



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

Home Automation using Bluetooth and IOT

Amar Pawar¹, Rahul Sharan², Rahul Patil³, Sandip Chavan⁴

Student, Department of Computer Engineering, BVCOE, Navi Mumbai, Maharashtra, India¹

Student, Department of Computer Engineering, BVCOE, Navi Mumbai, Maharashtra, India²

Professor, Department of Computer Engineering, BVCOE, Navi Mumbai, Maharashtra, India³

Professor, Department of Computer Engineering, BVCOE, Navi Mumbai, Maharashtra, India⁴

ABSTRACT: With headway of Automation technology, life is getting less complex and less demanding in all aspects. Home automation gives you access to control devices in your home from a mobile device anywhere in the world. Due to this technology, automatic systems are being preferred over manual systems. Internet of Things (IoT) is one of the promising technologies which can be used for connecting and monitoring your smart devices over the Internet. This paper provides a low cost effective and flexible home automation solution using an Arduino Micro-controller, an HC-05 Bluetooth module and an ESP8266 Wi-Fi module for internet connectivity.

KEYWORDS: Home Automation, IOT, WIFI Automation, Bluetooth Automation

I. INTRODUCTION

Mobile We are living in the world of automation where most of the systems are getting automated, such as industrial automation, homes and other business sectors. Home automation systems are advancement to the mechanization processes wherein human efforts are needed with the machinery equipment to operate various loads in homes. It involves automatic controlling of home appliances using different technologies and controllers over desktops, laptops smart phones or tablets.

Home automation system makes the operations of various home appliances more convenient and saves energy. With the energy saving concept, home automation or building automation makes life very simple nowadays. It involves automatic controlling of all electrical or electronic devices in homes or even remotely through wireless communication.

Internet of Things (IoT) is an ecosystem of connected physical objects that are accessible through the internet. The 'thing' in IoT could be a person with a heart monitor or an automobile with built-in-sensors, i.e. objects that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance or intervention. The embedded technology in the objects helps them to interact with internal states or the external environment, which in turn affects the decisions taken.

The IoT based home automation system will allow the user to control their home appliances over the Internet. The advanced homes are automated through the web and the home machines are controlled. The user commands over the internet will be received by the Wi-Fi modem. Arduino microcontroller has an interface with this modem. Microcontroller processes user's commands and controls home appliances.

II. LITERATURE SURVEY

In 2002, N. Sriskanthan and Tan Karand developed a home automation system based on Bluetooth wireless technology. This system allowed users to control and monitor their home appliances that are connected over a Bluetooth network within home environment.

In 2004, Al-Ali and Al-Rousan created a Java based home automation system using World Wide Web (WWW). Various home appliances were controlled from ports of standalone embedded system board integrated into a PC based server at home.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijirccce.com

Vol. 6, Issue 2, February 2018

In 2011, R. Piyare and M. Tazil introduced home automation system with low cost, flexible and wireless implementation. This system is secured to prevent intruders from accessing the system. The system uses Bluetooth technology and a cell phone to control the home appliances.

In 2013, S. V. A. Syed Anwaarullah presented a design for low cost and flexible home automation and monitoring system using an Android device. The proposed system makes use of RESTful web services for communication between the automation system and various home appliances. Any Android device which has Wi-Fi support can be used to access and control the devices at home.

III. PROPOSED SYSTEM

The purpose of this project is to develop a simple Home Automation system prototype for controlling various household devices using your Android Smartphone. There are two ways through which a user can control this system – using Bluetooth or through Internet.

