

Design and Development of Bluetooth Based Home Automation System Using Android Phone

¹Md. Rakib Hossain , ¹Mohammad Ali, ¹Abu Hena Mostafa Kamal, ²Md. Abdul Mazid

¹Department of Electronics and Communication Engineering
Institute of Science and Technology, National University, Bangladesh

²Department of Computer Science and Engineering
Institute of Science and Technology, National University, Bangladesh
Corresponding author email- rakibhossainist@gmail.com

Abstract

Smart Home automation system has become a play important role in our daily lives. So the main goal is to develop a home automation system that can be controlled by smartphone. This paper presents the design and development of Bluetooth-based home automation system using an Android phones. The design consists of an Arduino mega 2560 board and Light bulbs are connected to input/output ports of this board via relays also attached to the arduino board. Bluetooth module HC-05(2.4GHZ) which provides wireless communication between them. The home automation system and an Android application, is developed to provide a user interface for the remote control of home appliance. After implementation four light bulbs has been wirelessly controlled via android phone and the designed system working properly.

Keywords: Home automation, smart home, Bluetooth, android, arduino, relay

1. INTRODUCTION

Smartphone home is an emerging concept that attracts the synergy of several areas of science and engineering [1]. Moreover, Application development for mobile phones has already made an impact worldwide is going to be in enormous requirement for the coming years. Where Smart home is the term commonly used to define a residence that integrates technology and service through home networking to enhance power efficiency and improve the quality of living .Thank for Bluetooth technology and other similar technique ,with dramatic increase in smartphone users ,smart phone have gradually turned into all-purpose portable device .Furthermore Smart house can also provide a remote interface to home appliances or the automation system itself via telephone line ,wireless transmission or the internet and android application ,to provide control and monitoring via Smartphone or web browser, As smart phone is available to all integrating android app and smartphone system will the quality of living of home being.

2. LITERATURE REVIEW

N. srisskanthan, F. Tan, A. karande [2] presented model for home automation using Bluetooth via PC. Whenever R. Piyare [3] introduced design of wireless and low-cost solution to home automation. Again Hasan and Yavuz [4] designed control system which is telephone and PIC remote controlling communication. R. E. Rahim [5] introduced Controlling Home Power Socket Using Bluetooth Enabled Device. This work is completely different from other works. Here This paper uses an Arduino software and Android app.

3. SYSTEM DESIGN

3.1 System architecture

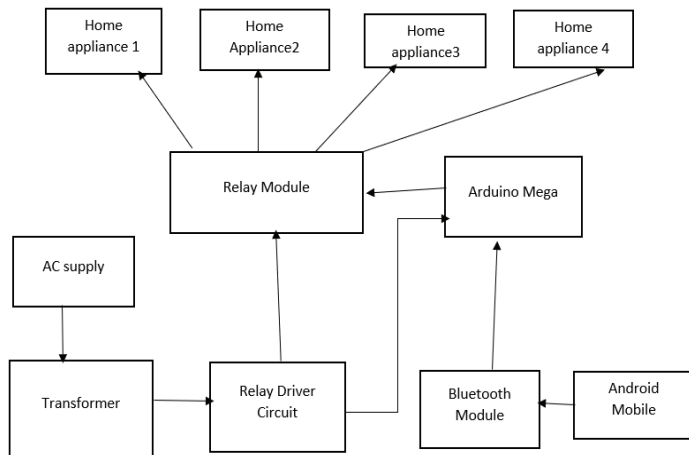


Figure 1. Block diagram of Home automation system

The controlling devices of the whole system are an Arduino. Transformer, Bluetooth module and relay driver circuit are interfaced the system. The data receive by the Bluetooth module from android phone is fed as input to the controller.

3.2 Hardware Implementation

The Five components used in this work are -

1. Arduino Mega 2560
2. Bluetooth module HC-05.
3. 4 channels 5 volts Relay Module.
4. Transformer 220v~50 Hz.
5. Relay driver

Here a transformer can be used. It converts 250 v to 9v. Here a relay can be used. A relay is an electrically open switch. It converts 250 v ac and 28 v dc. A Bluetooth module HC-05 can be used. Sending and receiving data via Bluetooth with an android device.

3.3 Circuitry Design

A controller is designed by attaching several components such as Arduino Mega2560-R3, Bluetooth module HC-05, Transformer, relays and other electronic component. These components need to be well connected to ensure the controller is functioning. Figure 2 shows the connection between the controller and the home appliances. The controller is divided into two parts input and output. This design is used proteus 8 simulation software.

