PROJECT REPORT ON SMART HOME

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This Report Presented in Partial Fulfillment of the Requirements for the Degree of
Bachelor of Science in Computer Science and Engineering

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APPROVAL

This Project titled **"Smart Home"**, submitted by Mohammad Faridul Islam, ID: 151-15-5038 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on July 09, 2020.
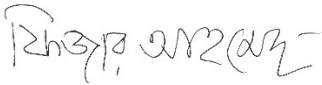
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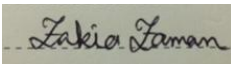Department of Computer Science and Engineering
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DECLARATION

I hereby declare that, this project has been done by me under the supervision of **Ms. Zakia Zaman, Lecturer, Department of CSE** Daffodil International University. I also declare that neither this project nor any part of this project has been submitted else any where forward of any degree or diploma.

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I really grateful and wish our profound our indebtedness to **Zakia Zaman**, Lecturer, Department of CSE, Daffodil International University, Dhaka. Deep Knowledge & keen interest four supervisors in the field of "SMART HOME" to carry out this project. Her endless patience scholarly guidance, continual encouragement constant and energetic supervision, constructive criticism, valuable advice, reading many inferior draft and correcting them at all stage have made it possible to complete this project.

I would like to express our heartiest gratitude to **Dr.Syed Akhter Hossain**, Professor and Head**,** Department of CSE, for his kind help to finish our project and also to other faculty member and the staff of CSE department of Daffodil International University.

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Finally, I must acknowledge with due respect the constant support and patience of our parents.

ABSTRACT

In modern era everything is moving towards to wireless system. I thought that why home's electric devices such as water tank, light, fan etc. could not be controlled without any wire. So I made this project. By using this project anyone can control any electronics device from anywhere. By an Ultrasonic sensor we can monitor the water level of water tank. If the water tank is full then the ultrasonic sensor will send a signal in android phone and alarm in phone, then we can switch off the water pump. I have improved some features in this project. When the water level will reach 80% and 90%,then ringing alarm randomly on smart phone. Finally, when the water level will reach the highest that means 100% then will send the final alarm and the water pump will be automatically switch off. I decided to make this project that the water tank automation is the unique idea. Because I have never seen this system by others or no one have done this project before in educational project.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Imagine anyone is now very far from his/her home right now. But he/she doesn't sure about that his/her room's light either on or off. How can he/she check now either it is off on? But if he/she has a system by which he can check it and control it, he/she could able to check anytime from anywhere that whether his/her room's light is on or off. Today we all use smart phone so I tried to make a system which can be controlled by an android app that should be installed in the user's smart phone and his/her home should have a Wi-Fi system by this system could be connected to internet.
Home robotization has made it conceivable to have what is regularly alluded to as a 'Smart Home'. A home's electronic materials that could be controlled by home's people from anywhere through the internet, such as he/she can turn on or off his/her homes individual light or fan. This allows his/her to make his home an active partner in managing his busy life.

My project Range Free Home Automation is basically a hardware product designed to control almost every digital component in your home such as fans, lights, AC and etcetera. Our final goal with this product is to bring our country one step ahead in technology and users satisfaction.

1.2 Motivation

Around one and half year ago I went for a tour of cox's bazaar for three days and when I came back to my home, I saw that my kitchen's light and my room's fan is being kept ON for last three days. I forgot to turn them off, so it's a waste of energy. We know that energy is very much important for our country because our population is growing very quickly. So, I think to make a project that me and anyone can handle his home's electronic materials from anywhere of the world by using his smart phone through the internet.

1.3 Objectives

By utilizing a microcontroller to accomplish equipment effortlessness we needed to actualize a minimal effort, dependable and adaptable home robotization framework that can be utilized to remotely turn on or off any family apparatus and this is our undertaking objective.

1.4 Expected Outcome

There are some major expected outcomes from our project. Some are-

- Project can be controlled from anywhere.
- Project should control any electronic goods.
- Reduce expense of electricity

1.5 Report Layout

Chapter 1 Is all about the overview, motivation, objectives and expected outcome of the project.

Chapter 2 Focus on the background of the project. It elaborates the related works, summary of the work as scope of the project. Finally, list down the challenges of the project

Chapter 3 High lights the requirement specification of our project.

Chapter 4 Illustrate the design specification the project.

Chapter 5 Present the implemented features of our project.

Chapter 6 concludes mentioning the limitation and future scope of the project.

CHAPTER 2

BACKGROUND

2.1 **Introduction**

Presently a-days robotization plays significant moves in numerous fields. For example, in mechanical field robotization has an enormous piece of significance. To gathering parts robotized robot is being utilized now more often than not. This procedure has a colossal effect on creation since it is a lot quicker procedure of generation. Another model could be as human level design acknowledgment, language acknowledgment and language generation capacity. Presently in restorative segment robotization is significant likewise, for example, essential checking in electrocardiography or radiography and research center investigation of human qualities, blood plasmas cells and tissues.

