Controlling and Monitoring of Home Parameters Using Remote and Voice Through Arduino and Google Assistance

Nazim Khowaja, Waqas Ahmed Siddique, Zohaib Zulfiqar, Alim Karim

Abstract*— In this modern world, everybody wants to become smart and works smartly. So, this home automation project will help people who are elders or disabled; this project facilitates them in their daily life. The purpose of this project is enhancing the living standard and provides ease in daily activities. The concept and aim of designing this automation system are to control home appliances and gadgets by voice and remote control. Wireless technology will use to implement access for appliances through smartphones. Our intention in this project is to design a control system that must be easy to install, use to operate, and economical for controlling electrical equipment. Since this project is based on wireless and remote control technology, the controller or user is only allowed to control and operate the appliances relate to the project while sitting anywhere in the room or house in the vicinity or range of the sensors and receivers. In future owners can easily add more appliances, and this project will also use in the industrial sector.

***Index Terms*—ARDUINO UNO, AUTOMATION, VOICE, REMOTE, GOOGLE ASSISTANT, IR REMOTE**

I. INTRODUCTION

In today's era, people want to become smart now a day's people won't make their lifestyle easy and stylish. Today in an industrial or commercial life automation system is used to control the devices. Now a day's people want an automation system at their offices and home to make their work easy and save time, and also they want as much as advantages from this technology. As we look at the industrial side, they want to control their machinery and other things like Lights, TV, Fan, AC the basic things that required them daily. People are now a day's demand that they want to control all their basic needs in life to be controlled or watching out their phones [1]. They want to control different devices with their IoT. IoT helps the user to connect with anyone, anytime and anywhere. Automation helps to connect and control any devices anywhere user want to by using different boards and sensors that can control lights and other things as well. Automation helps you to connect and control the home appliances through smartphones and remote for the smartphone. You need the internet can control this appliance from inside and outside of the home. Today it's very easy and affordable to buy an automation system, but what's the main problem is different companies have developed their apps if a person buys different appliances from different brands. Hence, the owner has to install more apps on their phone [2]. The owner has to, again and again, want to switch applications to get access to the appliances; it's also the waste of phone battery percentage. The purpose of home automation is to give easy access to the appliances to those people who are disabled or handicapped, so they can control the appliances by seating in one place. Multiple controls are required because everybody doesn't know how to use smartphone's so there should be another option available for these people. The problems identified by different researchers and try to solve these issues with the best outcome. Sadee et al. [3] in 2017 Home Automation Using 1sheeld this project was very basic; it was only controlled with the application, so this project was only for those who can use smartphones. Mantej et al. [4] 2017 Virtual Home assistant connecting home appliances with smartphone Bluetooth over GSM, this project has some good integration. Still, the problem was that to control appliances, users need Smartphone and GSM. Jervui et.al [5] 2017 Smart Elderly Home purpose of this project was to make easy for aged people's to get access but the issue was the same every time internet connection required controlling appliances. Pawan[6] 2018 Home Automation Using Google Assistant, it's only one-way connectivity users must know how to use a smartphone. Arjun [7] 2018 Waran Home Automation designed basic applications to control the appliance with Bluetooth. Shubham [8] 2019 Home Automation Using Arduino and Bluetooth in these automation projects, two appliances were connected, and a simple application was designed to control them. In this paper, we will help to make

This project easier, and anybody can easily use this project. First of all, in our home automation system, you didn't need a laptop or applications. All you need is a smartphone, or if you didn't have a smartphone, so we're using another way to control your appliances with IR remote. IR remote is an alternate way to control appliances. So our project is designed for everyone. Also, the owner can add more sensors or add further devices easily; it's affordable for everyone. In the future, we can also make this project more advanced for industrial use and adding more sensors like temperature sensors, security systems, and door lock systems. Instead of the IR sensor, we can also use alternate sensors so we can use remote from long range as well. This paper is organized as

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follows: Section 2 defines the studies of similar papers, Section 3 Shows the complete work of the project, Section 4 shows the different features of the project, Section 5, and Section 6 shows hardware used in project and result of the project. Last in Section 7 shows the conclusion of the work.

