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 ijirset@gmail.com

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Hands Free Home Control: A Bluetooth IOT Solution

P.S.Kamal Naidu, Ch.Sai Kiran

Department of Computer Science and Engineering, Sathyabama Institute of Science and Technology,
Tamil Nadu, India

ABSTRACT- In the twenty-first century, automation is a hot issue, thus it's crucial to our daily life. Every automated machine's key selling point is its reduction of manual work, effort, time, and mistakes brought on by human error. Smart phones have become a need for every individual on the earth as a result of the development of modern technology. Apps that benefit us in numerous ways are being created for Android systems. Natural language processing is a new technology that will allow us to control objects with our voice. Our study describes a voice-activated home automation system employing smartphones that combines all of these. Users of such a system will be able to voice-control any gadget in their home. Android smartphone, which is in nearly everyone's hand these days, and a control circuit are all that the user requires. When the first computers first appeared, it was still science fantasy to think that technology would advance to the point where voice instructions could be given to a machine. But, thanks to significant advancements in the industry, speech interface with gadgets is now about to become a reality.

KEYWORDS—VoiceRecognition,HomeAutomation,Arduino,Bluetooth,12v4channelRelay,ConnectingWires

I. PROBLEM STATEMENT

The goal of this venture is to develop a model that can identify and understand human speech and control equipment in accordance with the user's commands. The intention is to build a model that can work with a Bluetooth module, but it may also be expanded to include a Wi-Fi module. The main objective of the suggested system is to comprehend human language and programme the gadget to carry out the user's commands.

II. INTRODUCTION

a) Objective

Home automation is becoming more and more popular since it increases efficiency by lowering human effort and mistake. Home automation systems allow us to operate a variety of devices, including lights, fans, TVs, air conditioners, etc. A household automation system can also combine other features like security, alarms, and emergency systems.

b) Project Overview

There are many different kinds of home automation systems, including ones that can be operated by Bluetooth, the internet, remote control (IR remote), etc. Each variety has its own benefits and drawbacks. In this project, we created a speech-activated home automation system that allows users to operate various appliances using their voice. Arduino UNO, Bluetooth, as well as a smartphone are employed to build the vocal prompted home automation project. We are demonstrating a speech-activated home automation system that allows users to operate appliances using only their voice.

c) Components

In order to complete this project .we require

- ArduinoUNO
- HC-05Bluetoothmodule

- 12v4channelrelayboard
- ArduinoIDESoftware

III. EXISTING SYSTEM

A common idea in the electronics industry is home automation, which is motivated by the need for more comfort and security. Automation can take the role of conventional switches, which may prove dangerous because of the possibility of sparking and fire mishaps. An innovative connected home system has been created in order to take full use of Wi-Fi technology's benefits. By the use of Wi-Fi, this technology enables control of home appliances from a personal computer. Wi-Fi technology transmits data wirelessly using radio frequency at initial rates of 1-2 Mbps as well as a reach of 40–300 feet. The mechanism that controls this automation system is the Arduino UNO board instrument. It accepts data transmitted by Wi-Fi and uses relays to regulate the switching of electrical devices that are linked. Overall, this cutting-edge home automation system offers a simple solution for the quick and secure management of home equipment.

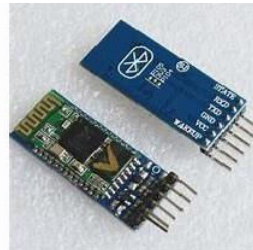
IV. LITERATURE SURVEY

a) Bluetooth based home automation

- Relays are used in Bluetooth-based home automation systems to connect domestic appliances to an Arduino BT board at input and output ports.
- The software for the Arduino BT board is written in C, a high-level interactive computer language for microcontrollers.

The Bluetooth technology is now active. Because of the password protection provided, only authorized persons have access to the equipment.

