safety perspectives were accomplished by utilizing the phone device and web camera. The model can empower a pin to close and open a door from an allotted region using SMS from a (social networking site) like Facebook, Whatsapp etc.

A digital door lock system by Ilkyu Ha (2015) designed which detects the unknown physical contact of a visitor then immediately informs the owner through the smart phone as shown in Figure 3.

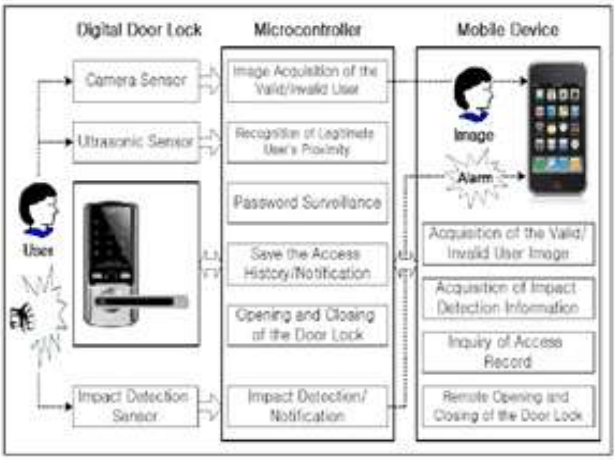


Fig 3: Digital Door Lock model based on Internet of Things by Ilkyu Ha (2015)

At the moment, if the wrong password gets detected more than the specified times, the system catches the picture of the unknown visitor and sends it to the owner through a smart device. In this manner, increases the strength of the security function. With help of the latest advanced technology, demonstration of an intelligent door system using the Internet of Things is given by Nazeem Basha, Jilani, Arun (2016). The system provides notification of intrusion by sending out email notifications to the owner. It logs all the intrusion data into Google spreadsheet of the owner‟s Google drive account. ADXL345 accelerometer detects the change in motion of the door and raspberry pi reads the sensor intrusion data and to communicate to the Amazon Web Services Internet of Things (AWS IoT) console.

Similar to the Ardiuno, Raspberry Pi module is used mostly as It is an inexpensive computer that uses Linux-based operating system (Miss. Ashwini C. Ingle, Mr. Ishwar S. Jadhav, Dr. K. P. Rane, 2016).

It is also having an open-source platform for using devices like GPIO, HDMI, 10/100 Ethernet and USB port etc. It is also having slots for SD cards in which Linux raspberry packages can be stored (Thakur, Vishwakarma, Rane, 2016). It has large scope in research and development in the field of automatic door lock systems.

OTP Based Systems

The proposed method in latest work does not need administrator's help to access the facility if the user knows OTP technique and has a registered mobile phone as proposed by Shin, Han, Jin (2013). Likewise, the OTP is generated and sent to the proprietor‟s mobile phone whenever the user requests to access the facility. Then the OTP should enter through the keypad on the door (Nehete & Rane, 2016) the door will open. In case if the mobile is not available or off then the option to open the door is to answer the security question asked by the system.

Motion Detector Based System

The Motion Detector System designed by Agarwal and Nayak (2012) working is based on the principle of the amount of light falling on the photodiode. At the point when the laser light is falling constantly on the photodiode, its reading is 255 in decimals. But when it's hindered by a deterrent; the voltage falls less than 50 in decimals. This flames the alarm and gives notification to the owner about the break in. An automatic lock can be activated.

Combined System

The locker security system is as shown in Fig 4 in view of RFID, FINGERPRINT, PASSWORD and GSM technology designed by Gangi & Gollapudi (2013) containing door locking frameworks which can be without much of a stretch, initiated, authenticated and validated by the authorized person. It unlocks the locker door in a real time manner.

