Bluetooth based Home Automation System Using Arduino

Eshitaa Puri[1], Anjali[2], Mandeep Singh Narula[3]

[1] *Student, Dept. of ECE, Jaypee Institute of Information Technology, Noida, India*
[2] *Student, Dept. of ECE, Jaypee Institute of Information Technology, Noida, India*
[3] *Assistant Professor, Dept. of ECE, Jaypee Institute of Information Technology, Noida, India*

ABSTRACT - The main objective of this project is to develop a home automation system using Arduino and a Bluetooth remote control board for any Android OS smartphone. As technology is advancing so houses are also going smart. Modern houses are a little bit slower from a common switch to a central control system, which includes remote control switches. Currently, standard wall switches are available in different parts of the house which makes it difficult for the user to get close to them to work. It becomes more difficult for adults or the physically disabled. To overcome this, the Bluetooth module is connected to the Arduino board at the receiver's end while at the end of the sender, GUI mobile app sends commands ON / OFF to the recipient where the luggage is connected. By touching the specified GUI area, loads can be turned on / off. Loads are driven by the Arduino board using optoisolators and thyristors using triacs.

Key Words: Arduino Uno Controller, Internet of things (Iot), Home Automation, Bluetooth Module, GUI

I.   INTRODUCTION

Home automation refers to the automatic and electronic control of the household, work, and electrical appliances. In principle, it means you can easily control the resources and features of your home online to make life easier again you are safe, and you spend less money on mortgages. Home automation is a network of hardware, communications, and electronics links that work to connect everyday devices via the Internet. Each device has sensors and is connected via Wi-Fi, so you can manage your smartphone or tablet whether you're at home, or miles away[1].

The Internet has become an integral part of human life and educational life otherwise they are nothing. Internet of Things (IoT)[2-5] devices are not only in control but also monitor electronic, electrical, and electronic equipment systems used for different types of infrastructure. These devices are connected to a cloud server controlled by a single user (also known as an admin) which is transmitted or notified to all authorized users connected to that network. Various electronics as well as electrical devices are connected and remotely controlled through the different network infrastructures. Web browsers available on laptops or smartphones or any other smart how to use switches, easily remove the difficulty of using the switch directly. Now, a per-day although smart switches are available to prove it very expensive, and because of their performance we need more devices like harp or switch. As there is a rapid change in wireless technology several communication devices are available found in the market that solves the purpose of communication between the device and the small controller. From Bluetooth to Wi-Fi, from ZigBee to Z-wave and NFC both solve the purpose of communication in the middle. RF and ZigBee are used for many wireless application networks.

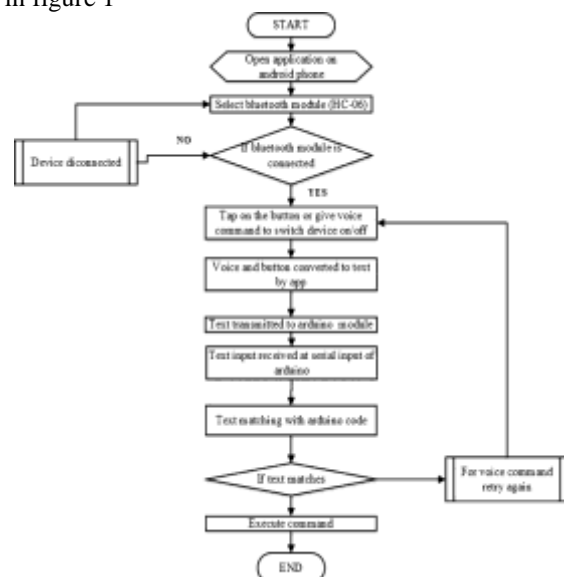The flowchart on which the project works is mentioned in figure 1

Fig -1: Flowchart for Bluetooth based home automation system

Widespread use of household appliances can be seen in cold cities like Milwaukee, where people set

---

the heat of the house to turn off when they leave and turn on the heater 15 minutes before they returned. The program is known as HVAC and is the best home remedy default. In an era of wireless technology such as Bluetooth, WiFi, Zigbee, and GSM, users are looking for household electrical appliances to be connected wirelessly. Each of these wireless technologies has its own set of features importance and details. This project successfully utilizes available Bluetooth 2400 Hz frequency, 100 m range, and speeds of approximately 3 Mbps.