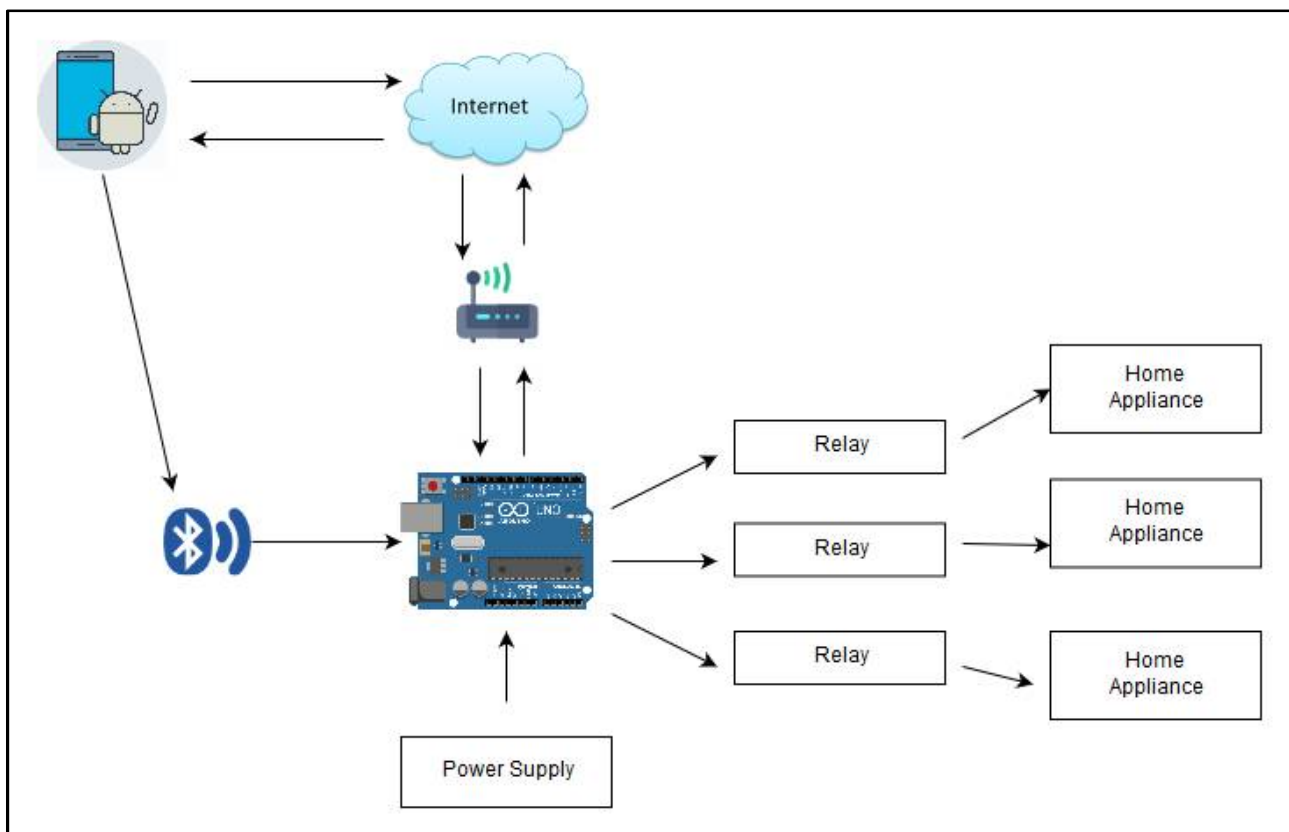


Fig.1. System Architecture

User will control this system using an Android App. When user opens the App, he/she will be presented with two options – Bluetooth or Online. If the user is within short range of the system, he/she can select the Bluetooth option. In Bluetooth mode, the app will communicate with Arduino using Bluetooth. If the user is far away from the system or outside the home, he/she can select the Online option. In Online mode, the user commands will be transferred over the Internet and Arduino will use ESP8266 Wi-Fi module to receive those commands.

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijirccce.com

Vol. 6, Issue 2, February 2018

In India, we get 204V of Alternating Current in our homes. Arduino board cannot handle this much voltage. In order to handle such high voltage, we used relay module. A relay is simply an electric switch operated by an electromagnet. This electromagnet can be activated using low voltage, in our case using the 5V input from Arduino board. This relay module can carry a maximum load of 10A at 240V.

For Bluetooth connectivity, we used HC-05 Bluetooth module. Using this module, the user can control this system using Bluetooth from Android device. For Internet connectivity, we used ESP8266 Wi-Fi module. This module allows Arduino to connect to the Internet and communicate with our Android App in an efficient and effective way. We will forward port 80 in our router to the IP Address of ESP8266 module so that user can communicate with our system through Internet even if he/she is outside the Local Network.

Description of Components:

Arduino Uno: It is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Arduino is an open-source physical computing platform based on a simple i/o board and a development environment that implements the Processing/Wiring language. Arduino can be used to develop stand-alone interactive objects or can be connected to software on your computer.