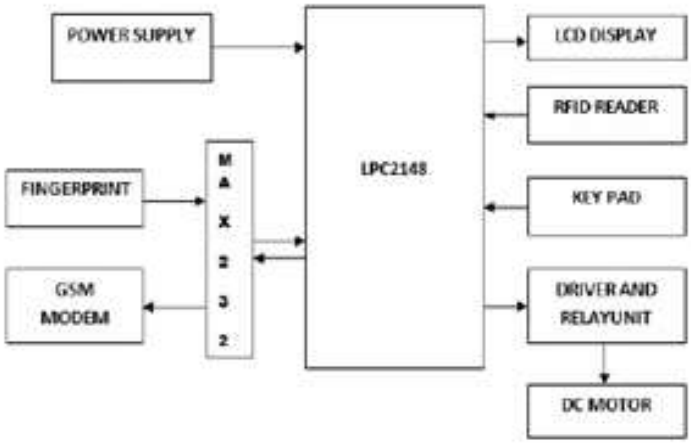


Fig 4: Locker Security System by Gangi & Gollapudi (2013)

WIFI Based System

ElShafee and Hamed (2012) have presented a WIFI based control system to maintain the temperature, detect smoke, door status and light level. The system consists of a web interface module for monitoring and controlling purposes. The hardware module consists of four assorted PCBS and is used to provide interfaces for sensors and actuators.

The system by Park, Sthapit, and Pyun (2009) uses ZigBee module in digital door lock and the door locks act as a central main controller of the overall home automation system. The developed system is based on network of sensors nodes, actuators with digital door lock as a base system. Hence the proposed system is limited to sensors, RFID and ZigBang model.

Javale, Mohsin, Nandanwar and Shingate (2013) explains a proposed system based on ADK (Accessory Development kit) at home. The system is based on automation for monitoring and controlling home appliances via android mobile phone or tablet.

A Smart Lock System using Wi-Fi Security proposed by (Kassem, Murr, Jamous, Saad, & Geagea (2016), is a complete reinvention of the standard Key-Door lock, where all the digital keys are stored in a Digital Keychain kept on the owner's phone. Encrypted and secured Smart-Lock-System can be connected to the Internet via internet cable (UTP) or wirelessly (Wi-Fi).

Ramlee, Tang and Ismail (2012) published a paper describing the Smart Home System for Disabled People via Bluetooth Wireless. Smart home system for disable people is the system called assistive domestics that focuses on making it possible for the disabled to motivate them to carry out daily activity, safely and comfortably. However, in our research work, we attempt to design the smart home system including the wireless controller via Bluetooth technology. This software application adapts in mobile phone, PDA, mobile computer (Samsung Galaxy Tab) using android's operating system (OS). This software application will control the electrical appliances switches wirelessly (Bluetooth). Results from this study found that the system was successfully produced where it is able to control any of the wireless switches at a distance of approximately 25-meter radius from the main controller. The system is seen potentially be used in hospitals, home care for the elderly and facilities for disabled users.

Another WIFI Based system by Bin Sulaiman (2018) it's Voice Controlled Wireless Home Automation Based on internet/ Bluetooth/ wi-fi is a project that is integrated system with mobile phone (application) to give the facility to the elderly and the disable people, so that they can easily control home utilities fully Based on their phone.

DATA COLLECTION AND METHODS

It is an important technique in terms of getting all the statistics which were applied before while performing the same project or maybe a related project. As this is a product-based project, very deep qualitative and quantitative analysis is not required, although a thorough understanding of the different procedures is required to carry out the product-based project. As we have discussed in literature, review various different controlling mechanisms via android based home automation which shows the number of procedures that are used for managing home utilities.

According to a study of go-assist.co.uk, they have taken a survey of adults aged between 25-65 years old asking them about the smart home, whether they like it or not. More than 700 people among thousands said they would love to have a smart home.

People would like to have their home as automation considering Security, monitoring, cost and energy, convenience, protection and felt of techie. There is also data on home automation done by Tweed (2014) and how people need smart things in their life. We also have collected data from the literature review. The literature reviews have not only given us the reason to pursue this idea in a better way, but it has also helped us to identify the reason for utilizing this Smartphone based technology. Previous trials and experiments are the major sources of giving an idea for adopting the better solutions for the future trial, and it has totally helped us to a certain level. Good understanding of the literature review has helped us to gain our objectives quite efficiently, and certainly, it has helped to consider the better procedure for our project.

