

ABSTRACT

In today's world automation is of utmost importance and most of the systems are automated be it industries, cars etc. It is now obvious that automation should also enter into homes. A smart home help customer to live comfortably as well as save energy and time, a smart home makes life more efficient. It will provide a range of features to enhance the lifestyle of people. It will not only make day to day activities easier and more efficient, it will also increase security of the house. Automated homes have recently become extremely popular and there are many industries that specialize in it but most of the products are extremely heavy on the pocket. We aim to make a system that will bring most popular features of home automation system at a much lesser cost. Our goal is to model a home automation system applying a wireless system in our case a Bluetooth based Home Automation System using Arduino UNO board and an App for control. The system also provides us with remote operation of devices by using any laptop/Personal Computer, mobile phone, tablet etc. This system can be expanded to control a large number of appliances and effectively cover not only the bedroom and kitchen but the entire house.

Keywords: automation; smart home; security, IoT..

I. INTRODUCTION

In today's world automation is of utmost importance and most of the systems are automated be it industries, cars, home appliances etc., A smart home ensures that we lead a comfortable life as well as save energy and time[1]. Automation provides a range of features to enhance the life style of people. It not only make the day to day activities easier and more efficient it also increases the security of the house[2]. Home Automation have recently become extremely popular and there are many industries that specialize in this area but most of the products are extremely heavy on the pocket[3]. This issue necessitated us to make a system that will include the most popular and in demand features of home automation system for a much lesser cost.

A home automation system using a wireless system, in this case a Bluetooth based Home Automation System using Cell phone was developed and experimented[4]. This facilitates the control of appliances through an android phone application.

Voice controlled home automation is a step further in easing the control of appliances [5]. This helps the handicapped as well as elderly people to access the home appliances with ease. As technology grows and expands with every single moment, automations have also taken leaps and bounds. Earlier a niche field which was accessible to only a select few, Home Automation is now becoming economically accessible to a much larger market. Through this paper we intend to make home automation economically accessible to every family. An automation system for home which makes use of cloud computing and wireless communication has been studied [6-7]. This is found to be cheaper. The internet of things is intended to bring everything in the universe under a single framework. This provides greater control of the stuff while updating the user on the status of the things [8]. Communication was also made possible through Bluetooth to automate home appliances [9-11]. New schemes for smarter homes were discussed and advancements were introduced [12]. Home appliances can also be controlled by using RP along with the concept of relay circuit by adopting a web page [13].

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Overview of project

Our aim is to provide a cheap home automation system to assist common man's life to make his schedule more efficient and help conserve energy; it will also be of great use to handicapped and elderly members of our society.

This paper presents the project as two modules in totality; the first module consists of control of lights, blinds and fans which will be switched on and off using voice commands on Google assistant.

The second module consists of control of common household appliances such as television, projector, air conditioners etc. We intend to attach four loads in this work.

The control of the appliances will be done using two methods in particular; they are App and voice control. Voice control can easily be achieved on an Android mobile using Google Assistant.

II. SYSTEM ANALYSIS

Problem Definition

The main problems that a home automation system faces are high cost of the system, strenuous configuration and set up process and security of the system. This developed system will be much cheaper than the available systems in the market and cover the control of most of the commonly used home appliances in a house using an Android App and voice control using Google Assistant on the user's mobile. The system is wireless and will be using Bluetooth as well as Wi-Fi to allow the user to control various appliances using their mobile phones, personal computers/ Laptops etc.

III. SYSTEM DESIGN AND IMPLEMENTATION

A. Proposed Home Automation System

The proposed home automation system is represented using a block diagram in Figure 1.

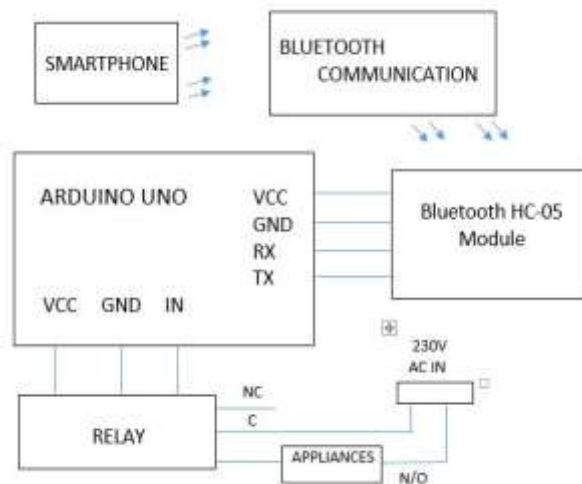


Fig. 1. Proposed Model of Automation system

B. Functions of proposed system

- The Home Automation system will have about two modules.
- The first module consist of control of lighting, fans etc. using an android phone App as well as voice commands using Google Assistant.
- The second module consist of control of various heavy power household appliances such as television, air conditioner, Iron box etc.