To make mechanization increasingly successful now numerous individuals are work with the range free robotization framework which can be controlled from anyplace through the web and ought to be low cost. For example, Wi-Fi based home motorization system, Bluetooth based home robotization framework, Range free home computerization framework and so forth. The move of the world economy from agrarian to modern in the nineteenth century to twentieth century robotization is especially mindful.

2.2 Related Works

Home automation is a process of control home's any kind's thing that could be controlled automatically such as automated doors and windows, control any room's light, fan, AC, any kind of plugged electronic goods, pet feeding, water pump, climate controls, plant watering, etc. In any case, there exists a distinction in that home mechanization underscores more on solaces through ergonomics and simplicity of activity.

2.3 Comparative Studies

In recent times, for home networking wireless systems like WLAN have become increasingly normal. Additionally, the utilization of remote advancements gives a few focal points that couldn't be picked up utilizing a wired system in particular in home automation system.

1. **Reduced installation costs:** Most of the necessary wires are already used so Wi-Fi controlled home automation system is in user friendly budget.

2. **Easy deployment, installation and coverage:** Almost from anywhere wireless nodes can be mounted. Installation process and make coverage is very easier so any one can control it.

3. **System scalability and easy extension:** Sending a remote system is particularly beneficial when, because of new or changed prerequisites, augmentation of the system is fundamental. As opposed to wired establishments, extra hubs don't require extra cabling which makes augmentation rather paltry. This makes remote establishments an original venture.

4. **Attractive benefits:** As placement of wireless node is very easy so attractive requirements can be managed very easily.

5. **Integration of mobile devices:** With the remote systems, partner cell phones, for example, PDAs and Smartphone with the robotization frameworks becomes conceivable all over the place and whenever.For our project we use android Smartphone by which we can control this project from everywhere.

2.4 Scope of Problem

It is a remote system project by which user can control his / her home automation system from everywhere without using camera for switching on or off of the any electrical appliance.

2.5 Challenges

- To make a flexible database which containing 0 & 1 for on and off.
- To make this project budget friendly.
- To make this project water pump

CHAPTER 3

REQUIREMENT SPECIFICATION

3.1 Business Process Modeling

The system is controlled by an android app through a database. The system also consists of two components. In this ESP8266 Wi-Fi Module based project we can control four or more channel relay outputs. This project is a basic Internet of Things (IoT).For reducing cost and making human effect we want to make home automation system with this technology.

The structure of this venture included coupling a few equipment parts and testing at the various phases of the usage.

Initially, a stream outline as appeared in figure 4.2 was produced for the plan demonstrating the procedures in question. The accompanying figure 5.1 shows the stream diagram of the framework.
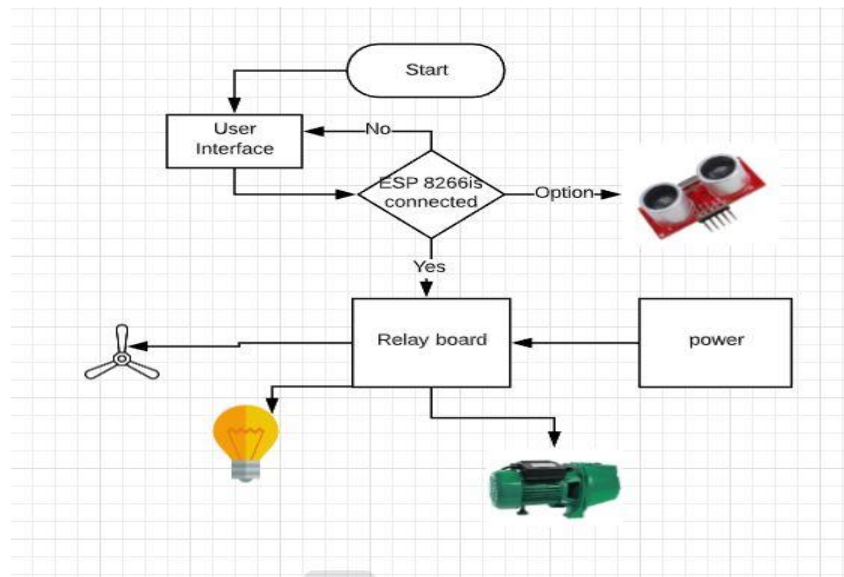
Figure 3.1: Flow chart of the system.

3.2 Requirement Collection and Analysis System Requirements

1. ESP8266 Wi-Fi Module
2. Relay Board
3. Power Cables
4. Bread board
5. Ultrasonic Sensor
6. Booster
7. Battery

Optional

1. Water Pump
2. Motor
3. Water Tank
4. Fan
5. Light
6. Android Phone

This range free Wi-Fi controlled home automation system will be able to have following feature of the end users.

1. Lighting Switches On and Off:

By this framework client can check in application whether his /her home's any room's light switch is on or off. By checking the light status client can turn on or off light switches.

2. Fan turns On and Off:

By this framework client can check in application whether his/her home's any room's fan switch is on or off. By checking the fan status client can turn on or off fan switches.

3. Water Pump Switches On and Off:

By this framework client can check in application whether his/her home's water siphon switch is on or off. By checking the water siphon status client can kill on or the switches.