Hardware Methodology

If we look at the hardware methodologies, it's been clear from our project that we have used a microcontroller, as this is the basic thing for carrying out all the necessary compilation of programs and cause the effect on the utilities according to the input by the users. There are a number of microcontrollers that are available in the market, like raspberry pie, Arduino Uno etc. But according to our comfort and the efficiency that I was looking for, a smart switch relay is the best one to be chosen for my project. Raspberry pie is quite complex, as it uses the Linux based operating system and it uses the python language. so, I decided to go for the Smart Switch Relay microcontroller because of its simplicity and efficiency (Jayant,2018).

Software Methodology

To accomplish the project, I had to go through various software methodologies, so that I could choose the one which is best to fulfil the requirements in an efficient manner. In the market, there are many software tools that are available, and even that could be different in its own way according to the purpose of using. So, in our case, after careful analysis, I have EWELINK App, because of its some specific advantages. There is some other software' that we could possibly use, but I have decided to use EWELINK App as this is easy to use and available on the most popular platforms android platform from google and IOS platform from Apple , and because my target was to achieve the project in much simpler and efficient manner.

System Analysis method - Hardware Architecture

Hardware Architecture
The hardware section of the proposed approach comprises the following components:

- Smart Switch Relay (BSF-B10).
- WIFI Module (ESP8285)
- Electric Intercom (intercom phone + Electronic Lock)
- Smart Phone (android or IOS)
- Display Unit (LEDs)

Smart Switch Relay (BSF-B10)
Is a small microcontroller board having various connection sockets to be coupled with different electronic devices like motors, sensors etc. It can be programmed to accomplish desired tasks independently or can be controlled via a computer. It can either be powered by a 12V battery or a Micro USB plug connected 12V Power Source. In the proposed research work Smart Switch Relay (BSF-B10) acts as a processing unit and is programmed to perform various logical functions. It also interfaces with other hardware components as shown in the figure.5

Fig.5: Smart Switch Relay

Android or IOS Smartphone
The smartphone communicates with the microcontroller by making connection with the Wireless Module (ESP8285), It sends the Command to the smartphone through which the door gets locked/unlocked. The smart phone gets the security credentials from the user as an input. If it is verified that the user is authorized and authenticated, the smart phone will send the Command to the Smart Switch relay which further instructs the Intercom Phone to send an unlock signal to unlock the door. The front-end module (Smartphone App) gets connected with the hardware module via the IP address of the WIFI module (ESP8285)

WIFI Module (ESP8285)
Works as a bridge between smartphone and Smart Switch Relay which is in our case built in the smart switch relay (BSF-B10).

Electric InterCom (intercom phone + Electronic Lock) Electric lock
Its Latch can operate from outside by key and from inside by button and can operated remotely by low voltage pulse (10W-12V) as shown in the figure.6 (Cisa ,2020)

Fig. 6: Electric lock

It's a phone which connects to the intercom system to know who presses the button outside the building or house and wants to enter the house or building, often there is on button to send the signal to the electric lock to unlock the door as shown in the figure.7. (Lange ,2017)

Fig. 7: Intercom phone

Display LEDs
LEDs are used to indicate status of the system output :

- Blinking red light shows that the microcontroller is not connected to WIFI.
- Solid red light shows that the microcontroller is connected to WIFI .
- Red light blink for one time then solid again shows that the user sends a command to the microcontroller

The hardware modules and the role they play in the proposed system are summarized in table-1.

Table 1: Functionality of System Components

S. NO.	System Component	Functionality
1	Smart Switch relay	Acts as a CPU for data processing
2	Smartphone system	Acts as a user front end
3	WIFI Module	Act as a connectivity module to transmit data
4	Electric lock	Control door lock
5	Display units	Acts as an output indicator

Software Specification

1) Smart phone (android or IOS)

Smartphone Platform (android or IOS) logo showing in figure.8 The smart mobile terminal platform is getting popular all over the world with its wide variety of appliances and enormous use in numerous spheres of our daily life. We all know that we are in the 21st century and we know that technology has improved a lot from the past century. platform is composed of operating system, user interface and application components which allow developer freedom to build new apps and provide a platform to the developers with numerous facilities to generate new applications at a rapid rate (Taneja,2020) .