II. RELATED WORK

So far, many researchers have been done and published in the field of home automation for different parameters used in the home. Automation is to control the systems and technologies to save the time and energy of humans. A home automation system¬ connects and controls the electronic appliances through the gateway hub. The scope of home automation was to make easy for the people who have natural problems like a person is blind he can use voice to control the appliances for a dumb person if he can't speak he can use augmented reality to control the appliances just have to focus appliance on the camera and press start button on APP [9]. This technology is also used in the industrial sector for easiness of the workers working on industries. These systems also used in hospital departments. So they don't need to hire more persons, one person can easily control the complete system. We can also integrate into this project by connecting electric meter through the GSM system. So we can also get notifications on the phone about how many electricity units we have used. Augmented reality was the new integration in this project through the APP [10]. This facility was basically for the people who can't have speaking abilities. This is easy for them to operate appliances with augmented reality APP. In today's world, technology is upgrading every day. The world is giving us a chance and ways to automate or lifestyles and industries. This upgrading is taking place in almost all fields [11]. In the past, it was very difficult for a blind or dumb person if they need to access to any appliances or they want to turn on fan and other things they have to find the switch or it. It took every time to them to find and turn it on, but now with home automation, they can easily get access to that thing with voice and augmented reality it was designed to save the time and especially for the people who have natural problems like if they can't see they can get access with voice. The main problem was that if a blind person touches the wrong wire or may get shocked, this was the solution home automation without touching switchboard to get easy access and turn on anything you want [12]. This idea was

Given by Team Blitzkrieg, they implemented on their member's idea and designed these systems successfully, the devices they used were Arduino 101, Genuino 101, Relays, and GSM shield. They started implementing it and got success. The good thing was that you don't need to go to check your meter readings. You will get a notification through messages on your phone how many units you had used. It helps in improving the services, increase in efficiency, and accuracy the outputs are in real-time. In today's generation, technology can enhance human life [13]. Technology is developing time by time. Automation was a dream earlier, but not today. They build an awesome home. With the Arduino UNO and Windows 10, we can build a home automation system that is capable of operating home devices automatically. How can we enhance this project because it's a very basic project whenever you want to access appliances, you have to use a computer or laptop to give commands? We can add more options on this project like smartphone connectivity with WIFI and Bluetooth, Remote control with infrared sensors to make it easy for everyone to connect with this devices and appliances and also to connect every devices and appliance that a normal person uses it on a daily basis like fan, Air conditioner, Fridge, Motor, Lights. Connecting with smartphones via WIFI or Bluetooth and remote control using infrared sensors is the new integration on this project. Because this was a very basic project, it was only controlled with windows 10. In today's era, the world wants the latest technology. They just want to give orders to a machine to perform their task [14]. The purpose and idea of this project are to help those peoples who are disabled or have other issues like they are very busy so they can just use their smartphone or remote to control home appliances, and the other problem was that these all projects already developed are the only one-way controlled system. What if someone doesn't know how to use a smartphone how they can use this technology there were furthermore things were missing on old projects. Like they were designed for lite loads. What if someone wants to use this automation system on heavy loads? The home automation idea was to give by Shubham Kumar [15]; he thinks according to his own needs, that is why it was a very basic project. He used to work 12 to 14 hours on the computer, so he thinks that to save him, he thinks to try to connect all the basic needs he needs in his daily life. So he designs this project and connected his room Fan, TV, Lights with his laptop by using windows 10 Cortana. So he doesn't have to stand again and again to turn on or off lights he controlled it from his laptop. This project was perfect and accurate but cannot use on the industrial side because every time the user needs a laptop or computer with windows 10[16]. Home automation system using simple APP it was simple application it was just controlling lights, and fan internet was required in this project purpose of doing this project was to use it for his own house that's why he keeps it very simple, but it was difficult for the other people who used this technology, and it was only one way controlled system it was not multiple controlled systems [17].

