

Development of Voice Activated Home Automation System

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Abstract: Home automation is one of the major growing industries that can change the way people live. Some of these home automation systems target those with special needs like the elderly and bedridden people. The developed system can be integrated as a single portable unit and allows one to wirelessly control lights, fans, bed, and alarm, and turn ON or OFF any appliance that is plugged into a wall outlet, get the status of different sensors like (Temperature sensor, LDR Sensor, PIR Sensor) and take decision accordingly. The system is portable and constructed in a way that is easy to install, configure, run, and maintain. Project can make life easier for bedridden patients and older people as their voice command (Bluetooth Module) can trigger the control section that adjusts their bed's position. It can even control home appliances like lights, alarms, fan/AC, and TV, based on the command

Keywords: Home Automation, Voice Control, Bed Motion, Sensors, Embedded System

I. INTRODUCTION

Smart home itself does not mean smart when the home is built friendly to the environment, how space it uses, or using solar power and recycling waste water, but what makes it smart is the interactive technologies that it contains [1]. A smart home is called "intelligent", because its computer systems can monitor many aspects of daily life [2]. The concept of the smart home is a promising and cost-effective way of improving home care for the elderly and the disabled in a non-obtrusive way, allowing greater independence, maintaining good health and preventing social isolation [3]. Smart home consists of home appliances, sensors, actuators and data processors and analysers [4]. Home automation of appliances can be either wired or wireless [5]. The main contribution of this paper is that it presents easy to implement, flexible and scalable solution for making a smart home environment. Smart home system presented in this paper is based on mobile device, because of constant growth of smartphones and tablets usage. The Bluetooth wireless technology is set to revolutionize the way people perceive digital devices in our homes and office environment. Now they are no longer just the individual devices; instead, with the embedded Bluetooth technology, they form a network in which appliances can communicate with each other. This wireless technology is especially useful in home environment, where there exists hardly any infrastructure to interconnect intelligent appliances. It could be suitably used for home automation in a cost-effective manner. Operating over unlicensed, universally available frequency of 2.4 GHz, it can link digital devices within a range of 10 m (expandable to 100 m, by increasing the transmitted power) at the speed of 1 Mbps. Building upon this theme; we propose a home automation system based on Bluetooth technology [1,2]. There are certain issues involved in the design of a home automation system. The system should be scalable, so that new device can easily be integrated into it. It should provide a user-friendly interface on the host side, so that the devices can be setup, monitored and controlled. The interface should also provide some diagnostic services so those problems with the system, if any, can be tracked down. The overall system should be fast enough to realize the true power of wireless technology. It should also be cost effective in order to justify its application in home automation. The aim of this project is to develop a system that will provide remote control of home appliances and also provide security against intrusion when the home host is not at home. This paper is mainly concerned with the automatic control of light or any other home appliances using internet. It is meant to save the electric power and human energy. Home automation systems have drawn considerable attentions of the researchers for more than a decade.

The advantages of using voice as an interfacing medium are multifold. Firstly we would do away with or significantly decrease the need of training for operating technology. Secondly, the simplification of services would entail a wider adoption of existing technology and would help people with varied disabilities access the same technology. We have deployed an Android Application as user front end primarily because of the ease at which the platform provides us with means to use complex technology and due to the widespread adoption in the Mobile industry. Android is being used as the operating system for over 80% of the smartphones. Voice controlled House Automation System leverages the power of Arduino to provide a holistic voice controlled automation system. Using Natural Language Processing and the available hardware in most smartphones, it translates voice to be used for controlling electrical devices.



Voice Controlled Home Automation System

II. LITERATURE SURVEY

Author is trying to explain the importance and modifications in home automation system. Also, previously we were using this automation system but it was limited to TV or fridge or AC but nowadays our complete electrical home appliances can be controlled by our voice fan, light, water geyser can be controlled with IOT. Before jumping to the final project various prototypes were being made, the author has made use of Microsoft Kinect sensor V2, its working and functionality by conducting an experiment on Windows 10 64-bit operating system using this V2 sensor. Two parameters were considered one was the distance from Kinect and the ability of sensor to operate in noisy background. The problem faced was that the accuracy on the sensor decreases when the distance of the transmitter increases more than 3 meter it drops by 55% and it was only able to detect British accent with more accuracy. With further modifications Kinect would be able to clear its flaws and would be becoming the perfect home automation system but in present there are many other systems which are far better than this sensor.