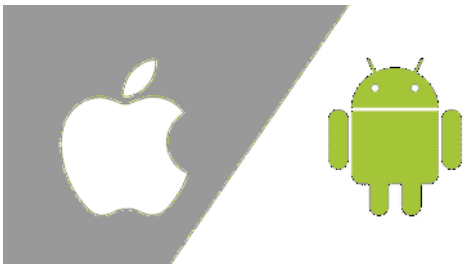


Fig. 8: IOS and Android Mobile Operating system Logo

2) EWelink App

eWeLink is the app platform that supports multiple brands of smart devices and manages and controls over hundred smart devices of 80 brands.It enables connections between diversified smart hardware and integrates popular Smart Voice assistant such as Amazon Alexa and Google Assistant as showing in figure.9 (Martin & Finnegan,2020)

Fig. 9: EWELINK app interface

3) IFTTT APP

IFTTT derives its name from the programming conditional statement “if this, then that. it is a software platform that connects apps, devices and services from different developers in order to trigger one or more automations involving those apps, devices and services ash showing in figure 10.(Martin & Finnegan,2020)

Fig. 10: IFTTT Logo

4) Google Assistant

Google Assistant is Google’s next generation way of searching with Google. Rather than providing links to websites, Google Assistant is designed to have conversations with you in order to complete tasks.

Google Assistant can interact with your Android phone to do a variety of tasks, such as setting alarms or playing music. it can even handle some home automation devices. Google has a page explaining various types of actions here as showing in figure 11(Sullivan,2017).

Fig. 11: Google assistant logo

5) Apple Siri

Siri is a built-in, voice-controlled personal assistant available for Apple users. The idea is that you talk to her as you would a friend and she aims to help you get things done, whether that be making a dinner reservation or sending a message.

Siri is designed to offer you a seamless way of interacting with your iPhone, iPad, iPod Touch, Apple Watch, HomePod or Mac by you speaking to her and her speaking back to you to find or do what you need. You can ask her questions, tell her to show you something or issue her with commands for her to execute on your behalf, hands-free as showing in figure 12 (O'Boyle,2020).

Fig. 12: Apple SIRI Logo

EXPERIMENTAL METHODS (FINDINGS)

The proposed system will be connected as shown in figure 9 by connected smart switch relay to button of intercom phone then connect the smart switch relay using home WIFI Figure.13 shows the block diagram of the automated door system using the smartphone app

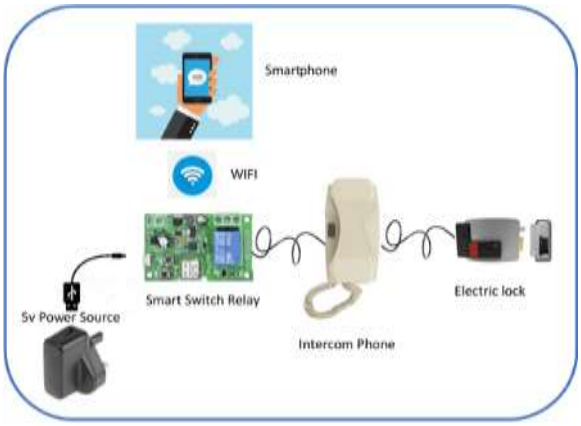


Fig. 13: block diagram of the automated door system

The EWelink app was designed to first display a menu to register new users using email as shown in figure.14 then after registration, users can login to the app by entering email and password as shown in figure.15