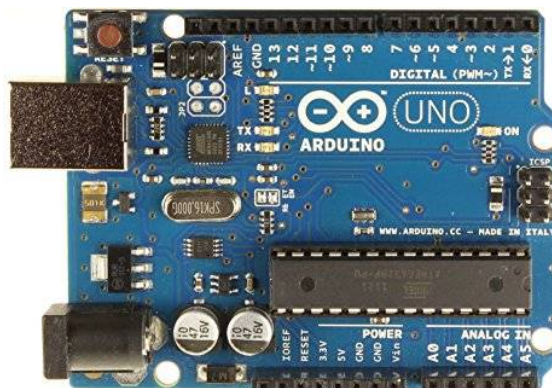


Fig.2. Arduino Uno R3 Microcontroller

Relay Module: A relay is an electrically operated switch. It has a electromagnet which is activated by a low voltage such as 5V from Arduino board. This electromagnet pulls a contact to make or break a high voltage circuit. This relay module can carry a maximum load of 10A at 240V.



Fig.3. Relay Module

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

HC-05 Bluetooth Module: HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband.



Fig.4.HC-05 Bluetooth Module

ESP8266 Wi-Fi Module: The ESP8266 Wi-Fi Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your Wi-Fi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

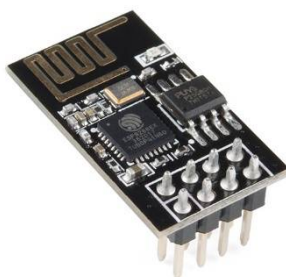


Fig.5. ESP8266 Wi-Fi module

IV. PSEUDO CODE

- Step 1: The user selects either Bluetooth or Online option from the android app.
- Step 2: If user selects Bluetooth option, the app establishes connection with the HC-0 Bluetooth module.
- Step 3: Else if online option is selected, the app establishes connection with ESP8266 Wi-Fi module.
- Step 4: Arduino reads the status of various home appliances, either they are off or on and sends the status back to the android app.
- Step 5: Android app processes the received data from Arduino and displays it on the screen.
- Step 6: User clicks the appliance button that he/she wants to turn on or off and the android app sends command along with that appliance number to the Arduino.
- Step 7: Arduino processes the received command and retrieves appliance number along with ON or OFF instruction.



International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

Step 8: Based on the received appliance number, Arduino sends HIGH or LOW signal to the relay module to switch on or off that appliance.

Step 9: Arduino sends the result back to the android app.

Step 10: End

V. SIMULATION RESULTS

We developed an android application which can be used to ON or OFF the home appliances. The following screenshots shows the status of various appliances connected to the system along with the switches to switch them ON/OFF. Fig. 6 shows the status of our system when all appliances are switched off.

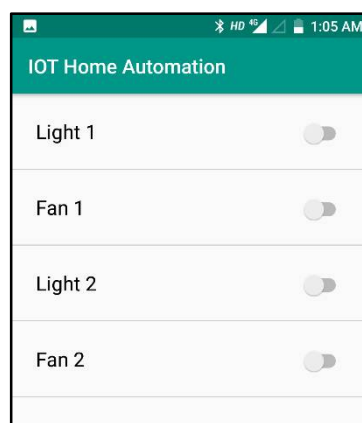


Fig.6. All Appliances switched off

As shown in the Fig. 7, when the user clicks on any of the switches available in the list, android app sends a command to the Arduino board to switch on/off that appliance. E.g. when user selects “Light 1” switch, android app sends command to switch on that light.

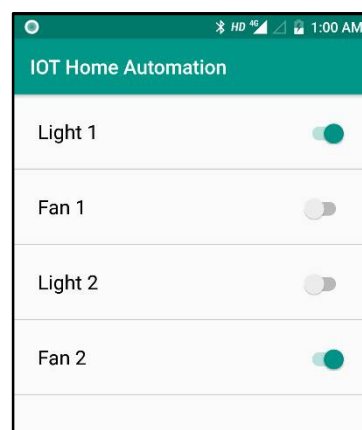


Fig.7. Some of the Appliances switched on

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

Fig. 8 shows the arrangement of various components used in our project. The components shown the following figure are – Arduino UNO Board, Relay Module, HC-05 Bluetooth module, ESP8266 Wi-Fi module and some jumper cables for connections.