There are a few concerns to consider when designing a home automation system. The system must be designed to integrate new resources so that these resources are appropriate and not a problem in the future. On the host side, the system should be easy to use, so that devices can be easily rented and controlled. In the event of future problems, the visual interface of the system should provide diagnostic services. Lastly, the system should not be too expensive to be widely used by anyone in the market.

Home automation was first introduced to the world market in the 1970s, but failed to meet human expectations and failed. There were various related reasons for the failure of the home automation system. The system was not easy to use and was inexpensive successfully. Right now, the most important point to keep in mind when designing a home automation system is that should be economical and easy to install. Figure 2 and figure 3 show the block diagram and the circuit diagram for this project.
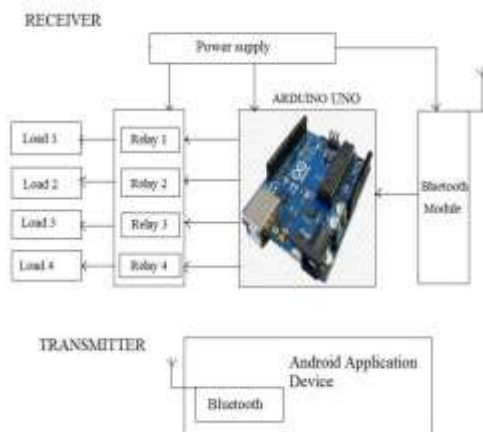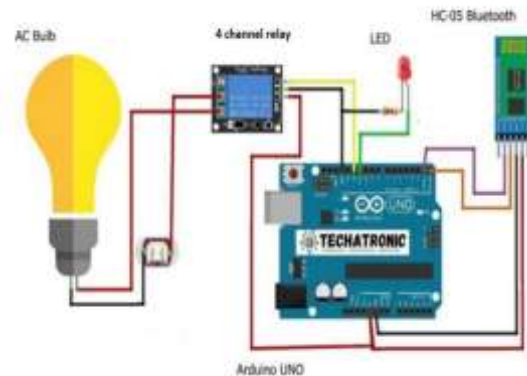

Fig -2: Block diagram

Fig -3: Circuit diagram

Description of Hardware

1.1 Arduino Uno:
Arduino is a physical processing tool based on a microcontroller board and integrated development environment board layout. Arduino open-source hardware technology [6]is one of the best platforms available used to build a home automation system. This technology can be used to control applications such as lights and sensors by reading them as inputs and converting them as results like turning on the engine, turning on the lights, or online publication of something. It is possible to tell the board what to do by sending instructions to the microcontroller[17-18]. to achieve this successfully an Arduino programming language based on cables and Pro-based Arduino (IDE) software must be used. The system that builds Arduino can work in a variety of ways applications such as Windows, Macintosh, and Linux.

1.2   Bluetooth Module
Bluetooth has become an ideal home automation solution. It is easy to control the temperature and other electrical properties Devices use Bluetooth although the computer may be heavily involved. It is possible to use the phone remotely with the controller to connect to a few household appliances using Bluetooth[16] as a wireless device. This includes the use of a wireless network. The client module and host controller communicate via Bluetooth-enabled smartphone. The Bluetooth module is essential for connecting the Arduino-UNO board and the Android device. Bluetooth hc-05[7] module above is compatible as it contains a serial interface and Bluetooth adapter. The module is easy to use as it does not require anything set after purchase separately with its AT model which is used to switch between primary and slave mode

1.3   Relay Module
All parts have a relay. The relay is open after all sensors and modules are present. In the case of opening

the door, where the fingerprints resemble a relay is opened again the door is opened with a servo motor. In the case of all sensors, the relay opens and sends messages to the phone when they are high. Relay, apparently as the switch is connected to the rest of the home electrical items. And transfer control is possible with GSM.