4. Alarm on smart phone:

When water level will be 80%,90% ,then ringing alarm randomly on smart phone. Finally, when water level will reach the highest level that means 100% ringing the final alarm and the water pump will be automatically switch off.

3.3 System design

Our designed home automation system uses ESP8266 microcontroller as Wi-Fi module and works through 4 channel relays. First user does command via his / her smart phone then Wi-Fi module has been instructed and then works through the relay. This process is shown in figure 4.2bellow.
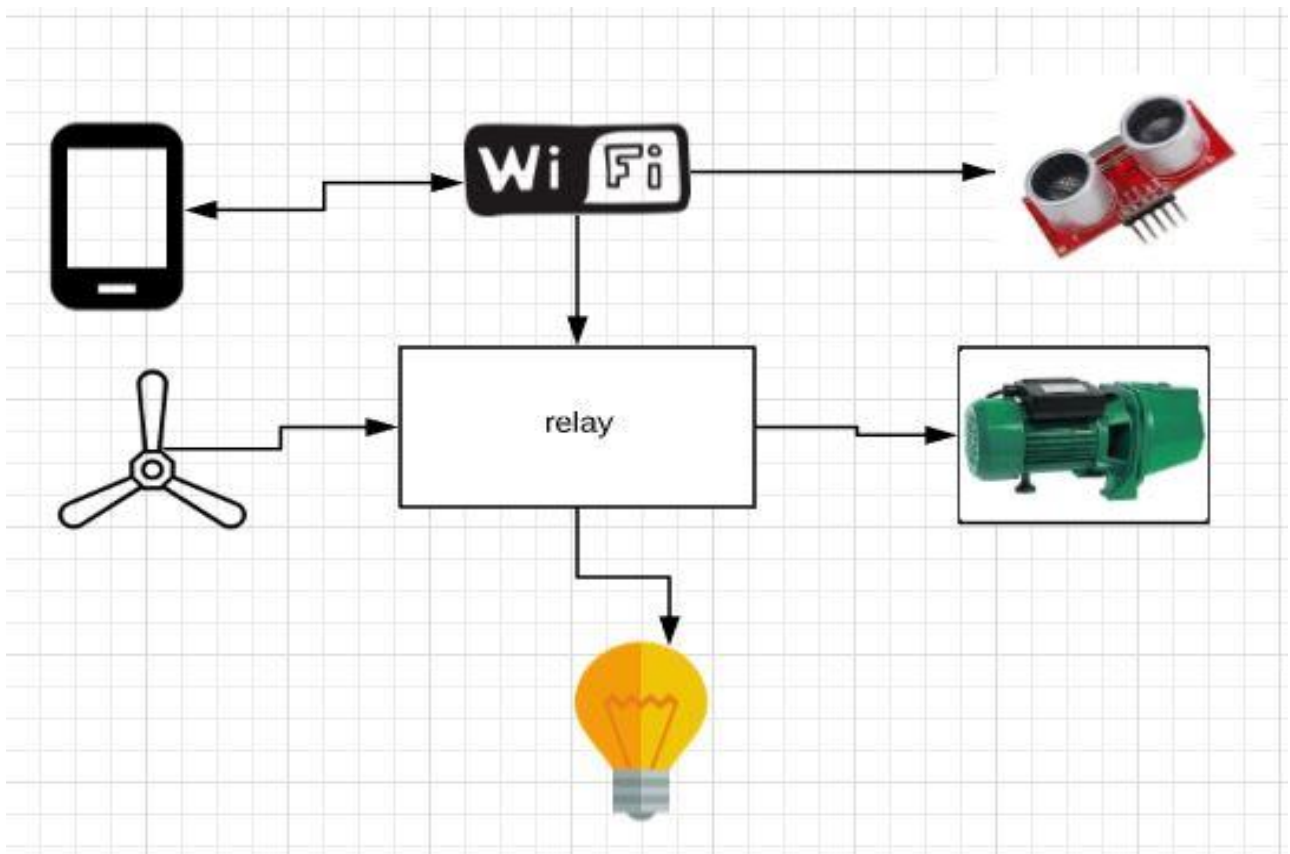

Figure 3.2: System Design of the proposed project

CHAPTER 4

DESIGN SPECIFICATION

4.1 Preliminary Consideration

Explicit intentional decisions in determination of suitable usage stages and equipment parts were made before the real plan of the undertaking work had done. For all choices minimal effort accessibility, unwavering quality, adaptability and effortlessness were given significant as need.

4.1.1 Selection of Implementation Platform

Now-a-days home mechanization framework can be executed. in many platforms. Of the current available platforms: Arduino, Power line, Rs232, Ethernet, Bluetooth, Wi-Fi, Infrared, GSM and Microcontroller were found most suitable because of low cost availability, reliability and simplicity. In those platforms Power line and Ethernet is too expensive and Bluetooth and Infrared are unreliable, so we used Wi-Fi Microcontroller platform.

4.1.2 Selection of Hardware components

The selection of hardware components for our project was based on low cost ability, flexibility and relability. We used ESP8266 Node MCU Module, relay, connection wire, adapter, light, fan, motor, water pump, electric wires.

