



Voice Based Home Automation System

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Abstract: — The primary goal of this venture is to foster a home mechanization framework utilizing an Arduino board with Bluetooth being somewhat constrained by any Android operating system PDA. As innovation is step by step getting progressed, houses should also get smarter. Current houses are gradually moving from conventional switches to centralized control system, involving remote controlled switches. As of now, traditional wall switches situated in various pieces of the house makes it challenging for the client to go close to them to work. Much more it turns out to be more challenging for the old or genuinely disabled individuals to do as such. Remote controlled home computerization framework furnishes a most current arrangement with PDAs. To accomplish this, a Bluetooth module is connected to the Arduino board at the recipient end while on the transmitter end, a GUI application on the phone sends ON/OFF orders to the receiver. By contacting the predetermined area on the GUI, the devices can be turned ON/OFF somewhat through this innovation. The loads are operated by Arduino board through opto isolators and thyristors using triacs.

Index Terms - Arduino UNO, Home Automation System, speech recognition, smart home, Internet of Things.

I. INTRODUCTION

Building home automation, often known as a smart home or smart house, involves automating a home. A home automation system will monitor and/or control home attributes such as lighting, climate, entertainment systems, and appliances. It might likewise incorporate home security, for example, access control and alert systems. Home appliances that are online are a crucial component of the Internet of Things ("IoT"). Controlled gadgets are often connected to a central smart home hub using a home automation system. Wall-mounted terminals, tablet or desktop computers, mobile phone applications, or web interfaces that may also be accessed off-site over the Internet are all options for the user interface for system control. Despite the fact that there are numerous rival vendors, open source solutions are receiving more attention. The current state of home automation, however, has drawbacks, such as the lack of standardized security measures and the deprecation of older devices without backwards compatibility. Home automation has a significant potential for data exchange between family members or trusted people for personal security and could eventually lead to energy-saving solutions that have a good environmental impact.

II. PROBLEM STATEMENT

Home automation is becoming more and more important in the modern world in order to improve our quality of life. Home automation aims to make operating household equipment more convenient. Home automation offers a futuristic way of living where a person may use a smartphone to control every aspect of his home, from turning on the TV to locking and opening doors. It also promotes energy efficiency. The difficulty of installing and customizing such a system, as well as the high expense of getting one installed, are the main reasons why home automation has not gained much popularity or demand. Therefore, it is crucial to make it affordable and simple to configure; if this is done, people will be ready to install it in their homes, workplaces, and educational institutions. In other words, in order to reduce the cost of applying home automation to homes, a system adjustment is necessary. Also home automation offers ease of mind and body to disabled persons and/or elders in their houses by just one click to do what they want as stated above.

III. OBJECTIVE AND SCOPE

The main objective of the proposed system is to develop a home automation system using an Arduino board with Bluetooth being remotely controlled by any Android OS smart phone. Houses are becoming smarter as technology advances. The traditional switches in modern homes are rapidly giving way to centralized control systems with remote-controlled switches. Currently, it is difficult for the user to approach standard wall switches because they are dispersed across the house. The elderly or those with physical limitations find it even harder to do so. With smartphones, a remote-controlled home automation system offers the most cutting-edge solution. In order to accomplish this, a Bluetooth module is attached to the Arduino board at the receiver end, and a GUI program on the mobile phone is used at the transmitter end to transmit ON/OFF commands to the receiver end, where linked loads are located. Through this technique, the loads can be remotely ON/OFF by tapping the designated area of the GUI. The loads are controlled by the Arduino board utilizing triac-powered opto isolators and thyristors.

IV. EXISTING SYSTEM

Various examinations have been directed by different analysts about the home computerization framework. A new report by Moeid M Elsokah, Hana H.Saleh and Amer R. Zerek proposed a voice acknowledgment based home computerization framework utilizing a EasyVR Shield 2.0 module, Arduino Uno, and ESP8266 Wi-Fi module. This framework is exorbitant and can't use in patients with hemiplegia as they just use voice acknowledgment. In one more comparative concentrate by Kumar et al. utilized just the voice acknowledgment module. Albeit the 'creators' guaranteed that their proposed framework is savvy, it isn't usable for hemiplegia incapacitated individuals. Another new review by Islam et al. introduced a shrewd home framework for debilitated individuals that can work on their lives, zeroing in on the key highlights, significant difficulties, and possibilities. Be that as it may, that's what study's restriction is assuming any persistent experiences issues in contacting any screen contact gadget, the framework won't work. Habiba et al. proposed a gadget utilizing voice acknowledgment, remote correspondence, GPS, GSM, area following, and so on. This gadget can't work for those patients who have inabilities with hand ailment. It will be a challenge for them to control this gadget.

