BLUETOOTH CONTROLLED HOME AUTOMATION SETUP USING ARDUINO

Yuvraj Singh[1*], Nurnabi Sk[2], Shubham Mitra[3], Ratri Bhattacharjee[4], Soumendra Pain[5], Pijush Kanti Ghosh[6], Kaushik Ghosh[7]

[1]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: rajyuvraj2003@gmail.com

[2]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: nurnabisk426@gmail.com

[3]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: subhammitraindia98@gmail.com

[4]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: bhattacharjeerattri@gmail.com

[5]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: soumendra.pain@bcrec.ac.in

[6]Department of Computer Science & Technology, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: piyush.ghosh@bcrec.ac.in

[7]Department of Electronics and Tele-Communication Engineering, Dr. B. C. Roy Polytechnic, Durgapur-713206, West Bengal, India, Email ID: kaushik.ghosh@bcrec.ac.in

Abstract: The main objective of designing this project is to automate appliances of interest. During the past few years, immense hard work has been placed to automate objects which essential human involvement earlier. One of the processes is Home Automation. This manuscript aimed at controlling appliances in our home with the help of smartphones. This is designed by interfacing Arduino Uno R3 with a Bluetooth module and connecting the Bluetooth module with the smartphone thereby switching the control of appliances directly with a smartphone. A relay is also used to switch on or off the appliances as per the command given by the user.

Key words: *Arduino uno, Bluetooth Module, Solid State Relay, Smartphone*

1. INTRODUCTION

Home automation is an electronic device that is automatically controlled and can be used in

our home. This device is connected to the Internet, which allows it to be controlled remotely. With home automation, devices can trigger one another automatically via an app or voice assistant. For example, it can be put the lights on a pre-set schedule so that they turn off when not required [1]. For instance during midnight, or it can have the thermostat turn the A.C. up about an hour before returning to work to acclimatize with humid conditions prevailing outdoors. Hence, home automation makes life more convenient and can even save money on heating, cooling, and electricity bills [2].

In this setup Arduino uno board, HC - 05 Wireless Bluetooth Module, Solid state relay, Android application have been used.

2. LITERATURE SURVEY

This part, discuss different Home Automation method with their features, they have. Smart home automation system can be designed based on Bluetooth technology by IMohammed D. Albakhait et al [3]. In this device, relay module can be used to connect the electrical switches of home appliances. Arduino Uno can be used as the microcontroller to control the relay on or off. Bluetooth module HC-06 can be used to transmit relay status and user commands between the microcontroller and a smartphone. Besides this, it can also be also illustrated the Bluetooth-based home automation system by using the HC-05 Bluetooth module by B. P. Kulkarni1 et al [4]. Prashant Kumar et al. [5] designed home automation with an air quality monitoring system. In this design, Raspberry Pi and Arduino Mega are used as microcontrollers to connect different electrical devices and sensors. Arduino Uno is used to monitoring the inside home environment, it detects several parameters of Carbon Monoxide, Carbon Dioxide, the concentration of Particulate Matter 2.5 and 10, humidity and temperature and by using TGS2442 sensor, TGS4161 sensor, DHT22 sensor, and SDS021 sensor respectively. Raspberry Pi is useful to connect and control home appliances. The air quality data and the position of all connected home appliances are uploaded and kept in a cloud database. Mobile Applications and Web portals are used to monitor the environment of the home and fetch data from the cloud. In [6] authors designed a cost-effective voice recognized smart home automation system. Arduino Uno is used as a microcontroller to connect the relay module. Users can provide a voice command to the smartphone to turn on or off the relay through the HC-05 Bluetooth module and also control the home appliances. Alina Munir et al. [7] designed a face and voice-recognized home automation.

In this module, Arduino Uno and Raspberry Pi both are used as microcontrollers. This module is used at the gate of an apartment to lock or unlock the door.

3. PROPOSED METHOD

In this automation device Arduino Uno, which is very useful for automation, is used. Arduino Uno is an embedded system, by which a computer-based system and the projected model are connected so that it can be controlled by using programming. First of all, Arduino Uno is connected with the HC-05 Bluetooth module which can receive the instructions from a smartphone device that is used by the user. The HC-05 Bluetooth module is connected with Rx and Tx pins of Arduino Uno so that it can provide instruction to the microcontroller. Then, Arduino Uno is also connected with the relay, which can receive the signals from Arduino Uno and perform the operation as switching. In Arduino Uno, programming code has to be uploaded so that it can control the relay drive [8].

