Smart Home Automation System using Android Application

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Abstract - *The Home Automation System (HAS) is extension of current activities performed inside the home and this Home Automation System (HAS) can be developed easily now a day's, because of powerful computational devices and wireless sensor network(WSN), to provide user friendly and cost fairly home automation system. In home automation system (HAS), different technologies like Wi-Fi, Bluetooth and ZigBee are used for communication, and different devices like smart phone, tablet and laptop used for controlling various appliances.*

Key Words: *WSN, Wi-Fi,IoT,Android*.

1. INTRODUCTION

Now a days because of modern technology Home Automation System is become very useful for handicapped people. It is very useful to the user for control and handle all the appliances that are connected to the system, from a controlling devices. "Easy use of appliances" is main motive of this system. In this system home appliances can be monitored and controlled, and the user can interact with the system through a user friendly interface. The home appliances like fans, lights, switches are remotely controlled through a main control board. By using of the Internet of Things (loT), the developing of home automation are going to become simpler and more popular. Internet of Things (IoT) is nothing but connecting different real world objects to provide proper communication, synchronization, and inter-connecting between various devices or physical appliances is also known as "Things".

2. LITERATURE SURVEY

In current situation home automation system is developed using many technology like IoT and cloud etc. There are many systems in market like

2.1 Sensor Based Home Automation and Security System.

This is a web based home automation system in which user can interact with the system through a web-based user interface over the Internet. The system connected to home appliances. The main processor interacts with external components, *viz.* sensors, appliances and devices.[1]

2.2 i-Learning IoT: An Intelligent Self Learning System for Home Automation Using IoT.

In this system, Home automation is working on cloud principle. With the help of different sensors, monitoring is done. Home pc is going to report that problem to Cloud Server. Cloud server will store the information into the database and will take actions according to output.[2]

2.3 Java-Based Home Automation System.

In this system home appliances can be monitored and controlled locally via the embedded system board, or remotely through a web browser from anywhere in the world using Internet. This system is scalable that can add any appliances and it is also secured by password.[3]

3. MOTIVATION

In some cases there may be handicapped people in house and they are not able to move frequently for controlling appliances in house, so using home automation system these people can easily control all the appliances. For handicapped people it is essential to develop home automation system which required less and easy user interaction.

Home automation system also improve the standard of living and provide easy, flexible and interactive user interface. To provide all functionalities in low cost and flexible environment we need to apply modern technology and devices.

4. PROPOSED SYSTEM

In this system android application used to send signal to arduino board and Wi-Fi module connected to arduino gives this signal to arduino for controlling appliances using relay board.
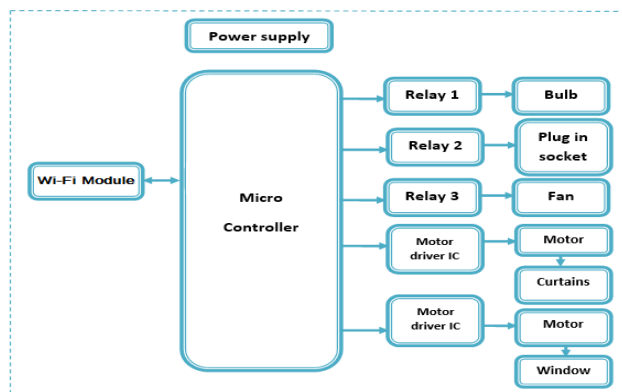

4.1 System Architecture

Fig -1: System Architecture Diagram

1. Android application in mobile sends the signal to the Wi-Fi module which is connected to same network. Android application has all the GUI buttons for each appliances.

2. Wi-Fi module receive the signal from the mobile application and give this signal to the arduino board for processing.

3. We use arduino board as controller to control all the appliances. Relay board and Wi-Fi module is connected to arduino board. Each command is processed by arduino board and control the relay board for switching on/off the appliances

4. Relay board use as electrical switches, for performing on/off operation. Power supply is provided through the relay board to the appliances.

5. Finally user can access the android application in mobile and give command to Wi-Fi module which is connected to arduino which can control the all appliances.

4.2 Mathematical Model

We use set theory for representing our system

Let S be the System

S={S, E, U, I, O, Send (), Receive ()}

Where,

S = Start state of system.

I = Input Command for system.

O = {O1, O2.O3, O4, O5}

Where,

O1 = Operation for Fan.

O2 = Operation for Tube.

O3 = Operation for Curtains

O4 = Operation for Windows.

O5 = Operation for Switches.

Send () = is a function for sending the commands to controller. For Ex. - Send (I).

Receive () = is a function for receiving the commands from android application. For Ex. - Receive (I).

E = End State of system.