1.4 Relay Driver:

The electro-mechanical relay is an actuator that helps with a wide range of shapes, sizes, and designs, and has many uses and uses in electrical circuits. But while power transmissions can be used to allow low-power electronic or computer-type circuits to switch to high-frequency waves or voltages in both "ON" or "OFF", some sort of relay circuit is required to control it. The design and types of circuit relay exchange circuits are large, but many small power projects use transistors and MOSFETs as their main switching device as the transistor can provide fast DC switching (ON-OFF) control of the coil transferred to various input sources for this collection. a small one of the most common ways to change relays[8]

II. METHODOLOGY

The components we will be using are an Arduino Uno, Bluetooth HC05, a single relay, a jumper wires and a breadboard. The system has a mobile application that will connect to a Bluetooth HC05 that is part of the control system, and the Bluetooth HC05 receives data from an Android application. The application has many buttons that send some variables when the button is clicked. The Bluetooth HC05 now receives and sends this data to the Arduino via the serial link. And Arduino starts comparing these data to the database and there are many conditions for different light bulbs. When the condition is met, the corresponding lamp will start flashing. Here the HC05 acts as the receiver and the Arduino act as the controller. The Arduino also uses a relay module so that you can connect electronics to the Arduino. Most modern phones, TVs, tablets, and set-top boxes use Android. Android has been in the business since 2008 and will soon enter the automotive and other entertainment industries [9]. Andy Rubin developed Android systems for mobile phones and later became Director of Mobile Platforms when Google acquired Android Inc. All Android phones come with an application called Play Store (originally known as Android Market), which is used to download Android applications from the. The Play Store contains many Android apps that can be used to perform different functions depending on user

requirements. The components we are going to use are Arduino Uno, Bluetooth HC05, Single Channel Relay, Jumper Wire, and Breadboard.

In the system, we have a mobile app that will be connected to the Bluetooth HC05 which is part of the control system and Bluetooth HC05 receive the data from the android app. There are many buttons in the app which sends some variables when we press those buttons. Now, the Bluetooth HC05 receives and sends this data to the Arduino by serial communication [10]. And Arduino starts to compare this data with the Database and there are many conditions for the different bulbs. if any condition finds true   then the associate bulb starts to glow. Here the HC05 works as recipients and Arduino is like Controller. With the Arduino, we are also using the relay module so that we can interface the electronic appliance with the Arduino, most contemporary phones, TVs, tablets, and set boxes use Android. Android has been in business since 2008, and there is a likelihood that it will soon penetrate the motor vehicle industry and other industries that use entertainment[13]. Andy Rubin developed the Android system for phones, and he was later made the director of mobile platforms when Google acquired the Android Inc. All Android phones come with an application called Play Store (originally known as Android Market), which the uses to download Android applications. The Play Store contains many Android apps that can be used to perform different functions depending on user requirements. The proposed model, although sound in its implementation, still has some limitations It can lose connection under certain conditions. It has low bandwidth as compared to Wi-Fi. It allows only short-range communication between devices. Security is a very key aspect as it can be hacked[11].

we have a running Bluetooth Home automation system. Machine-to-machine communication[20] and you understand that you are not the most experienced consumer of technology, it is unlikely that you have missed out on a wide range of home remodeling products that fill the shelves and advertisements of every home improvement store.[12] Suddenly the normal function of the headlights will leave you wondering if your lamp can send you a message telling you that the lamp needs to be replaced.

III.CONCLUSION

This project is truly an inexpensive and effective home app project. This project is also an inexpensive project with easy connections and easy-to-use deteriorating and physically disabled people. By using this method, household appliances can be controlled to avoid the risk of electric shock and ease

of use for consumers. It can keep safe things at home by warning people if smoke is found or gas leaks in the home. With a few additions and improvements, this project could be the product of the Home automation system[13-15] commercial products. In the future, we can add heat sensors so that they can monitor the temperature parameters around the house and we can improve communication using web-based technology. This project can also be promoted with a wireless camera, to integrate with other security features of the Smart Home Automation System. In terms of improving home security, doors and windows are also installed by setting an alarm in the event of any kind of theft or vandalism[19].