Bluetooth technology is a wireless transmission at a small distance. So, this Bluetooth technology can be used in personal area networks such as home environment, where most of the appliances can be interconnected and monitored using a microcontroller with Arduino Uno and smartphone [9]. In this automation device, there are five integral parts. They are Arduino Uno, HC-05 Bluetooth module, Relay drivers and android application used in the smartphone. These five integral parts are shown in the block diagram in figure 1.
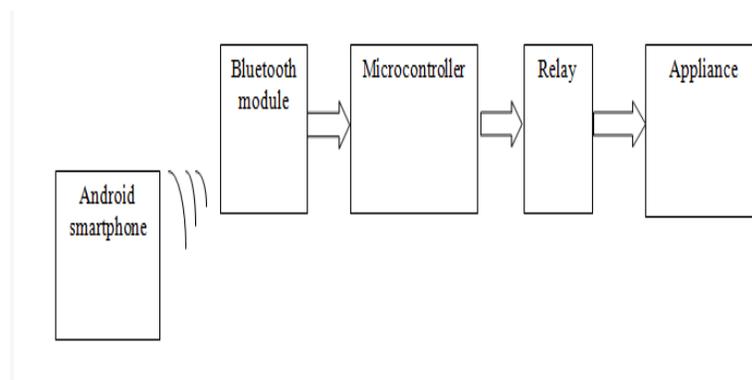

Figure 1 Block diagram of Bluetooth controlled Home Automation Setup Using Arduino

4. FLOW CHART AND PROCESS

The flowchart of the device is shown in Figure 2. The process of the device is described step

by step below.

Step 1: In the first step, the application must be run which has been installed already on the smartphone.

Step 2: Then HC-05 Bluetooth module is selected and interfaced with the application.

Step 3: If the module is connected, then select the "switch mode" option from the application.

Step 4: Provide the instruction or command as 1 or 0. (1 for switch on and 0 for switch off).

Step 5: After providing the command the respective command is being transmitted to the Arduino Uno via Bluetooth module.

Step 6: In the last step, if the command is 1 then the appliance is switched on via relay module else the appliance is turned off when provided 0.
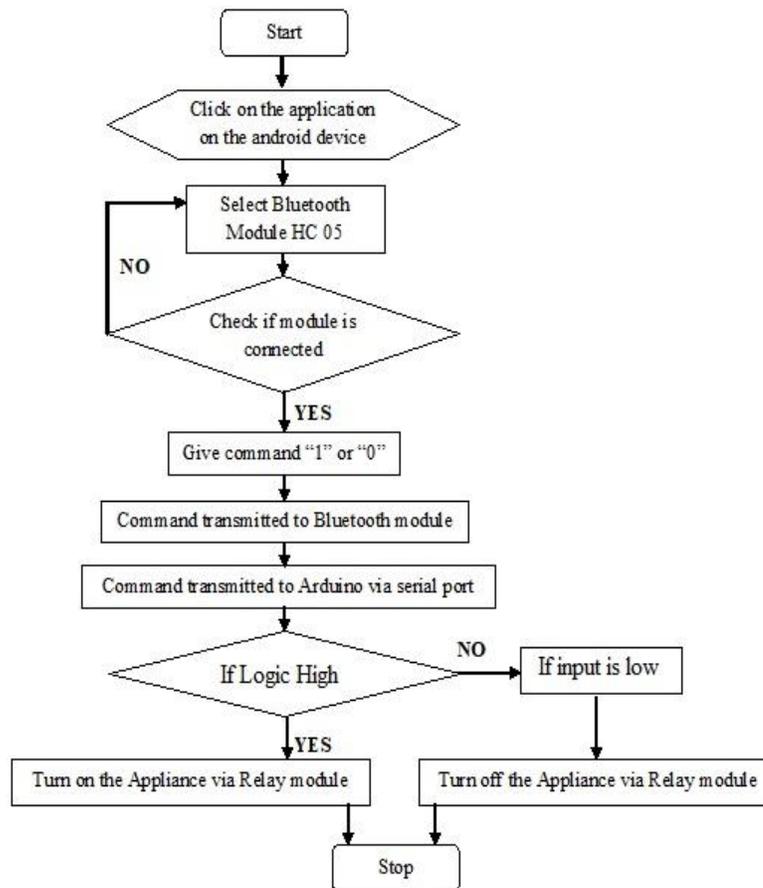