4.2 Wi-Fi Module – ESP82366

The ESP8266 Wi-Fi Module is a self-sufficient SOC with encouraged TCP/IP show stack that can give any microcontroller access to your Wi-Fi sort out. The ESP8266 can do either promising an application or offloading all Wi-Fi systems association limits from another application processor. Each ESP8266 module comes pre-changed with an AT bearing set firmware, which suggests, you can just partner this to your Arduino contraption and get about as a lot of Wi-Fi limit

As a Wi-Fi Shield offers (and that is basically out of the case)! The ESP8266 module is an outstandingly sensible board with a beast, and routinely making, sort out.

This module has a shocking enough arranged dealing with and limit that enables it to be solidified with the sensors and other application unequivocal contraptions through its GPIOs with immaterial improvement early and irrelevant stacking during runtime. Its raised degree of on-chip joining thinks about irrelevant outside gear, including the front-end module, is required to incorporate unimportant PCB zone. The ESP8266 underpins APSD for VoIP applications and Bluetooth synchronization interfaces, it contains a self-adjusted RF enabling it to work under each working condition, and requires

no outside RF parts.

There is a basically incomprehensible wellspring of data accessible for the ESP8266, all of which has been given by stunning framework support. In the Records an area underneath you will discover different favorable circumstances for help you in utilizing the ESP8266, even heading on the most proficient method to changing this module into an IoT (Web of Things) course of action [3]. The going with figure 4.4 shows a Wi-Fi module ESP8266.
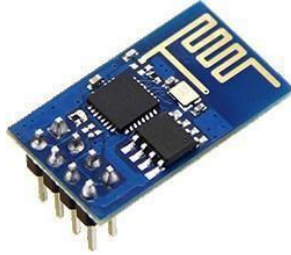

Figure 4.1: Wi-Fi module ESP8266

4.2.1 Features of ESP8266

ESP8266 Wi-Fi module has such an enormous number of features in it, for instance,

- 802.11 b/g/n
- Wi-Fi Direct (P2P), delicate AP
- Integrated TCP/IP convention stack
- Integrated TR switch, balun, LNA, power enhancer and coordinating system
- Integrated PLLs, controllers, DCXO and force the board units
- +19.5dBm yield power in 802.11b mode
- Power down spillage current of <10uA
- 1MB Flash Memory
- Integrated low force 32-piece CPU could be utilized as application processor
- SDIO 1.1/2.0, SPI, UART
- STBC, 1×1 MIMO, 2×1 MIMO
- A-MPDU and A-MSDU collection and 0.4ms watchman stretch
- Wake up and transmit parcels in < 2ms
- Standby power utilization of < 1.0mW (DTIM3).

This module is really small but it can be used in so many Wi-Fi based projects for the features it has.

4.3 Relay Board

A hand-off is a sort of switch which is constrained by an electric stream. A hand-off makes it conceivable for a low voltage low current circuit to switch a high voltage similarly as high current gadget securely - for example, a little battery-filled light marker circuit can be used to control tremendous mains controlled security lights through a hand-off.

Rather than including a mains evolving hand-off to circuits authentically, it is endorsing to use a hand-off board - for instance a financially created circuit board fitted with a hand-off, Drove marker, back EMF keeping away from diode, and easy to use screw-in terminal affiliations. These are presently open more productively than we can make them ourselves.