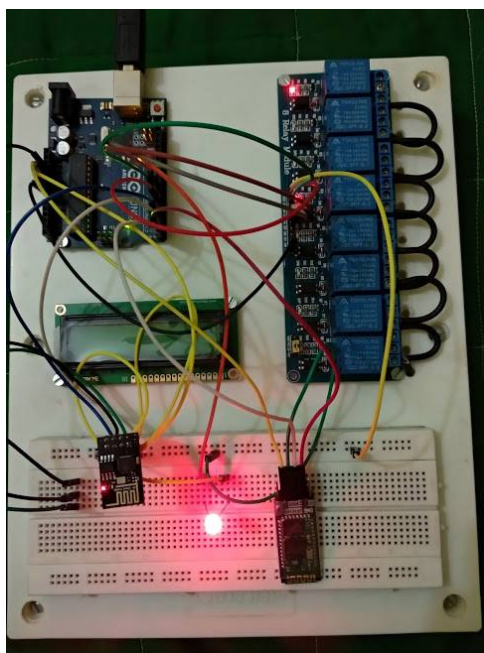


Fig.8. Arrangement of components

VI. CONCLUSION AND FUTURE WORK

This paper gives a basic idea on how to develop a simple home automation system to control various home appliances using wireless technology such as Bluetooth and Wi-Fi. The main objective of this project is to give handicap people an easy access to various home appliances.

REFERENCES

1. N. Sriskanthan and Tan Karand, "Bluetooth Based Home Automation System", Journal of Microprocessors and Microsystems, Vol. 26, pp.281-289, 2002.
2. A. R. Al-Ali and M. AL-Rousan, "Java-Based Home Automation System", IEEE Transactions on Consumer Electronics, Vol. 50, pp.498 - 504, 2004.
3. R. Piyare and M. Tazil, "BLUETOOTH BASED HOME AUTOMATION SYSTEM USING CELL PHONE", 2011 IEEE 15th International Symposium on Consumer Electronics.
4. Ahmed ElShafee and arimAlaa 5amed, "Design and Implementation of a WiFi based Home Automation System", International Journal of Computer, Electrical, Automation, Control and Information Engineering, Vol. 6, pp.1074-1080, 2012.
5. S. V. A. Syed Anwaarullah, "Internet of Things: Ubiquitous Home Control and Monitoring System using Android based Smart Phone", International Journal of Internet of Things, Vol. 2, pp.5-11, 2013.
6. Prof. R.S. Suryavanshi, Kunal Khivensara, Gulam Hussain, Nitish Bansal and Vikash Kumar, "Home Automation System Using Android and WiFi", International Journal Of Engineering And Computer Science, Vol. 3, pp.8792-8794, 2014.
7. Nupur K. Sonawane, PayalD.Waghchavare and Kajal A.Patel, "Bluetooth Based Device Automation System Using Cellphone", International Journal of Computer Applications & Information Technology, Vol. 7, pp.136-141, 2014.
8. Vinay Sagar K N and Kusuma SM, "Home Automation using Internet of Things", International Research Journal of Engineering and Technology (IRJET), Vol.02, pp.1965-1970, 2015.



ISSN(Online): 2320-9801
ISSN (Print) : 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijircce.com

Vol. 6, Issue 2, February 2018

9. Pooja N.Pawar, Shruti Ramachandran, Nisha P.Singh and Varsha V.Wagh, "A Home Automation System using Internet of Things", International Journal of Innovative Research in Computer and Communication Engineering, Vol. 4, pp.6555-6563, 2016.
10. Dhakad Kunal, Dhake Tushar, Undegaonkar Pooja, Zope Vaibhav and Vinay Lodha, "Smart Home Automation using IOT", International Journal of Advanced Research in Computer and Communication Engineering, Vol. 5, pp.1108-1112, 2016.
11. Er. Rihana Jamadar, Ms. EramMalim, Mr. Shaikh Aamir and Mr. Ansari Abdulhai, "Internet of Things Based Home Automation", International Journal of Scientific Development and Research, Vol. 2, pp.543-546.
12. J.Chandramohan, R.Nagarajan, K.Satheeshkumar, N.Ajithkumar, P.A.Gopinath and S.Ranjithkumar, "Intelligent Smart Home Automation and Security System Using Arduino and Wi-fi", International Journal Of Engineering And Computer Science, Vol. 6, pp.20694-20698, 2017.