[2] Voice assistants, such as Siri, Alexa, Cortana, and Google Assistant, which are software agents that can understand human speech and respond through synthesized voices. Users can ask voice assistants questions, control home automation devices, manage basic tasks, and perform media playback through voice commands. The research paper suggests that voice assistants have implications for privacy and security and highlights potential future uses, such as delivering library services and materials.

Voice assistants represent an expression of a long-standing science fiction idea of communicating with computers through spoken language. Companies such as Apple, Microsoft, Amazon, and Google have created software agents such as Siri, Cortana, Alexa, and the Assistant that operate on specialized speakers or mobile devices. These agents are designed to recognize and respond to human voice commands, making it easier for users to interact with their devices and complete various tasks. As each of the currently available voice assistants has its own unique features, they all have some similarities and are capable of performing basic tasks such as sending and reading text messages, making phone calls. They can also provide answers to general informational questions such as the current time, weather forecast, or conversion rates. In addition, they can set timers, alarms, and make calendar entries, create lists, and perform basic mathematical calculations.

[6] Voice-activated devices, such as voice assistants, have useful features but also pose security risks. Anyone with access to a device can gather personal information, access accounts, and perform tasks. A reported case showed that

Siri would unlock the front door for anyone who asked. Google's Assistant software now includes voice printing to uniquely identify each user by voice.

[7]Minimization of requirement for direct physical contact with technology. IOT can be used to test the viability of creating a voice-controlled home automation system, and it provides a practical, affordable, and effective way to operate home appliances.

[8]Mobile application, thing speak cloud, Web App with Web Server, Home Automation, Voice Recognition, IOT. The investigation was carried out utilizing a combination of testing, hardware and software design, and literature review. To determine the properties of the existing systems, a review of the literature was done. The hardware design process involved choosing the necessary elements, such as microcontrollers, sensors, and actuators.[9] The microcontroller was programmed as part of the software design, and the voice-controlled system's user interface was created. To verify the system's effectiveness and functionality, testing was done.

III. METHOD OF DISEASE DETECTION

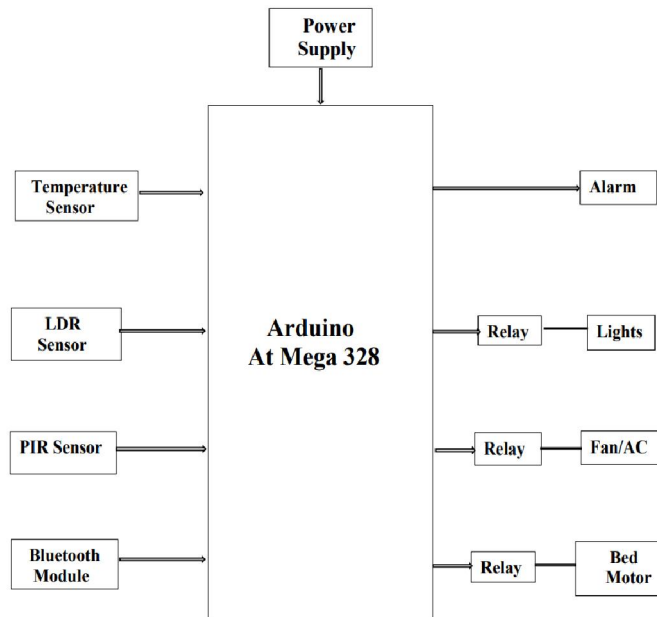


Fig. 1. Block Diagram

The Block diagram of the system is shown in Fig. shows and the functional block The system receives voice commands through Google Assistant running on the smartphone. If the command is valid (for instance, Light On), the 'If This, Then That' (IFTTT) applet will send the web service request to the Android app and convert it into digital data, understandable by the Arduino, and transfer the data to Arduino wirelessly through Bluetooth and actuate the device as per the voice command

Arduino Uno

The Arduino Uno is a circuit board with ATmega328 built in it, the Arduino Uno which we are using consists of 14 digital input/output pins (where the 6 pins can be used as PWM output pins), 6 of them are analog, there is also USB connecting port, a power jack, and reset button. This microcontroller is very basic and simple for demonstration purposes. We can power the Board with an AC-to-DC adapter or battery and by USB cable through the computer. One of the other best thing about this microcontroller is that it has a CPU that comprise a significant amount of RAM, ROM, and some other components as well.

