Proceedings of the International Conference on Sustainable Computing and Data Communication Systems (ICSCDS-2023)
DVD Part Number: CFP23AZ5-DVD; ISBN: 978-1-6654-5579-4

SMART HOME APPLICATION FOR CHALLENGED ALONG WITH HUMAN TEMPERATURE DETECTOR

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Abstract* — *A smart home is a component of the Internet of Things (IoT) technology implementations that help people with their daily activities. To link devices to the Internet of Things, a variety of communication methods can be used. Impairments restrict the activities that disabled people can participate in. This paper proposes an automation system that enables disabled people to control televisions (TVs), lights, and fans, any other electrical devices at home, using just voice commands without moving. The Google Assistant feature for mobile phones is used to achieve voice recognition on electronic components. This system also contains the concept of human temperature measurement where the temperature sensor, fixed to the door, checks the temperature of the person and opens when it is normal. This prevents the user from getting infected by the illness, keeping in mind the present situation of covid19.

Keywords* — *Smart home, Automation system, Voice commands, Google Assistant, Temperature measurement, Disabled people

I. INTRODUCTION

The presence of people with impairments in our social lives is a reality. Because nobody wants it that way, they also require attention. Physical problems are an issue for impaired people since their physical restrictions impede their ability to move more easily. Unlike normal people, disabled people cannot perform their own tasks at home.

A smart home is a brand-new idea for a house that offers comfort, safety, and energy-saving capabilities for the home at any time, improving people's quality of life. The goal of the smart home is to make it easier for its residents to manage all aspects of their comfort while living there, from safety concerns to the issue of accessing equipment that is made more interactive and can be managed through just one device, the app on a smartphone or other device.

An IoT-based smart home application could make it easier for people to control numerous items, including electrical equipment, online. Additionally, a variety of wireless technologies may enable connections from distant locations to advance the intelligence of the home environment. Innovative ideas and considerable development for smart homes are generated using IoT technology to raise living standards.

The aim of this paper is to provide an IOT-based system that helps disabled people to manipulate various home appliances such as fans, lights, television, etc. with voice commands. The voice commands are given to an android application that contains google assistant. This system also checks the temperature of a person outside the house

with the help of the temperature sensor and the door either automatically opens or remains closed based on the body temperature of the person. This system makes it easy for disabled people to control their home appliances remotely and helps to prevent the person from diseases by not allowing the infected person into the house.

II. LITERATURE STUDY

A thorough analysis of the body of the work in this field is often required for a literature review on home automation. A household appliances control system was described by Nguyen [1]. The home appliance control system uses power line communication and infrared radiation. The user can use this technology to remotely monitor and operate their appliances from anywhere. And they carry out this through their mobile phone or the web. A system that uses a personal computer to control home appliances was proposed by Haque [2]. In order to build this system, Microsoft voice engine tools and Visual Basic were used as programming languages. A timer or a voice assistant can be used to run appliances. For connection between mobile devices and PCs, Jawarkar designed a software framework [4]. In order to support AT commands, the UART 16550A chip has been programmed using the proper control format. In this system, the cellphone is used to execute commands given by pre-configured users, receive commands from those users, and send SMS messages to users informing them of status changes related to input.

IPrabhakar V. Mhadse suggested Voice recognition technology was developed and put into use in a home automation system. Using MATLAB programming and a voice processor, the system accomplishes automatic speech recognition [5].

Using speaker identification via a wireless connection, S. R. Suralkar conceived and implemented a speech recognized automation system [6]. The system uses a speech processor to implement automatic speech recognition and a MATLAB coder to implement speaker identification using the MFCC technique.

III. METHODOLOGY

One approach to building a smart home system would be to first undertake user research to discover the target population's individual wants and preferences. This might entail conducting interviews, surveys, and focus groups with people who have impairments that make it difficult for them to utilize typical smart home controls.

Next, design and build a system that connects Google Assistant with smart home devices including lighting, thermostats, televisions, and other appliances and allows for voice control.

Finally, run the system through its paces with the intended audience to check that it is user-friendly and simple to use, and make any required changes based on feedback.

According to previous research on the IoT Home Automation system, four different types of apps are used, including SMS, applications, and applications. (Telegram, Blynk, and so on), as well as the internet. In contrast to the easier Google Assistant app, while using the app to manage electronic components in a smart home, the user must create a text message before sending a command. Because utilizing voice instructions is more convenient than writing directions, users may just speak orders into the Google Assistant app, and the system will display the texts which were previously spoke. Consequently, users will not have to retype text messages. Furthermore, previous investigations did not examine the hazard posed by feverish persons to the disabled.