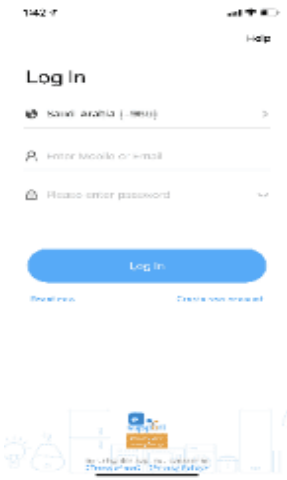
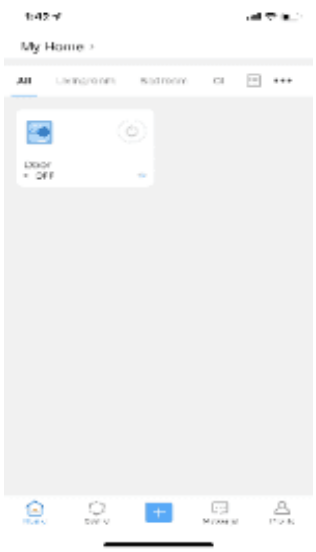


Fig. 1: EWELINK App Fig. 2: EWELINK Login Fig. 3: EWELINK add device

After login the user can add the smart switch relay through wifi by pressing + icon and searching for the device add and give a name for the device as shown in the figures.17 and 18



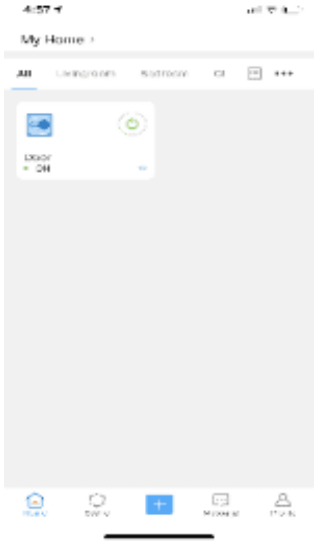


Fig. 17: added device **Fig. 18:** Triggered Device

The app can be installed on any android or IOS phone to control a hardware section (smart switch relay) that controls the unlocking and to control or open the door where it is installed.

After adding the device, the icon of the device will show in blue means the device is connected ,When pressing the added device to open the door as showing in figure.18 the icon of the smart switch relay will change to green and app will send signal to smart switch relay then smart switch relay will send signal to the intercom phone in turn the intercom phone will send signal to the electric lock to open the door .

So the smart switch relay will replace the button in the intercom phone and act as you pressing the button in the intercom phone but in a smart way. To use the voice assistant i will give an example using Apple Siri We will use IFTTT App to connect EWelink to Apple Siri as shown in the Figures 19, 20, 21 and 22.

We will add the device from Ewelink to IFTTT then add it to apple shortcuts then we can control the apple SIRI by speaking to the siri using the name of the shortcut we add .

Fig. 19: IFTTT Screen

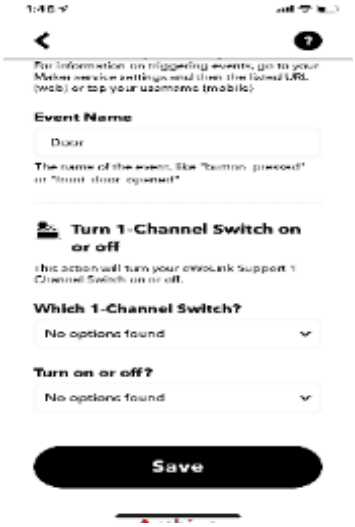


Fig. 20: IFTTT Connected to EWELINK

Fig. 21: Apple Shortcuts

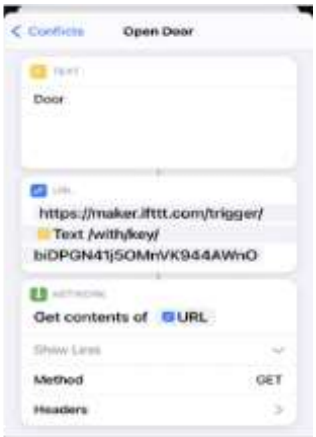


Fig. 22: Apple Shortcuts to IFTTT

TESTING AND EVALUATION METHOD

The system is implemented using the above explain hardware and software and these below figures for the actual hardware components so after testing the application above it is time to test whether or not the application and the system are working well or not. After assembling the hardware and connecting my mobile to the Smart Switch Relay microcontroller I have tested that the system is working as below figures from 23 until 27.