V. PROPOSED SYSTEM

Utilizing input from a wide range of switches or sensors and controlling a variety of lights, engines, and other physical outputs, Arduino can be used to build interactive objects. The board can be assembled by hand or purchased preassembled; the open-source IDE can be downloaded for free. Arduino activities can be carried out in isolation or in conjunction with software running on your computer (such as Flash, Processing, and Maxmsp). The majority of the microcontroller's I/O pins are accessible on the Arduino board for usage by other circuits. Six of the 14 digital I/O pins on the Diecimila, Duemilanove, and contemporary Uno may create pulse-width modulated signals, and there are also six analogue inputs that can also be utilized as digital I/O pins. The HC-06 is a user friendly need only basic knowledge and it is programmable using the AT commands. The block diagram of the proposed system is shown in Fig.1.

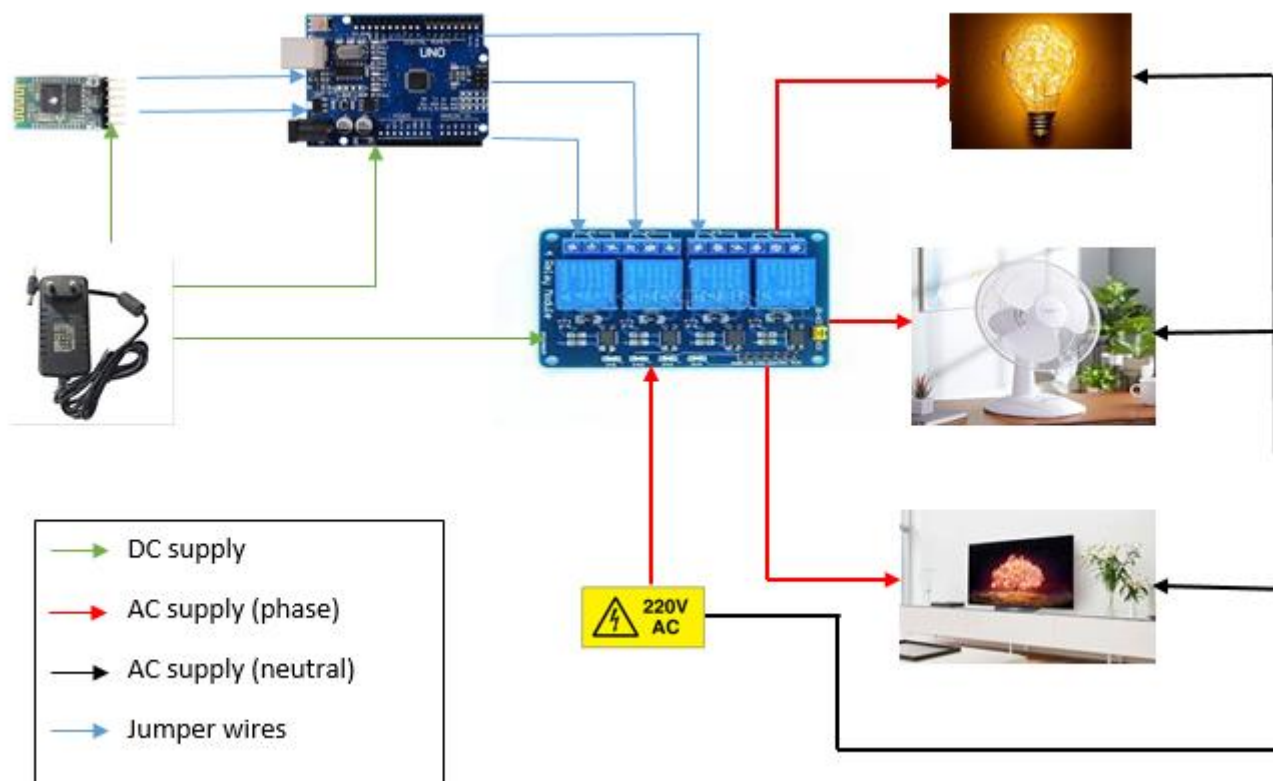


Fig.1 Block diagram

VI. HARDWARE DESCRIPTION

The hardware modules used are an Arduino Uno, Bluetooth and a relay. The Arduino Uno is the brain of the proposed system. It is micro controller which needs to be programmed in order to control the devices. This Bluetooth module used is HC-06 which is an upgraded version HC-05. The difference is connections can be made easily when compared to HC-05. This is used to connect our smart phones with the devices to control them. Relay acts a switch in IoT. It is an electrically controlled switch. The relay that is used is a 2 channel relay.

VII. SOFTWARE DESCRIPTION

The software that has been utilized is Arduino IDE. Any programming language with compilers that generate binary machine code for the target processor may be used to create a programme for Arduino hardware. Java was used to create the cross-platform Arduino integrated development environment (IDE), which is available for Microsoft Windows, macOS, and Linux. The Arduino IDE has specific code organization guidelines to support the languages C and C++. A software library from the Wiring module, which offers numerous standard input and output operations, is provided by the Arduino IDE. It has a code editor with tools for text copying and pasting, text replacement, automated indenting, brace matching, and syntax highlighting. It also offers straightforward one-click compiling and uploading tools for Arduino. A hierarchy of operating menus, a message area, a text terminal, a toolbar with buttons for standard functions, and more are also included.