C. Software Design

The software required for the setup is Arduino IDE.

D. Implementation and Setup

Bluetooth Module HC-05 is used for wireless communication for automation.

This is preferred since it is very easy to use with serial port protocol and is operated at a low power. Different types of applications using android platform with Bluetooth can be further developed.

In this work a four channel 12V relay is used to connect the appliances and control their switching. A 30A relay is also used for the control of heavy loads such as air conditioners, refrigerators, heaters etc.

Android mobile phones are used to control the system as they are the most popular ones in the market, also it has an open source operating system. Therefore it can be used free of cost on mobile phones. The App can be downloaded from the Android Application store called "Play Store" which is available on each android mobile. The App has provisions for supporting Bluetooth network by allowing the device to exchange data with other devices wirelessly using Bluetooth. Android Bluetooth APIs are used to access the Bluetooth feature.

For voice control of light loads Google Assistant is used. Initially Applets are created for switching on and switching off of the relay on the forum IFTTT (If this then that).

The code is uploaded to the Node MCU. Authentic token is added in the code as well as the name of the Wi-Fi hotspot which is used. Then the password of the Wi-Fi hotspot is added to access the hotspot. Now the Node MCU is connected to the Wi-Fi.

For hardware assembly the Node MCU is connected with the relay board using jumper wires. The electronic appliances are connected to the relay board. IFTTT bridges the gap between Google assistant and the Blynk App, as we can neither communicate directly with the Nodemcu nor the relay through voice. IFTTT sends the appropriate request to the App which in turn sends the request to the Nodemcu board and controls the relay.

E. Hardware Setup

Figure 2 shows the hardware setup which has the home automation system along with the mobile phone. This also has voice control relay in ON position.

Figure 3 shows the voice control relay in OFF position.

Figure 4 gives the detailed depiction of module 2.



Fig.2 Voice Control, Relay On.



Fig.3 Voice Control - Relay Off.

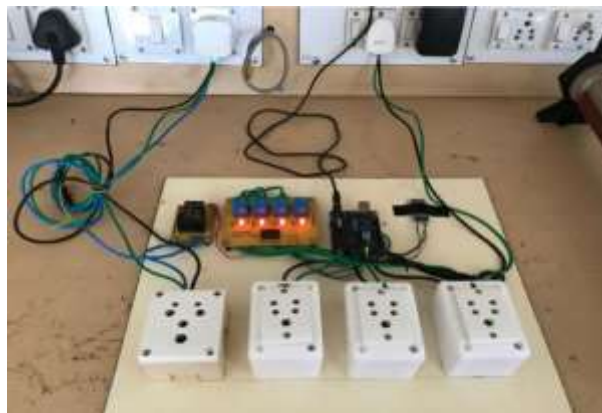


Fig. 4. Module two, Control using HC-05

As seen in Figure. 2 the relay is turned ON with a voice command using Google assistant. The appliances are connected to the relay in series which makes the relay act as switch. Figure. 3 shows the relay in OFF condition.

Figure. 4 is the setup of the system controlled using Bluetooth module HC-05. There is a 4 channel relay which acts as a switch and the 4 channels can be individually turned ON and OFF. There is also a master switch which turns all the relay channels simultaneously ON and OFF.

IV. CONCLUSION AND FUTURE SCOPE

Conclusion

It is successfully proven that the home automation system using IOT is working to the expectations by implementing it using light loads such as lights and fans. They are controlled using both the Android App as well as successfully implementing voice control using Google Assistant. Heavy household appliances such as air conditioners, heaters etc. were successfully tested as well.

The proposed home automation system brings the niche market of home automation to the mass market by reducing its cost by far.

Scope of proposed work

The proposed home automation system can be used to control many devices remotely through wireless communication. It provides centralized control of many equipment such as lights, blinds, Television, Air conditioners, security and surveillance system, kitchen appliances etc. This system can be expanded to control a large number of appliances and effectively cover not only the bedroom and kitchen but the entire house. The voice control using IFTT also facilitates control of appliances over the web. Hence the constraint of proximity concerned with Bluetooth control is eliminated.

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