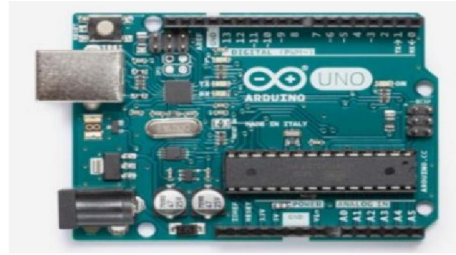


Fig. 2.Arduino Uno

Bluetooth Module

Another important thing to consider is the Bluetooth module (HC-06), which will be the medium for connecting the android phone with the Arduino Uno, we refer it to as the slave module. The voltage that is required of a Bluetooth module is 3.3, and the major reason for choosing this module is its less voltage consumption, and it is also compatible with the microcontroller to work at a very low voltage.

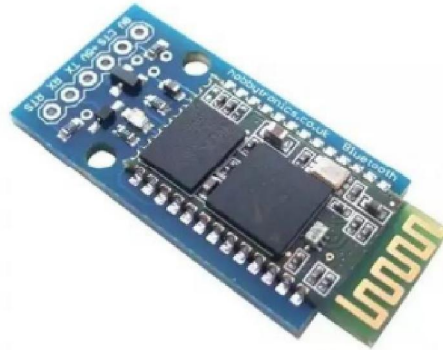


Fig. 3.Bluetooth Module

Relay Module

In order to control the voltage and power of the Arduino Uno, we have fitted it with the Relays module which ultimately controls and prevents the high voltage through its electromagnetic behavior to detect the current.



Fig. 4.Relay Module

Temp Sensor LM 35

The LM35 can be applied easily in the same way as other integrated-circuit temperature sensors. It can be glued or cemented to a surface and its temperature will be within about 0.01°C of the surface temperature. This presumes that the ambient air temperature is almost the same as the surface temperature; if the air temperature weremuch higher or lower than the surface temperature, the actual temperature of the LM35 die would be at an intermediate temperature between the surface temperature and the air temperature.

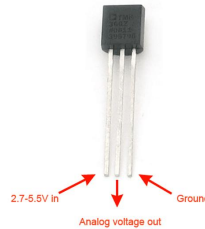


Fig. 5.Temp Sensor LM35

LDR Light Sensor

The majority of street lights, outdoor lights, and a number of indoor home appliances are typically operated and maintained manually on many occasions. This is not only risky but, additionally, leads to wastage of power with the negligence of personnel or uncommon circumstances in controlling these electrical appliances ON and OFF. Hence, we can utilize the light sensor circuit to automatically switch OFF the loads based on daylight's intensity by employing a light sensor. This article discusses in brief what is a light-dependent resistor, how to make a light-dependent resistor circuit, and its applications



Fig. 6.LDR Light sensor

IV. CONCLUSION

Controlling the home utilities via voice is just an amazing step forward toward the development of the wireless sector, as this involves totally a wireless medium to create the connection. There are many Android-based applications that have been developed to initiate the working on this technology which also includes voice-controlled wheelchairs etc. In all the previous experiments and trials which are done before, we have utilized the same concept to implement it in an efficient manner, so that more people can be benefited which involves just a say of the word to make things work i.e. home utilities. Without a doubt, this technology will bring revolution in people's life if that is implemented on a larger scale.

V. ACKNOWLEDGMENT

It gives us great pleasure in presenting the paper on "Development of Voice Activated Home Automation". We would like to take this opportunity to thank our guide, Er. Auti P.D., Assistant Professor, Department of Electronics and Telecommunication Engineering Department, Rajiv Gandhi Collage of Engineering, Karjule Haryana, for giving us all the help and guidance we needed. We are grateful to him for his kind support, and valuable suggestions were very helpful.

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