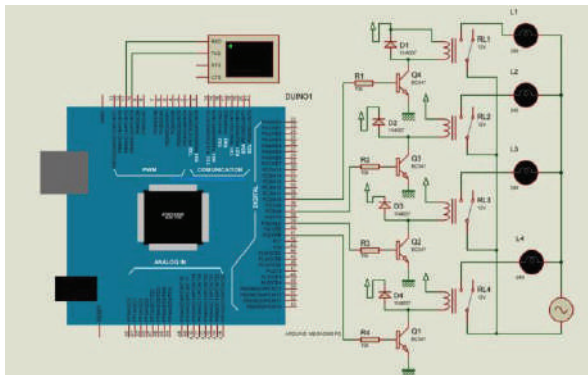


Figure 2. Electronic circuit design

4. SOFTWARE DEVELOPMENT

4.1 Arduino programming

Arduino programming includes a code based on C language.

4.2 Android Application Development

The Smartphone used throughout this project was a SAMSUNG with Android OS. At first to run this project need to download Bluetooth app has been downloaded from google play store. It can be used Bluetooth Spp pro. Then install Bluetooth spp pro. After installing the app, It need to open it and then search Bluetooth device and select HC-05 Bluetooth device. Then configure keys. Bluetooth Home is the Android application developed to control home appliances.

5. RESULTS & DISCUSSON

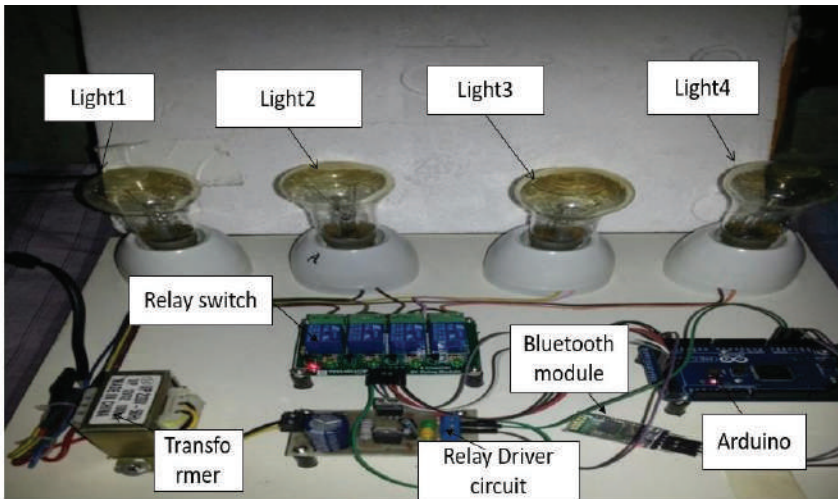


Figure 3. System prototype

First make sure HC-06 Bluetooth module is paired with android mobile as shown in figure 4. The default password for pairing 1234. Check the manual of Bluetooth module. Click on “SELECT DEVICE Icon to select paired Bluetooth module as shown in figure 5. When press “aa” it sends the data to Bluetooth module connected with the circuit as shown in figure 6. When Arduino detects “aa” the light 1 is on as shown in figure 7. When press “bb” it sends the data to Bluetooth module connected with the circuit as shown in figure 8. When Arduino detects “bb” the light 1 is off as shown in figure 9.

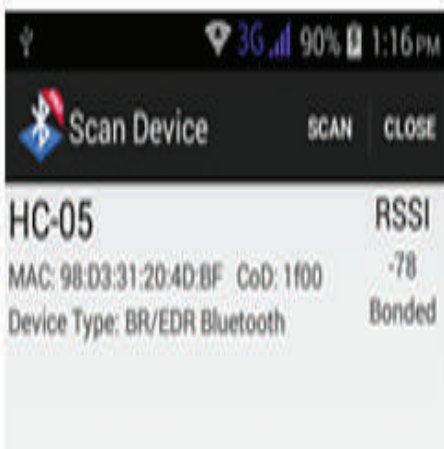


Figure 4. Bluetooth connection search

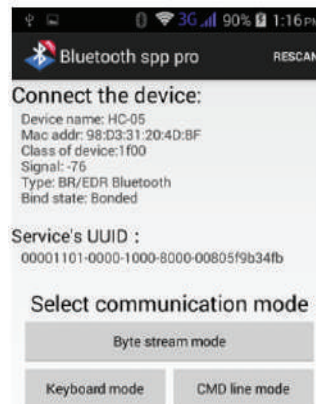


Figure 5. Paired bluetooth module

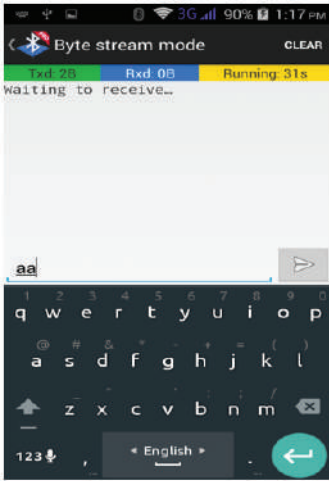


Figure 6. Bluetooth connection search “aa”