VIII. EXPECTED OUTCOME

The progress of any undertaking relies upon a definitive justification behind which it has been proposed. There should have some number of points that could bring about the inspiration interaction of planning the task. Points are sure number prerequisites which support the task. Furthermore, firm targets generally give sponsorship to the points and open the future entryways to improve things development of the proposed thought. Android-based application for controlling the home utilities makes positively an amazing difference on the general public, where it can likewise cause the disposal of separation towards the day to day routine objects when all individuals will get a similar simplicity of overseeing utilities. The significant point of this undertaking is to give a stage which has never existed. The application programming will work alongside the google voice acknowledgment administrations, where it will get the voice order and it will be changed over into text design so it very well may be reasonable in a legitimate manner and that order will be moved to Arduino Uno by means of Bluetooth or Wi-Fi, and by then the order will be executed to follow through with the responsibility, eventually the activity will be acted in the manner gadget is pre-customized. The outcome of the proposed system is to construct a wireless home automation system controlled by a smartphone specifically an android device. To also design and implement cost effective home automation system yet an efficient one. To design a user friendly and a safe system to control home appliances especially aimed to aid the elders and handicapped. The prototype of the proposed system is shown in Fig.2.



Fig.2 Smart Home Automation

IX. DISCUSSION

The HC06 Bluetooth module is connected with the android device. The command given by the user will be transmitted to the Arduino Uno by the HC-06 module. Based on the command received by the Arduino Uno respective signal will be sent to the corresponding relay module. The relay module controls the appliances. All the appliances have a common 220V neutral line. The 220V phase line is connected to relay module. Each relay is separately connected to each and every appliances.

Some problems and issues were encountered. Early attempts to establish a Bluetooth connection between the Android phone and the Arduino-Uno board failed. When the Xbee Bluetooth module was utilized, this issue occurred. The solution to this issue was researching the subject online and ultimately switching out the Xbee module for an HC-06 Bluetooth module. Using and connecting the relay modules was a different problem. At first, ordinary relays were intended to be used in the proposed system, but soldering them into a breadboard proved challenging because the breadboard needed special modification and the whole didn't match the relay pins. In addition, connecting everything using a soldering iron is not the ideal way if several tests and wiring and unwiring are required. This problem was tackled by using relay modules.

The comparison between the usage of ZigBee and Bluetooth for home automation systems is shown in table 1.

Key	Bluetooth	ZigBee
Frequency	Bluetooth frequency ranges between 2.4 GHz to 2.483 GHz.	ZigBee frequency range is mostly 2.4 GHz.
Network Range	Bluetooth has a network range of 1 to 100 meters and a maximum network speed of 250 megabits per second.	ZigBee has a network range of up to 70 meters and a maximum network speed of 1 megabit per second.
RF Channel	Bluetooth has 79 RF Channels.	ZigBee has 16 RF Channels.
Modulation Technique	Bluetooth uses GFSK modulation technique.	ZigBee uses GFSK, BPSK and QPSK modulation techniques.
Cell Nodes	Bluetooth has maximum 8 cell nodes.	ZigBee also has more than 65000 cell nodes.
Bandwidth	Bluetooth needs low bandwidth.	ZigBee needs low bandwidth but higher than Bluetooth.
IEEE	Bluetooth follows IEEE 802.15.1.	ZigBee follows IEEE 802.15.4.
Coverage	Bluetooth radio signal range is up to 100 meters.	ZigBee radio signal range is up to 100 meters.
Power	Bluetooth batteries are rechargeable.	ZigBee batteries are not rechargeable, but they last longer.

Table 1

X. CONCLUSION

The proposed system's main goal is to use an Android smart phone to conveniently operate household appliances and to offer effective home security and safety measures. Future technologies like retina/fingerprint scanning can also be used for login. In order to increase the security system's accuracy, image processing can be added. To assess if an intruder was detected or whether the alarm was false, this system would employ a trusted face database. The advantage of the proposed system is that it is affordable to everyone. Another huge advantage is the appliances need not be smart, a few changes in the existing wiring system will be enough.

XI. FUTURE SCOPE

Home automation is becoming more and more common, making it a fundamental prerequisite for future homes that are intelligent enough to offer occupants the highest level of comfort. Our lives are growing more and more reliant on the ubiquitous and well-liked smart devices. Controlling smart devices installed in houses connected via IoT is made simple by gadgets like smart Homes (Google Home, Amazon Echo, and Apple HomePod) and smart assistants. Additionally, users have access to a variety of smart devices and integrations for performing daily household tasks like switching lights and other devices, changing light colors, and checking for home security with the help of cameras, door speakers and microphones, and door locks that can be managed via smartphones. Additionally, there are numerous other technologies being developed to make our houses smarter.

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