The proposed system includes an Internet of Things-based smart home application, a voice-activated remote control, and a temperature sensor fastened to the front entrance of the users' residence. The Arduino UNO, NodeMCU (ESP8266), relay, Power supply, Temperature sensor (DHT11), a Driver circuit, Piezo buzzer, and DC motor are the main components of this home automation system.

This system has a specific Android app that works as a remote control for the appliances.

The program includes Google Assistant, which is used to accept commands and operate the appliances according to the orders supplied. In addition, it contains switches that can be toggled with a touch.

To identify speech on electrical devices, the Google Assistant smartphone app is employed. Remote appliance monitoring and administration are not possible with the current setup. The proposed method, on the other hand, makes use of a Wi-Fi-based linked home system that allows for monitoring and administration of the appliances.

IV. IMPLEMENTATION

This technology is highly helpful in enabling people to control their electrical devices, such as televisions, lights, and other items, using solely voice instructions through a smartphone

Before issuing voice instructions, the phone should be linked to the NodeMCU microcontroller by Wi-Fi or a mobile hotspot. Open the Google Assistant voice application after the connection between the mobile phone and the NodeMCU has been established. The Google assistant application takes the commands for handling the electrical devices. Toggling the relevant switches or spoken commands can be used to operate the electrical equipment. For example, when a person says, "BULB ON," the NodeMCU detects the instruction and delivers it to the Arduino UNO microcontroller. To receive voice instructions, the application does digital sound processing. The Arduino UNO then activates the digital pin, and the signals are sent to the relay associated with the light. The light illuminates when the relay is activated. The identical thing will happen in the "BULB OFF" situation. Similarly, additional appliances may be controlled in the same way.

For the temperature measuring portion, the DHT11 temperature sensor attached to the door checks the person's temperature before allowing the person to enter the dwelling of the disabled. The record of the person's body temperature is supplied to the driver circuit, which controls the Piezo buzzer and the DC motor. If the temperature is optimal, the driver circuit permits the DC motor to run. The DC motor is utilized to illustrate the door opening. If the person's temperature exceeds the normal range, the buzzer sounds, and the DC motor stops. The bell signifies that the oncoming individual's temperature is high, and so the person is not permitted to enter the residence.

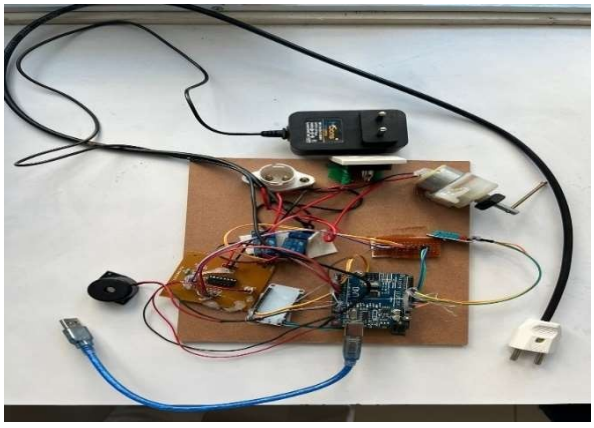

Fig. 1. This the prototype of the whole control system

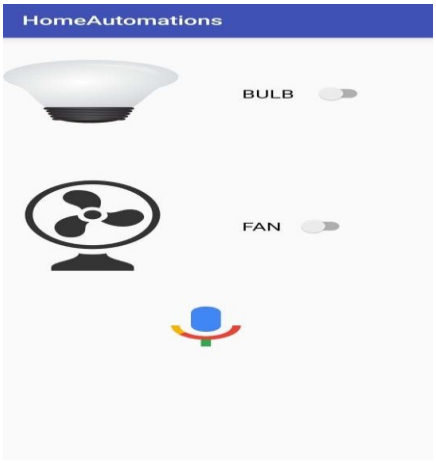

Fig. 2. This is the Android smartphone application consisting of switches and the Google Assistant software

V. EXPERIMENTAL RESULTS

After the design has been finalized, the object is checked, tested, and measured. The goal of this step is to assess the overall effectiveness and functionality of the device. To begin, various tests should be performed to see how the Google Assistant responds to voice requests. The goal of this check is to look at voice pronunciation. When utilizing the Google Assistant app on an Android smartphone, the speech pronunciation must be correct and clear. If a voice command is correctly and precisely spoken, the Google Assistant application will accept. Furthermore, if a voice's pronunciation is wrong or imprecise, the Google Assistant application will reject. The examination results are shown in the table below.