5. IMPLEMENTATION DETAILS
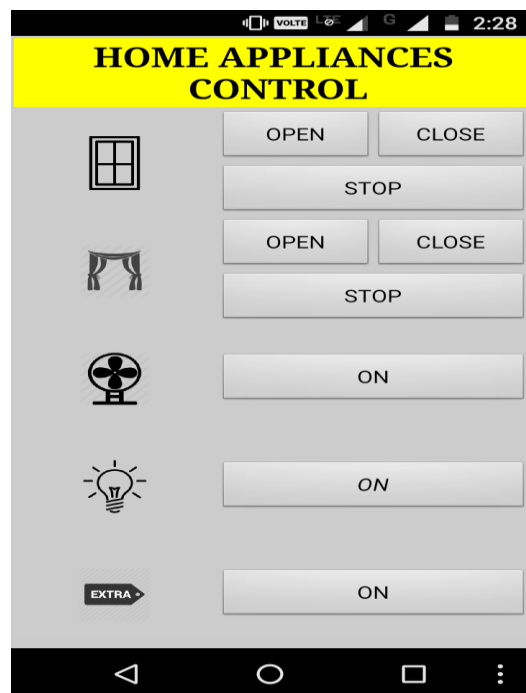
5.1 Software Implementation

Fig -2: Android Application GUI

To build the android application we used the MIT app inventor that is online android application development tool provided by Google. For each appliance we use one button for turning ON/OFF the appliance, after clicking the button it will automatically get toggle. Commands are sent through the webviewer object to the Wi-Fi module. Webviewer passes the commands through the address of Wi-Fi Network.
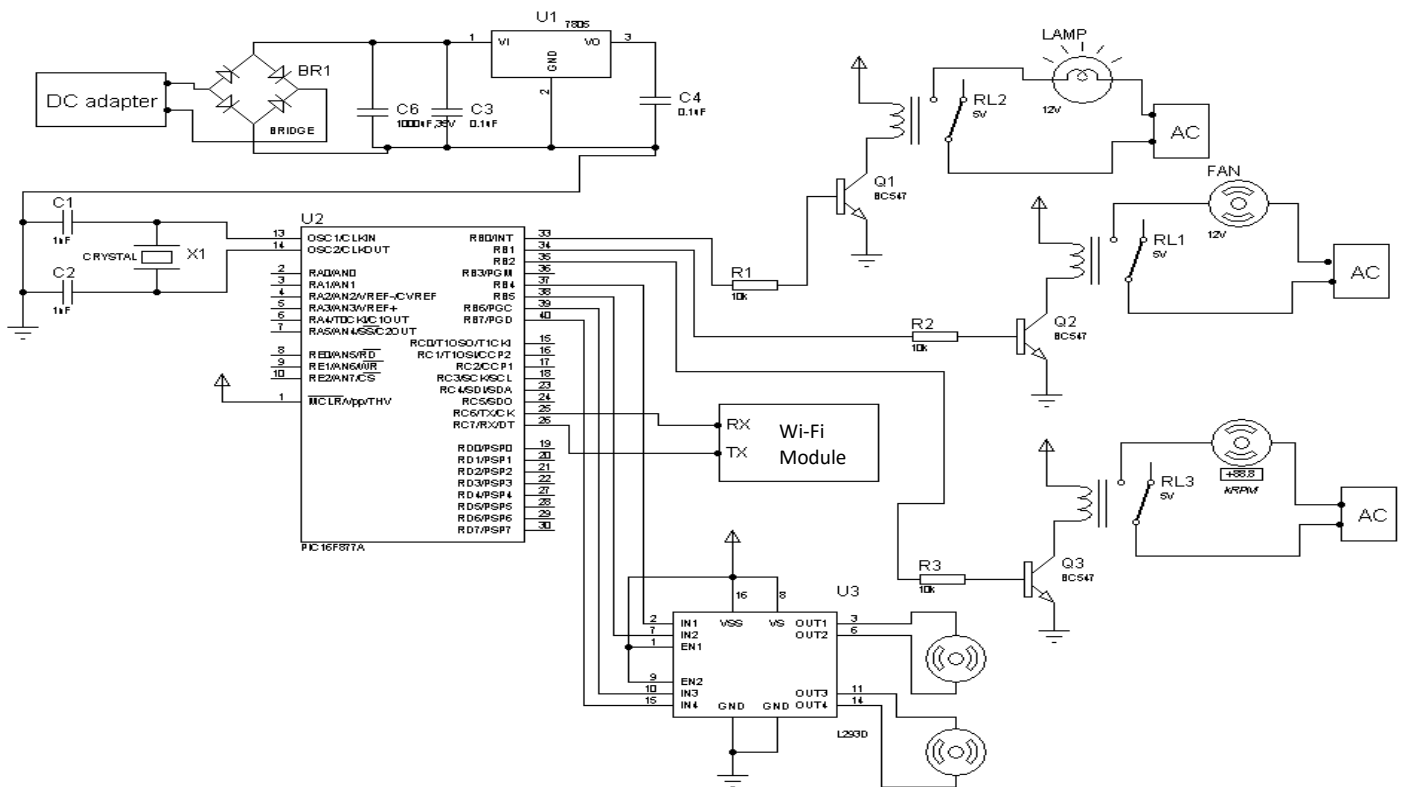
Fig -3: Circuit Diagram

5.2 Hardware Implementation

In hardware implementation we are using arduino Atmega328 as a controller. It has 14 digital input/output pins. The ATmega328 on the Arduino comes preprogrammed with boot loader that allows you to upload new code to it without the use of an external hardware programmer. Arduino does not have any wireless connection that's why we are using Wi-Fi module for wireless communication. ESP8266 Wi-Fi module is used for communication between android mobile app and arduino board. Arduino processes the received command and control the relay board. For electrical switches we use relay board that is connected to arduino. Here in our system eight relays are used in that four relays used for DC motor for driving motor forward and backward, where L293D motor driver IC is used for driving these motors. We have used 24V motor to move windows and curtains. Limit switches are situated at the end of mechanism that helps to stop the motors at the end of windows and curtains.

6. FUTURE SCOPE

In our system we are providing restricted access to user that is limited to only same network. So in future we are providing access to system remotely via cloud and IoT technology.

7. CONCLUSION

Smart Home System provide interface between various types of home and electrical appliances like windows and fans etc. It provide control and ease of use of appliances as per users need. After analysing other existing systems, we propose the novel technique for better human interaction and for providing better utilization of android and arduino. By using Home automation system we can manage cost, flexible and energy efficient smart homes.

8. ACKNOWLEDGEMENT

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