

Wireless Home Automation using IoT

Swati Patil

Department of Electronics
&Telecommunications Engineering

Bharati Vidyapeeth College of
Engineering, Navi Mumbai
kadamswatis@gmail.com

Hrishikesh Thakare

Department of Electronics
&Telecommunications Engineering

Bharati Vidyapeeth College of
Engineering, Navi Mumbai
hrishikesh.thakare2018@gmail.com

Rohit Sharma

Department of Electronics
&Telecommunications Engineering

Bharati Vidyapeeth College of
Engineering, Navi Mumbai
sharmarohit1845@gmail.com

Subhranil Sengupta

Department of Electronics
&Telecommunications Engineering

Bharati Vidyapeeth College of
Engineering, Navi Mumbai
subhranil.sengupta2000@gmail.com

Julfikar Shaikh

Department of Electronics
&Telecommunications Engineering

Bharati Vidyapeeth College of
Engineering, Navi Mumbai
julfikarhshaikh@gmail.com

Abstract—The Internet of Things, or IoT in brief, refers to the linking of physical objects to the Internet. We already use the Internet of Computers, where data is saved and transmitted via computers and electronic devices, but the Internet of Things (IoT) aims to link things to the internet and collect real-time data from them in order to make human life more comfortable and easy. Our proposed model is a Home automation system which is focused on aspects: Security, Customization & Energy Efficiency. With the help of MIT App Inventor, we have developed our custom-made Android application which provides an user-friendly interface to control all the appliances using voice command.

Keywords— IoT, Home Automation, Security, Energy management

I. INTRODUCTION

Home automation is a rapidly growing technology and is expected to grow multi-folds in upcoming years. Internet of things or IoT plays a major role in the Home Automation System as it allows things to be connected to the internet. In our proposed model we have built our Home Automation system with the help of IoT where devices are interconnected wirelessly with the help of Bluetooth. We have covered various aspects in our prototype which includes: security, customization and energy management and have tried to overcome the loopholes present in the existing home automation systems available in the market. The devices can be controlled just with the help of voice command through our app which is developed using MIT App Inventor.

II. PROBLEM STATEMENT

Existing Home Automation systems lacks in some or the other aspect of security, customization and energy management. There is no proper model which covers all these aspects which is a point of concern for the users. Security is one of the major concerns revolving around the Home Automation System where users often face issues like hacking, error in sensors, delayed output, failure in operations, etc .

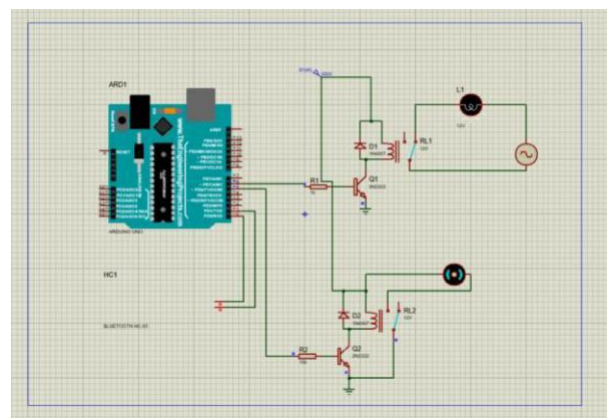
III. IMPLEMENTATION SETUP

A. Components required

1. Arduino UNO
2. ESP8266
3. Loads – Light bulb, fan
4. Relay
5. Solar Panels
6. I2C
7. Sensors (for security) – DTH11, MQ2, Ultrasonic sensor, PIR, etc
8. Android Device

B. Circuit Diagram

For the virtual demonstration we built the system using the Proteus software. The circuit diagram below shows the connection of the entire system where loads are connected to the Arduino UNO Board through relays & resistors. This was the initial phase of our system where we tested it online and later on fixed the bugs in our physical model.



C. Costing

Sr No	Components	Cost
1	Arduino UNO	650
2	8/10 PCB	120
3	Relay	180
4	Solar Panel	250
5	LCD Display	200
6	ESP8266 Wifi Module	200
7	Buck Convertor	150
8	L298	130
9	I2C Module	200
10	Lithium Battery	120
11	Adapter	280
12	Sensors (IR, MQ2, DHT11, etc)	1500
13	Wire & Cables	100
14	Load	520
Total		4600

IV. MIT APP INVENTOR

For the interface, we've built our customized app using MIT App Inventor. The app is capable of passing voice commands to the Arduino UNO board which will further control all the devices. MIT App Inventor is an IDE which allows building apps using a web browser. The IDE consists of 2 major blocks i.e Designer & Blocks.

The Designer block is majorly used for setting up the UI part of the app where various buttons, textbox, etc can be added to the app. The Designer block basically helps in building the front-end of the app. The 'Block' section is used to feed the logic part where the back-end operations are handled. It is the backbone of the app as all the functionalities are declared here in the form of blocks.