REFERENCES

[1]. N.David, A.Chima, A.Ugochukwu, and E.Obinna," Design of a home automation system using Arduino", International Journal of Scientific & Engineering Research, Vol. 6, pp. 795-801, June-2015.

[2]. Prof. M. B. Salunke, Darshan Sonar, Nilesh Dangle , Sachin Kangude, Dattatraya Gawade, "Home Automation Using Cloud Computing and Mobile Devices", Vol. 3, Issue 2 (Feb. 2013), ||V2|| PP 35-37

[3]. A. ElShafee and K. A. Hamed, "Design and Implementation of a Wi-Fi Based Home Automation System, "World Academy of Science, Engineering and Technology, vol. 68, pp. 2177-2180, 2012.

[4]. Ahmed Elshafee, Karim Alaa Hamed, "Design and Implementation of a Wi-Fi-based Home Automation System", International Journal of Computer, Electrical Automation, Control, and Information EngineeringVol: 6, No: 8, 2012, pp 1074 - 1080.

[5]. Zekeriyakeskin, Yunus Emrekocaturk, okan Bingol, Kublai Tasdelen, "Web-based smart home automation: PLC controlled implementation", vol11, NO 3, 2014.

[6]. Silviu Folea, Daniela Bordencea, Casiana Hotel, Honoriu Valean "Smart Home Automation System Using Wi-Fi Low Power Devices".

[7]. Mitali Patil, Ashwini Bedare, Varsha Pacharne "The Design and Implementation of Voice Controlled Wireless Intelligent Home Automation System Based on ZigBee." International Journal of Advanced Research in Computer Science and Software Engineering.

[8]. Mansour H. Assaf, Ronald Mootoo, Sunil R. Das, Emil M. Petriu, Voicu Groza, and Satyendra Biswas "Sensor Based Home Automation and Security System." 978-14577-1722-7/12/$26.00 ©2012 IEEE.

[9]. [9]. A. R. Al-Ali, Member, IEEE, M. AL-Rousan"Java-Based Home AutomationSystem" IEEE Transactions on Consumer Electronics, Vol. 50, No. 2, May 2004.

[10]. K. Venkatesan and Dr. U. Ramachandraiah, Networked Switching and Polymorphing Control of Electrical Loads with Web and Wireless Sensor Network, 2015 International Conference Robotics, Automation, Control and Embedded Systems (RACE), Chennai, (2015).

[11]. ShopanDey,Ayon Roy and SandipDas, Home Automation Using Internet of Thing , IRJET, 2

[12]. (2016),1965-1970. 3. Vishwateja Mudiam Reddy, Naresh Vinay, Tapan Pokharna and Shashank Shiva Kumar Jha, Internet of Things Enabled Smart Switch, Thirteenth International Conference on Wireless and Optical Communications Networks (WOCN), Hyderabad, (2016)

[13]. Pei Zheng, Lionel Ni, Smart Phone and Next Generation Mobile Computing, Morgan Kaufmann publisher, San Fransisco. 2006.

[14]. R. John Robles and Tai-hoon Kim, "Applications, Systems and Methods in Smart Home Technology: A Review," International Journal of Advanced Science and Technology. 15: 37-48-2010.

[15]. Ms. Poonam V. Gaikwad, Prof. Mr. Yoginath R. Kalshetty, "Bluetooth Based Smart Automation System Using Android", International Journal of New Innovations in Engineering and Technology, Volume 7 Issue 3– April 2017.

[16]. How Bluetooth Technology Works, [online]. Available: www.bluetooth.com/bluetooth/ technology/ works

[17]. What is Arduino, [online]. Available: https://www.arduino.cc/en/Guide/Introduction

[18]. ARDUINO UNO REV3, [online]. Available: https://store.arduino.cc/usa/arduino-uno-rev3

[19]. Ms. M.Preethi, Mr. R.Dharmalingam, "Based on the wireless Bluetooth microcontroller controlling home appliances", International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE), Volume 6, Issue 5, May 2017.

[20]. Ayan Maity, Avijit Paul, Priyanka Goswami, Ankan Bhattacharya, "Android Application Based Bluetooth Controlled Robotic Car", International Journal of Intelligent Information Systems, 6(5): 62-66-2017.