The least mind boggling hand-off board has just one exchange, one Drove used to show the status of the switch, one covering diode to foresee back EMF from hurting related equipment, and screw-in terminals for the voltage inputs and for the NC, NO, and COM relationship on the hand-off. Figure 4.4 shows a clear move.
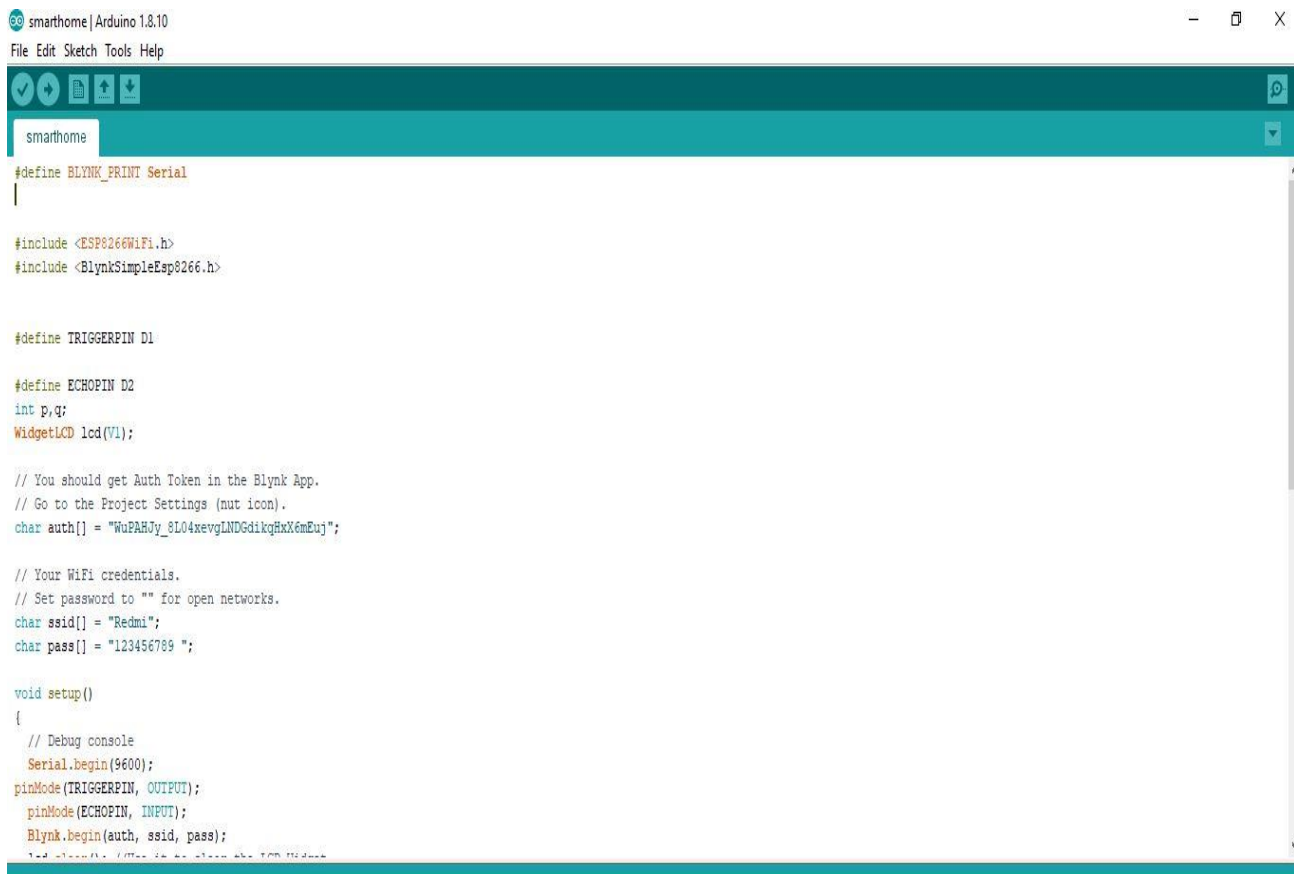
Figure 4.2: A simple 4 channel relay.

Presented above is such a hand-off load up, that can acknowledge an info voltage of 12 VDC and 24 VDC, will switch mains power at flows of up to 8 Amps, and is twofold shaft so one can utilize it to turn two gadgets on or off simultaneously.

For some undertakings there will be more than one transfer required - for instance in sun powered trackers where 2+ (high current) engines must be controlled if the sun powered boards fitted to the tracker are to pursue the Sun\'s movement crosswise over AND here and there the sky. For such inevitabilities numerous transfer (otherwise known as multi-channel) hand-off sheets are accessible. These can have anything from 2 to 16 transfers fitted to a similar circuit board to make it simple to keep everything sheltered and clean. Figure 4.6 shows an a board with eight transfers.

4.4 Arduino IDE:

For this situation we can utilize diverse IDE like Microsoft's visual studio yet we picked this since this IDE is considerably more coordinated with Arduino than visual studio. Arduino IDE is likewise very easy to use and simple to utilize. Figure 4.5 shows a screen capture of Arduino IDE.

Figure 4.3: Screenshot from Arduino IDE

4.5 Ultrasonic Sensor:

Ultrasonic sensors are such an acoustic sensor divided into three general characterizations: transmitters, authorities and handsets. Transmitters convert electrical sign into ultrasound, recipients convert ultrasound into electrical sign, and handsets can both transmit and get ultrasound.

Thusly to radar and sonar, ultrasonic transducers are used in systems which survey centers by decoding the reflected sign. For example, by evaluating the time between sending a sign and tolerating a resonation the partition of a thing can be resolved. Uninvolved ultrasonic sensors are basically recipients that recognize ultrasonic fuss that is accessible under explicit conditions.

This module includes ultrasonic transmitters, receiver and control circuit. Its stable performance and high ranging accuracy make it a popular module in electronic market. There are 5 pins out of the module, VCC, Trig, Echo, GND and OUT. Best performance in 30 degrees angle; Electronic brick compatible interface; Dual transducer;

Figure 4.4: Ultrasonic sensor

4.5.1 Feature of ultrasonic sensor:

- Voltage: DC 5V;
- Current: 15mA;
- Ultrasonic Frequency: 40K Hz;
- Maximal Range: 500cm;
- Minimal Range: 2cm;
- Resolution: 1cm;
- Response time: 100MS;
- Output signal: 5V TTL level;
- Trigger Pulse Width: 10µs;
- Operating temperature: -10--+60degree;
- Storage temperature: -20--+80degree;
- Dimension (L x W x H): Approx. 44 x 20 x 18 mm;