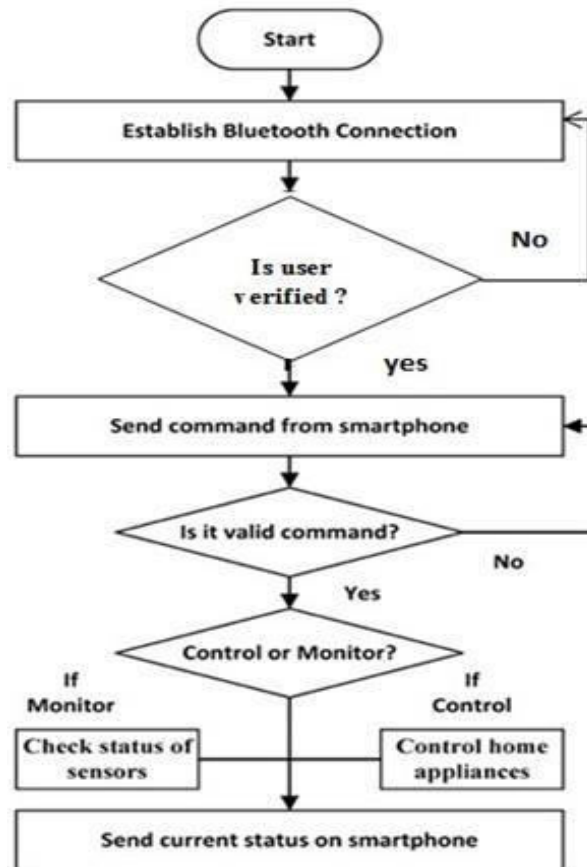
- A Bluetooth connection is established between both the Arduino BT board and the phone for wireless communication.
- This system's Python script is transportable and may be deployed on any Symbian OS environment.
- A simple circuit is designed and implemented to take input from the phone and display the device's condition.



V. PROPOSED SYSTEM

Here, we'll demonstrate voice commands for four distinct home appliances. The Arduino, Bluetooth, Relay, LCD display, mobile, and Mobile Application are the main elements of this project. Our smartphone must first have the app installed, which is simple to find in the play shop. Our voice command is received by this app, which then wirelessly transmits it through the Bluetooth module. This command is decoded by the Arduino from Bluetooth module. The household appliances are then controlled by an Arduino order that is sent to the Relays. Eight distinct voice commands can turn these four household appliances on and off. The state of the household appliances, whether on or off, will be shown on the LCD module. To start, we must decide amongst 8 distinct Voice Command categories to operate 4 devices. To operate a gadget, certain specific voice commands are utilised. For example, the instructions "turn on light" and "turn off light" are used to switch on and off certain lights. The Microcontroller code makes use of these voice commands.

Flow chart diagram



Our Bluetooth module accepts voice commands from the app and sends them to the Arduino. This command is now being compared to the predefined instructions by Arduino (which are defined in Arduino code). If the instruction is correct, Arduino instructs the relay to turn on. The gadget status (on or off) is shown on the 162 Large Lcd Module.

For example, we may utilise the app to provide the voice command "switch on light." This command is then sent to the Arduino by the Bluetooth module. The Arduino then sends a Low (0) voltage level to the relay module's Input-1 (IN1) pin. The relay is now turned on. As a result, the device (light) connected to relay-1 of said relay will also turn on. The condition print "D1 (Device 1) is ON" is shown concurrently on the 16*2 LCD Display Module.

When we use the application to give the voice control "switch off light," everything functions as it should. This command is again sent to the Arduino via the Bluetooth module. The Arduino provides a High (5v) signals coming to the relay capsule's Input-1(IN1) pin this time. The connection has now been disconnected. As a result, the device (light) attached to relay-1 of the aforementioned relay will likewise switch off. For the 162 Big Lcd Module, the status indicator "D1 (Device 1) is OFF" is displayed continuously.



VI. ARCHITECTURE

The Arduino IC or architecture is being discussed here (ATmega328p). The ATmega328/P is an upgraded RISC (reduced instruction set computer) based low-power CMOS 8-bit microcontroller. The AVR employs Harvard architecture, which has distinct memory and buses for program and data in order to optimise speed and parallelism. Program memory instructions are carried out using just one level of pipelining. An additional 16MHz Crystal Oscillator controls the clock.

The ATmega328 CPU's fundamental operation is below:

- (a) Data is transferred serially over the interface (from the Arduino IDE on the PC). When the data has been decoded, the instructions are sent to the instruction register, which decodes them by employing a single clock pulse. The subsequent set of instructions is stored into the instruction register with the arrival of the subsequent clock pulse.
- (b) There are three 16-bit registers in addition to the 8-bit general purpose registers.
 - Data for typical computations and outcomes is stored in 8-bit registers.
 - Information out from timer counter is kept in 2 separate 16-bit registers.
- (c) Even when the power is out, EEPROM retains data forever. In an EEPROM, programming takes time.
- (d) The Interrupt Unit determines if an interrupt is present before executing an instruction in the ISR (Interrupt Service Routine).