Figure 2 Flowchart of Bluetooth controlled home automation

5. RESULTS AND DISCUSSION

According to the discussed method, the outcome of this device is to develop home automation. By this project, a home automation device has been developed, so that home appliances like

light, fan, air-condition, etc. can be controlled easily. The main objective of this device is also, to get smart automation at low cost. This system is easy to handle by the user. The developed prototype is given in figure 3.
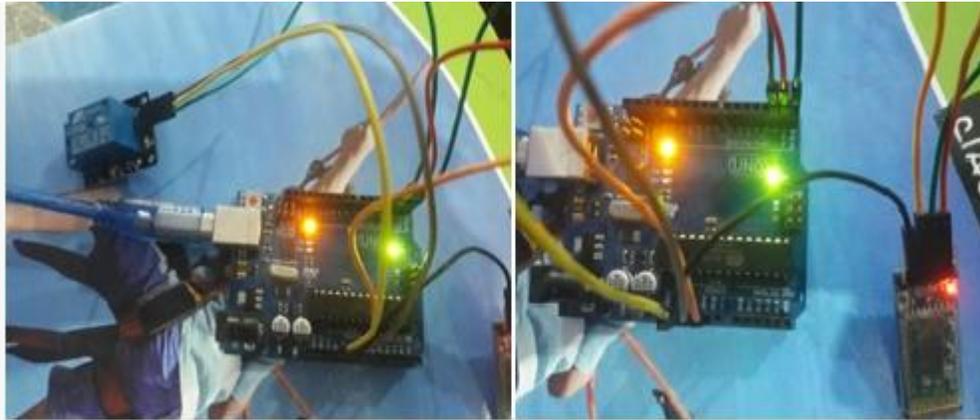

Figure 3 Developed prototype of Automation system

6. ADVANTAGES

The main advantages of this device are, it is user-friendly and cost effective. Everything is automated by a microcontroller, so it is very easy to use. This is controlled by smartphone application so that no extra training is required. Small alternation can be done as per the requirement. And also, all the home appliances can be controlled by one android application.

7. CONCLUSION

Therefore it can be concluded that the manuscript is all about Home automation, which is a kind of electronic device which can control home appliances. The manuscript is also deriving how home automation is designed. It also discussed methodology and application. The created device is compact in size and cost-effective. The use of this manuscript is to develop a device that saves the electricity and human efforts.

REFERENCES

1. David, Nathan and Chima, Abafor and Ugochukwu, Aronu and Obinna, Edoga, "Design of a home automation system using arduino", International Journal of Scientific & Engineering Research, vol. 6, no. 6, pp. 795-801, 2015.

2. Anandan, R, "Wireless home and industrial automation security system using gsm", Journal of global research in computer science, vol. 4, no. 4, pp. 126-132, 2013.

3. M. D. Albakhait, M. S. Hasan, and A. A. Hajer, "Bluetooth Based Smart Home Automation System using Arduino Uno Microcontroller," Journal of Engineering and Applied Sciences, vol. 14, no. 17, pp. 6352–6357, 2019.

4. M. B. P. Kulkarni, "Home Automation using Bluetooth Control Technology," International Journal for Research in Applied Science and Engineering Technology, vol. 7, no. 4, pp. 2136–2140, 2019.

5. P. Kumar, A. Agarwal, G. Purohit, and K. S. Raju, "Intelligent Home with Air Quality Monitoring," SSRN Electronic Journal, 2019.

6. S. Bajpai and D. Radha,"Smart Phone as a Controlling Device for Smart Home using Speech Recognition," 2019 International Conference on Communication and Signal Processing (ICCSP), pp- 0701—0705, IEEE, 2019.

7. Munir, Alina, S. Kashif Ehsan, SM Mohsin Raza, and Mumajjed Mudassir, "Face and speech recognition based smart home." 2019 International Conference on Engineering and Emerging Technologies (ICEET), pp. 1-5. IEEE, 2019.

8. M. Muthukumaran, M. Kannusamy, M. Kanagaraj, A. Guruveswaran, "Bluetooth based Home Automation using Arduino", IJERT, vol.7, 2019.

9. Wibowo Agus, "Communication Concept Between Bluetooth As a Master and Slave To Exchange Digital Information", Int. J. Eng. Adv. Technol, vol. 9, no. 2, pp. 5468—5470, 2019