4.6 Web Interface(Controller)

One must have this webpage in his/her mobile in order to operate this project. Figure 4.6 shows the web interface.
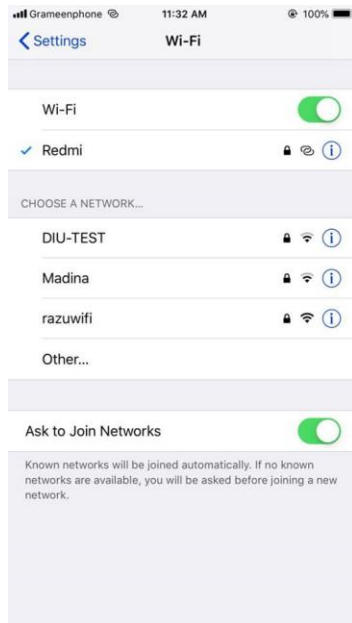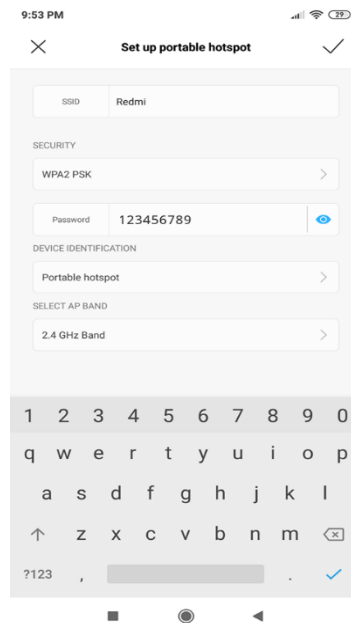
Figure 4.5: Wi-Fi name   Figure 4.6: Wi-Fi configure page
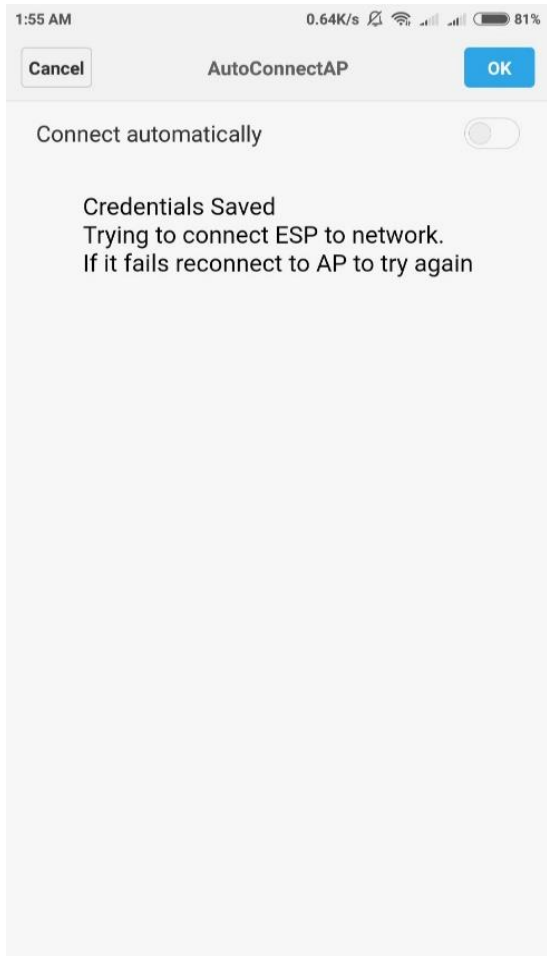
Figure 4.8: Established with Wi-Fi network
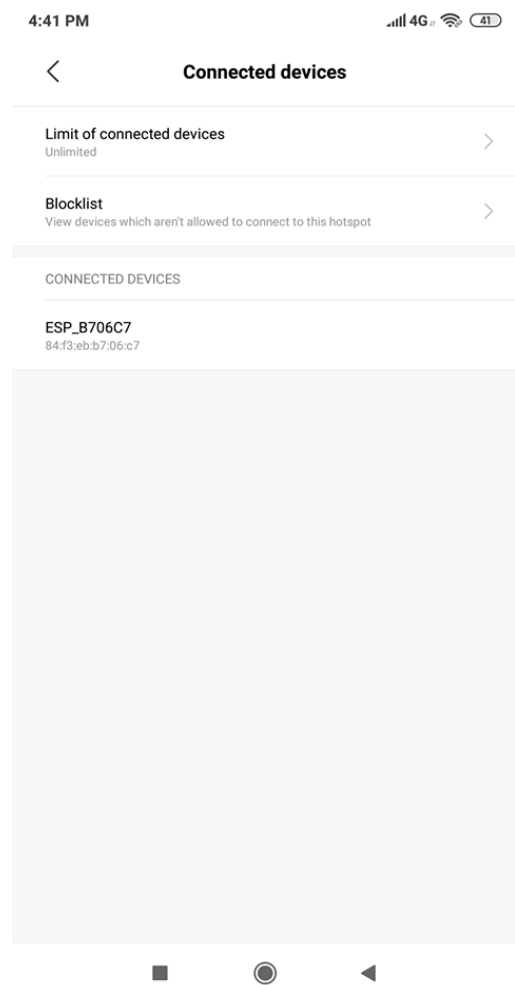
Figure 4.7: Connect with Wi-Fi network

CHAPTER 5

IMPLEMENTATION AND TESTING

5.1 Writing Diagram /Layout

The following figure 5.1 shows the full wiring diagram/layout of the system.