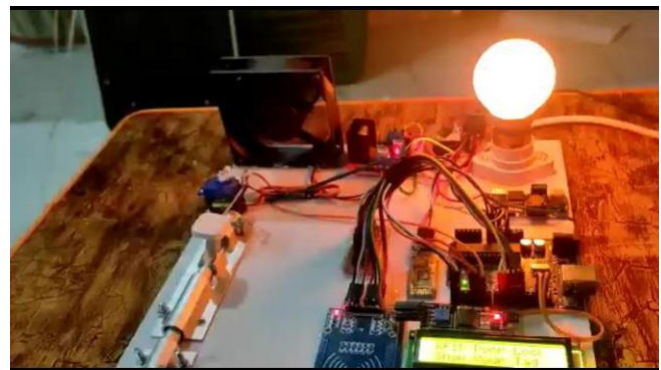
V. WORKING

The below image represents the physical model of our system. We have tried building our own model of Home Automation System where devices can be controlled wirelessly using voice commands. The voice input from the user through the developed app is transmitted to the Arduino via Bluetooth. The Arduino then controls all the devices connected via the relay. When a specific voice command is matched, based on the code it then turn on or off the

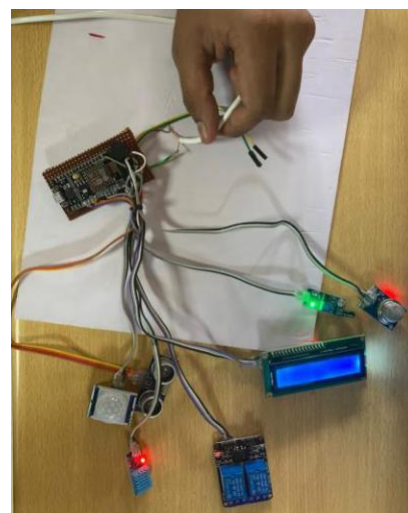
devices respectively. The model also has a provision of Door lock system which is based on Radio Frequency Identification of RFID. The door lock can be controlled using the RFID tag or the card provided. Once the door is unlocked, then only all the connected appliances can be accessed hence the internal devices always remains secured as there cannot be any external interference until the door is unlocked.

The model also has an attached LCD display which shows the status of all the connected appliances. It shows the lock/unlock status of the door, light and the fan.

In case of power failure, we have a backup power source which runs on solar energy which is capable of running the entire system until the main power supply comes back. This marks the energy efficiency point of model. Solar energy is a renewable source and does not require additional supply hence our model runs of minimal energy.



For the security aspect, we have assembled all the sensors together on a board which takes care of all the security related activities. The system is capable of detecting any object, fire, flame, gas leakage, temperature, humidity, etc. All of these sensors together combined function with the core of our model and make the entire system secured. All of the sensors pass their data wirelessly through the ESP8266 wifi module present in the system. In case of any unusual accidental act, once the sensors detect it, the buzzer turns on and the user is notified about the same on the app as well. If the user is not able to respond to the security notification, the entire system would be turned off after a set period of time.



VI. ADVANTAGES

The proposed model has the following advantages over the existing models present:

1. **Security** – As mentioned above, the model is secured in multiple ways. Firstly, in order to establish a connection with our system, a pin is required for the Bluetooth connection. Next the system internal devices can only be accessed once the door is unlocked hence there is no chance of any external interference. We also have a set of sensors which sense various environmental conditions such as fire, humidity, temperature, etc.
2. **Energy Efficient** – With the addition of solar panels as a backup source, our system runs on minimal energy and hence its cost-effective as well
3. **Customization** – The developed application is very easy to use and any age-group can control the devices easily without any major difficulties.

VII. FUTURE SCOPE

Using our model of Home Automation System, various appliances can be controlled easily just with the help of voice command in a secured and user-friendly way. In future with proper guidance and adequate planning & budget, this model could be scaled up to a complete Home Automation Solution.

VIII. CONCLUSION

With rapid progress in technology, Home Automation is expected to grow multi-fold. These systems have the potential to reduce human effort to an extent. It also helps in operating & securing the home in a smarter and a better way. Our prototype is a step towards rectifying the

loopholes present in existing systems in terms of security and customization.

ACKNOWLEDGMENT

This research work is being carried out as part of our Final Year Project under Department of Electronics & Telecommunications, University of Mumbai

REFERENCES

- [1] S.Anusha, M.Madhavi, R.Hemalatha, "HOME AUTOMATION USING ATmega328 MICROCONTROLLER AND ANDROID APPLICATION", International Research Journal of Engineering and Technology, Volume: 02 Issue: 06 June-2015
- [2] R. Ramlee, D. Tang, and M. Ismail, "Smart home system for disabled people via wireless bluetooth," in System Engineering and Technology (ICSET), 2012 International Conference on. IEEE, 2012, pp. 1-4.
- [3] S. Kumar and S. R. Lee, "Android based smart home system with control via Bluetooth and internet connectivity," The 18th IEEE International Symposium on Consumer Electronics (ISCE 2014), JeJu Island, 2014, pp. 1-2. K. Elissa, "Title of paper if known," unpublished.
- [4] S. M. Brundha, P. Lakshmi and S. Santhanalakshmi, "Home automation in client-server approach with user notification along with efficient security alerting system," 2017 International Conference on Smart Technologies for Smart Nation (SmartTechCon), Bangalore, 2017, pp. 596-601
- [5] R. S. Ransing and M. Rajput, "Smart home for elderly care, based on Wireless Sensor Network," 2015 International Conference on Nascent Technologies in the Engineering Field (ICNTE), Navi Mumbai, 2015
- [6] Sonali Sen, Shamik Chakrabarty, Raghav Toshniwal, Ankita Bhaumik, "Design of an Intelligent Voice Controlled Home Automation System", International Journal of Computer Applications (0975 – 8887) Volume 121 – No.15, July 2015
- [7] Mukesh Kumar, Shimi S.L., "Voice Recognition Based Home Automation System for Paralyzed People", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 4, Issue 10, October 2015.