User Interface Bluetooth Terminal Application



- (e) (f) Serial peripheral interface, or SPI, is a common interface bus for transmitting data between embedded systems and small peripherals like as cameras, displays, SD cards, and so on. It makes use of several clock and data lines, in addition to a choose line, to select the target machine for communication. Watchdog timer helps identify and fix MCU issues.
- (f) Once the value of positive pin is greater than that of the negative pin, the output is determined by the analogue comparator.
- (g) Status and control monitor other CPU blocks periodically to regulate the flow of orders being executed.
- (h) the logical and arithmetic unit (ALU): The AVR ALU is directly coupled to all 32 of the multi purpose working registers. A single clock cycle is used to complete arithmetic operations among general purpose registers.
- (i) (j) I/O pins: You may connect Arduino sensors, actuators, and other ICs to the board's digital inputs and outputs (digital I/O). You may employ the Arduino to accomplish some quite useful activities if you understand how to use them.

a) Modules

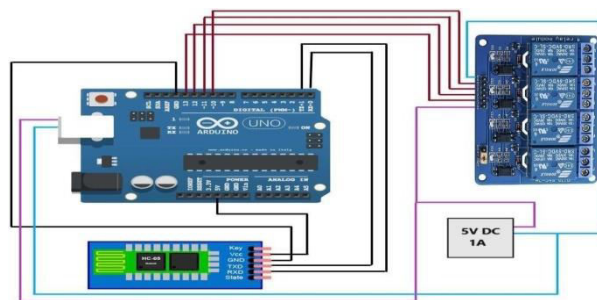
Bluetooth module: On the transmitter side, a mobile phone GUI software sends ON/OFF impulses to the receiver,



where loads are connected and a Bluetooth module is hooked to the Arduino uno board. The loads can be remotely turned ON/OFF using this method by tapping the specified area on the GUI.

Voice module: Uses inbuilt voice recognition on Android mobile devices to send voice instructions to your robot. connects to Bluetooth Serial Modules & transmits the voice that was identified as a string. For instance, the Smartphone will produce a string if you say Hi. Your Bluetooth module responds with a *Hello#. followed by the start and stop bits * and # Used with any microcontroller that has the ability to handle strings.

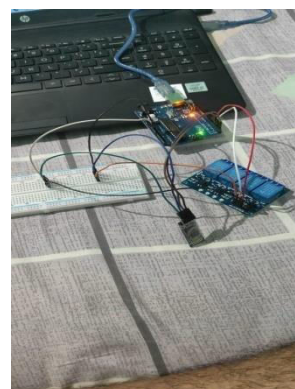
Examples of platforms include Arduino, ARM, PICAXE, MSP430, 8051-based CPUs, and several additional controllers and processors..

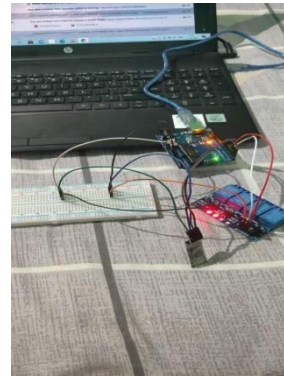
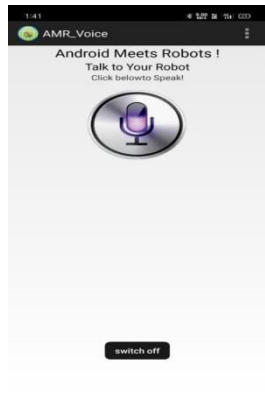


VII.CONCLUSION

With the help of an Arduino board and Bluetooth module (HC-05), we successfully developed a voice-controlled home automation system in this project. This project may be used to extend the number of relays to control "4" input controls. Our adopted module is more trustworthy and adaptable to regulate various loads.

Switch on





and The wireless control's coverage area is 10 metres. So, this idea might be helpful for a voice-controlled, real-time home automation. As a result, voice-activated home appliance control utilising Arduino technology outperforms remote control control of domestic appliances employing Bluetooth module HC-05. Many automation applications, including those in the automobile, military, healthcare, transportation, and industrial automation, can be added to this project. Also, the adoption of GSM modules can expand the coverage area.

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