Figure 5.1: Wiring diagram of the system

5.2 Code

In this project we needed to utilize a sketch for Arduino and esp8266 Wi-Fi module where I worked with sequential ports and AT Commands. I utilized 11,12 and 13 sticks at first for this undertaking yet it is likewise entirely Possible to control more sticks by just including the underlying pinMode and computerized Write lines for that stick.

For controlling the mechanization framework through ESP8266 Wi-Fi module I made a straightforward database and android application.

5.2.1 ESP8266 Code Explanation

Here is how the Arduino Sketch works:
Whenever I click on a button in the HTML page a GET request is sent to the ESP8266

- To know when request is in progress, the Arduino looks for the string "+IPD," in the Serial buffer using Serial find.
- The code then reads the next character (the connection id, 0 in the example requestabove).TheconnectionIDisneededtoknowwhichconnectiontoclose (different simultaneous requests have a different ID).

- Nextwegetthepinnumberbylookingforthestring"?pin="intheserialbuffer, once again using Serial find
- Now that we have the pin number we know which pin toggle

5.3 Implementation

Here are some pictures of the developed prototype. Figure 5.4 shows the developed prototype of our project.
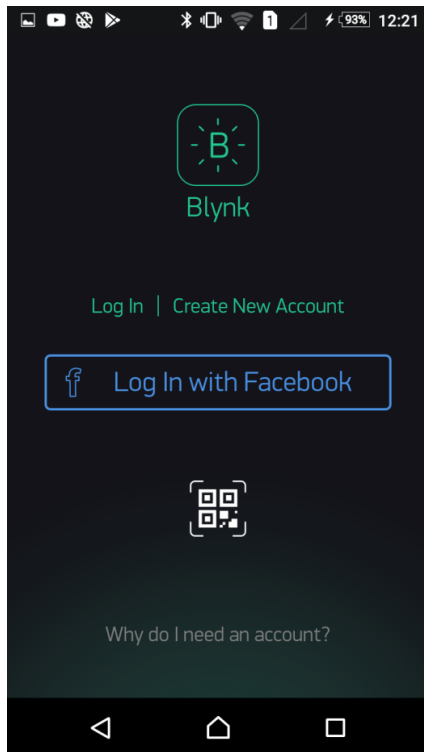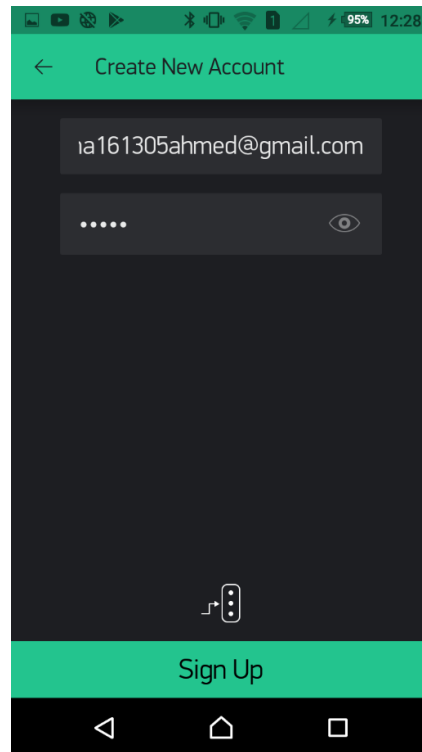
Figure 5.2: Home page
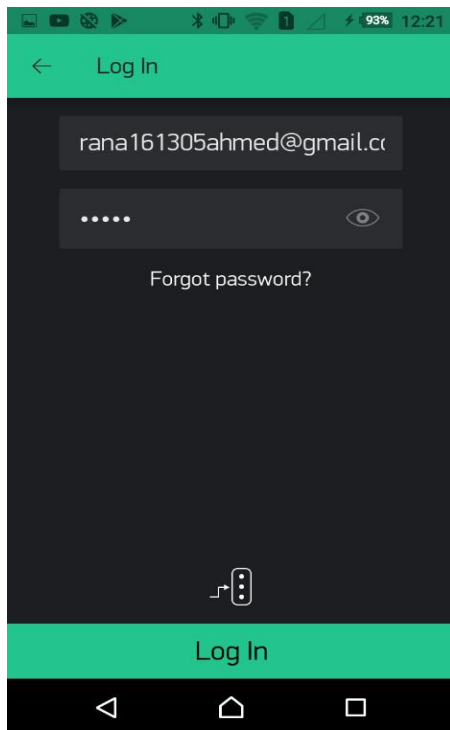