Figure 7. Light 1 is on

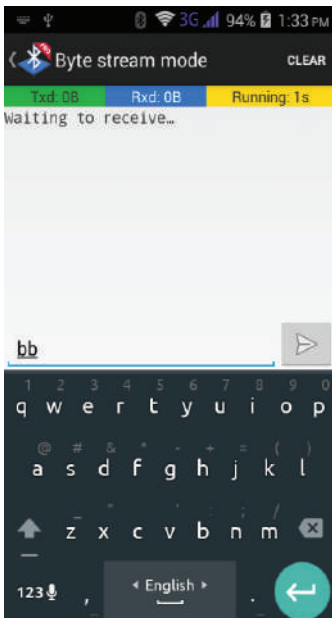


Figure 8. Bluetooth connection search “bb”

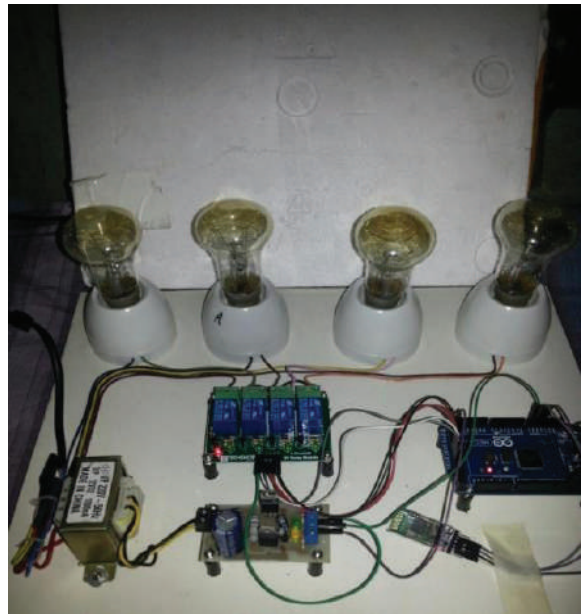


Figure 9. Light 1 is off

5.1 Cost Analysis:

Cost analysis of the system is designed below:

Arduino AT mega2560	1540 BDT.
Bluetooth module HC-05	634 BDT
Relay module	280 BDT
Transformer	350 BDT
Bulb light	120 BDT
Holder	80 BDT
Connecting wire	50 BDT
Others	100 BDT

Total cost = 3154 BDT

Table:1 Cost analysis of this project

Our system is low cost with respect to another system.

6. CONCLUSIONS

The Bluetooth based home automation system was successfully design and implemented. The cost comparison analysis shows that the system is cheaper than the existing system. Since the Bluetooth is a radio frequency and open source and also available in all most everywhere so it will possible to implement the system broadly in near future.

REFERENCES

- [1] Badrul Hisham and M. Ishak, "Bluetooth-Based Home Automation System Using an Android Phone", *Jurnal Teknologi*, vol. 70, no. 3, 2014.
- [2] N. Sriskanthan, F. Tan and A. Karande, "Bluetooth based home automation system", *Microprocessors and Microsystems*, vol. 26, no. 6, pp. 281-289, 2002.
- [3] "Li Ma, Lei Gu and Jin Wang." Research and Development of Mobile Application for Android Platform". *International Journal of Multimedia and Ubiquitous Engineering* Vol.9, No.4, pp.187-198, (2011)", 2017.
- [4] "R. A. Ramlie, D. H. Z. Tang, and M. M. Ismail “. Smart Home System for Disabled People via Wireless Bluetooth”. In *System Engineering and Technology (ICSET)*, 2012 International Conference on. 1–4.,2012.", 2017.
- [5] "R. E. Rahim. “Controlling Home Power Socket Using Bluetooth Enabled Device.” Bachelor of Electrical Engineering (Electronic), Faculty of Engineering, Universiti Teknologi Malaysia, Johor, Malaysia.2011", 2017.
- [6] " P. Sánchez, M. Jiménez, F. Rosique, B. Álvarez, and A. Iborra.” A Framework for Developing Home Automation Systems”: From Requirements to Code. *Journal of Systems and Software*. 84: 1008–1021.2011", 2017.
- [7] "M. Chan, D. Estève, C. Escriba, and E. Campo.” A Review of Smart Homes–Present State and Future Challenges”. *Computer Methods and Programs in Biomedicine*. 91: 55–81.2008", 2017
- [8] "Android Developers Guide. Android Architecture. [online] 2013. URL: <http://.android.com/about/versions/index.html>.", 2017.