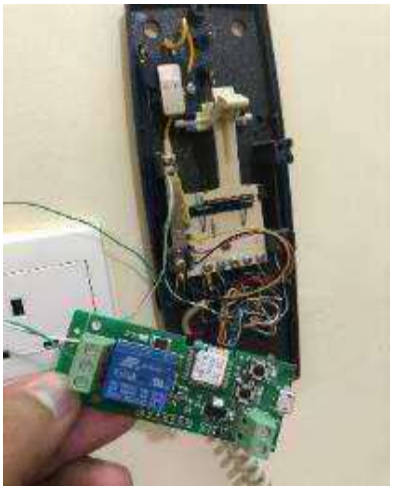


Fig. 23: Connecting SSR TO Intercom Phone

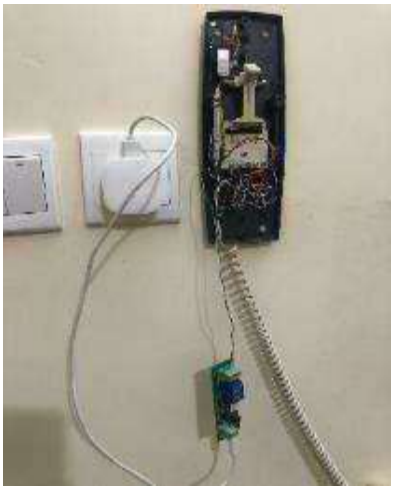


Fig. 24: Connecting SSR to power

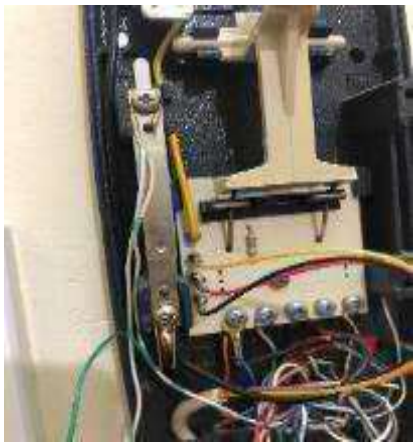


Fig. 25: Zoom Photo for Connection **Fig. 26:** Photo after Covering

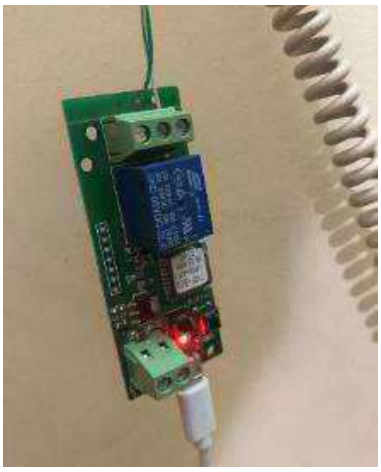


Fig. 27: Smart Switch Relay Connected to WIFI

DISCUSSION

The technology of voice-controlled through a mobile application has already been implemented in different areas but putting this on the home utilities is something which experienced a bit interesting to work. According to my thoughts and objectives, we have worked as the efforts required to complete the project and manage to achieve my target. Challenges and difficulties have been on the way of my project many times, we followed all the plans strictly and remain committed under all the hardships. The most part of my project required analysis and deep understanding of IoT technologies, so from the various literature reviews and a research paper to have the knowledge of this technology. we read a good number of articles and other materials as well, but throughout all my research process we stay committed to showing a clear reflection of all the reviews on my project. And we believe this project will be a good literature review for the future research work on smartphone based voice-controlled technology.

CONCLUSIONS AND FUTURE SCOPE

This system is a fine example of design and implementation of a low cost smart Automated Door system based on Smart Switch Relay microcontroller board and Smartphone App . The best part of this project is that the user doesn't need to buy expensive parts or change door locks So this system is cheap, reliable and easily installable. In future more work can be carried out on this system and more features can be incorporated, like we can use the same smart switch relay to trigger most of the home appliances like light switches and power outlets and so on.

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