Figure 5.3: Register page

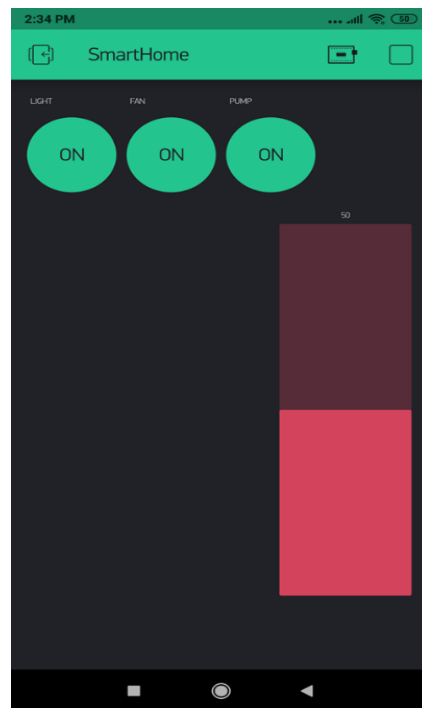

Figure 5.4: Log in page

Figure 5.5: Switch Button

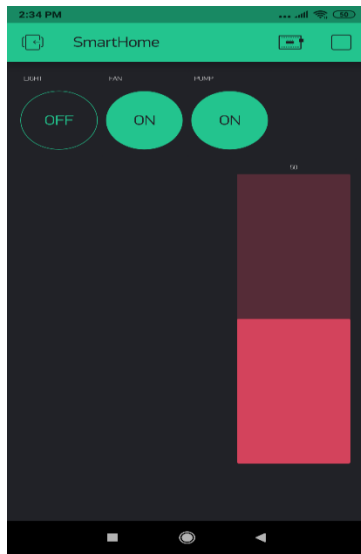Figure 5.6: Initial stage of project
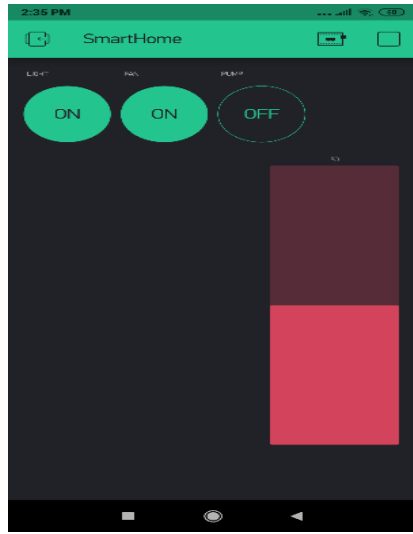

Figure 5.7: Light on

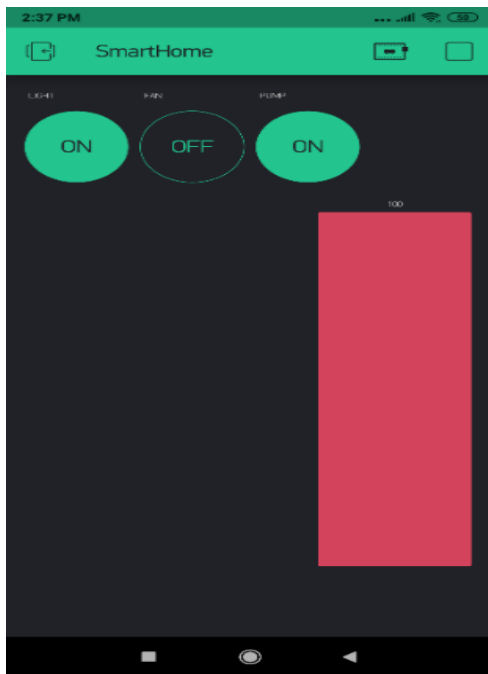Figure 5.8: Water pump on

Figure 5.9: Fan on

Figure 6.0: Water pump, light and fan are on

CHAPTER 6

CONCLUSION AND FUTURE WORK

6.1 Conclusion

It is discernible from this task a home robotization framework can be reasonable by utilizing locally accessible cheap segments and can be utilized for controlling different home apparatuses like water siphon, fan, light, forced air system, TV and so forth from anyplace. Furthermore, additionally, the necessary parts are minimal enough and less that the segments can be bundled in a little unspectacular holder.

This venture home robotization framework was actualized a few times and it was effective to control light and fan utilizing the application.

In this way, the home robotization framework can likewise be made by utilizing Bluetooth, infrared beam and WAP (Wireless Application Protocol) and the adjustments in the plan will likewise be less and it will at present have the option to control different home apparatuses. Furthermore, this task can be change in size or scale and it is likewise versatile.

6.2 Limitations

For implementing this project, a smart phone is must need to control the automation system and a holder to contain this project.

6.3 Future Work

- ❖ We will work more to control more home appliances like full air-conditioning systems.
- ❖ We will try to use advanced user interface.

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REFERENCES:

1. Study on ESP8266,<https://en.wikipedia.org/wiki/ESP8266 >, [last accessed on 02-10-
2019 at 12.30 pm.]

2. Study on 4 Channel 5v Relay,
<http://wiki.sunfounder.cc/index.php?title=4_Channel_5V_Relay_Module>,[last accessed
on 02-10-2019 at 12.30 pm.]

3. Study on esp8266-wifi-5v,<https://www.hackster.io/makerrelay/esp8266-wifi-5v >,
[last accessed on 02-10-2019 at 12.30 pm.]

4. Study on Relay,<https://en.wikipedia.org/wiki/Relay>, [last accessed on 02-10-2019 at
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