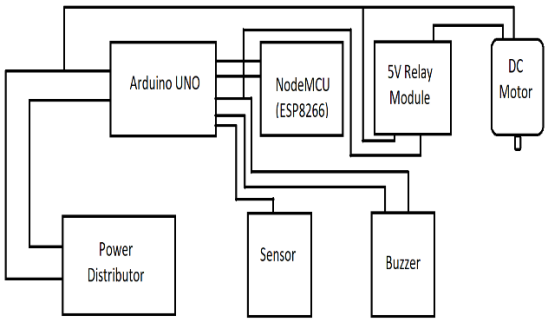

Fig. 3. Circuit representation of the prototype

Exp .no	Voice Pronunciation	Response of Google Assistant
1	Correct Pronunciation	Accepts the command
2	Correct Pronunciation	Accepts the command
3	Correct Pronunciation	Accepts the command
4	Correct Pronunciation	Accepts the command
5	Correct Pronunciation	Accepts the command
6	**Incorrect Pronunciation**	**Rejects the command**
7	Correct Pronunciation	Accepts the command
8	Correct Pronunciation	Accepts the command
9	**Incorrect Pronunciation**	**Rejects the command**
10	**Incorrect Pronunciation**	**Rejects the command**

Table. I. Examining the voice commands to the app containing Google Assistant.

Second, testing is done to see how fast the appliances work when the user uses the app. This test will assess the application program's hardware and software compatibility, as well as the device's performance. This testing allows us to verify whether the device's performance complies with the desired design.
Now, focus is put on how long it takes for the appliances to turn on when the disabled person uses switches, as well as the Google Assistant and connect the Android smartphone to the management system.
The outcomes of the preceding are shown in the table below.

Exp .no	Time taken to switch on using app switches (In Seconds)	Time taken to switch on using Google Assistant (In Seconds)
1	2.3	2.4
2	2.0	3.0
3	1.8	2.2
4	3.2	1.4
5	4.0	1.7
6	1.2	1.8
7	2.6	2.3
8	3.0	3.6
9	3.5	3.7
10	2.9	3.0

Table. II. Testing the time taken by the appliances to switch on using app switches and Google Assistance.

Now, focus is put on how long it takes for the appliances to turn off when the disabled person uses switches, as well as the Google Assistant and connect the Android smartphone to the management system.
The above-mentioned outcomes are shown in the table below.

Exp .no	Time taken to switch off using app switches (In Seconds)	Time taken to switch off using Google Assistant (In Seconds)
1	1.7	2.1
2	1.9	1.0
3	1.5	1.7
4	2.4	2.8
5	2.6	2.5
6	2.0	1.7
7	2.6	2.0
8	3.7	2.9
9	3.2	3.0
10	2.8	3.3

Table. III. Testing the time taken by the appliances to switch off using app switches and Google Assistance.

Table. IV. Response of the buzzer and dc motor based on the person's temperature.

Exp. no	Temperature of the person (Fahrenheit)	DC motor Working (yes/no)	Buzzer (on/off)
1	101.6 F	No	**On**
2	96.3 F	**Yes**	Off
3	100.9 F	No	**On**
4	97.7 F	**Yes**	Off
5	98.9 F	No	**On**
6	104.1 F	No	**On**
7	96.8 F	**Yes**	Off

Based on the human's temperature, If the temperature of the person is more than 98 F the buzzer gets activated, the buzzer buzzes and alerts the owner. If the human's condition is below 98 F, The DC motor starts running and allows the person enters the home.

VI. CONCLUSION AND FUTURE SCOPE

We create and deploy Google Assistant-based IoT voice commands for smart homes in this study. This technology, when combined with Google Assistant on smartphones, would allow visually challenged people to operate electrical items such as fans, TVs, and lights. The on/off switches on electrical devices do not require users to move. Google Assistant will respond to voice commands that are correctly spoken. Voice instructions are easier to implement because they do not require the input of written messages. Users benefit from convenience by not using text. Users do not need to input text messages into the Google Assistant application; instead, they can simply speak commands, and the system will display the previously mentioned text messages. The transmission power of an Internet connection will generate a valuable performance tool for the Google Assistant's reaction times, system processing, and turning on and off electrical devices. The system must be built and tested in the real world. According to new research, designing devices using Wireless Networks, NB-IoT, and 5G networks to achieve minimal latency and maximum signal strength involves various challenges. As a result, testing equipment' performance will improve.

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