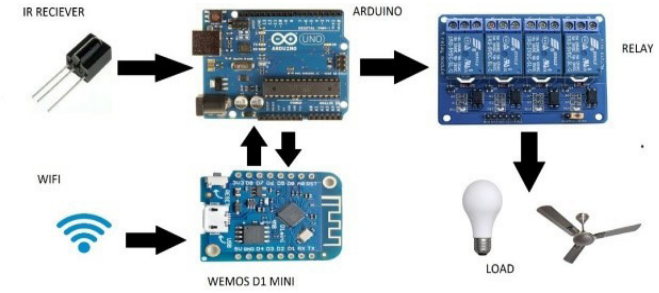

Fig. 1 Basic Idea of Project

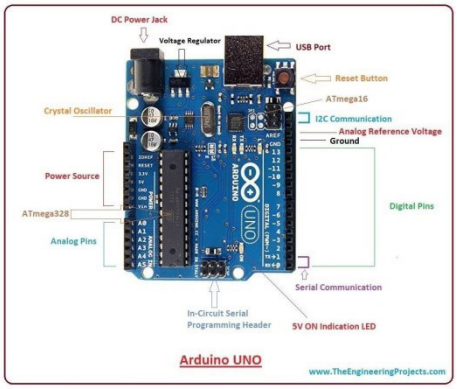

Fig. 2. Arduino Uno

III. MATERIAL AND METHOD

The basic idea of this we're using Arduino UNO board, Relay, WeMos, IR Receiver, Fan, Light. basic model is presented in fig 1. By using a remote IR receiver will send the signal to the Arduino UNO board, then Arduino will send it to relay, and appliances will turn on. By using WIFI through Smartphone Google, the Assistant user will send a signal to the Arduino board with the help of WeMos D1 Mini, then WeMos will send to relays and appliances will turn on.

Hardware Requirements

- Arduino Uno
- Wemos
- IR Remote
- IR Receiver
- Relay Module
- Wires
- Holders and Lights

All the components required to make this system are commonly available in the market and can easily be bought for lower prices. This makes it a great project to have installed at homes, schools, and offices as it will cost much less and components are easily available in local markets.

A. Arduino Uno

Arduino UNO is one of the world's most extensively used microcontroller device; it is designed by Arduino.cc. as shown in fig 2

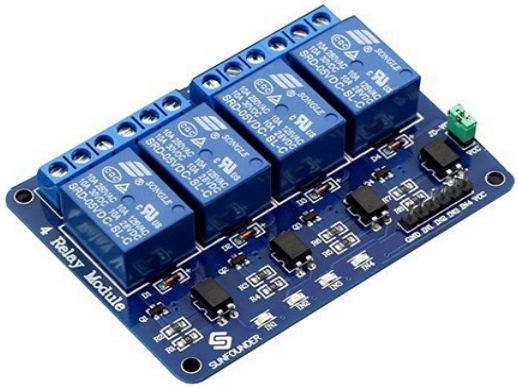

Fig. 3. Relay Module

It is based on an open-source electronic platform having built-in automatic voltage micro-controller called Atmega-328. In 2003 the world's first Arduino project was launched by David Cuartialles and Masimo Benzie in Italy at the institute of interaction design Ivrea.

The aim of these two students was to provide an economical and efficient way for professionals and students to manage the monitoring and control of devices in the world. Arduino UNO is equipped with a built-in USB interface with fourteen input/output digital pins and six analog Input pins this all pins are used to link with externals pieces of equipment and other electronic devices. Pulse width modulation is also available in Arduino UNO It allows the designers to control and sense the external electronic devices in the real world.

All the important features and characteristics required to operate a controller are available in the Arduino UNO board. It can directly communicate with PC by having Universal serial bus cable, which is utilized to transport data and information.

B. Relay Module

Relay is a device that worked on the principle of electromagnetic induction as hown in fig 3. It is basically a switch. An electromagnet is used in many relays to operate it mechanically. But in some relays like solid-state, some other principles are often used. When the low voltage signal is available for controlling purposes, then the relay is used or when only one signal is used to control several circuits. According to the principle of electromagnetism, when the coil of the relay is electrified, it becomes a magnet, and this magnet is capable of changing the state of the switch. The main feature of the relay is electrical isolation means that the switching component is completely separate from the controlling or coil section. Electromagnetically or electronically, we can close or open the circuit of the relay. The closing and opening of one circuit of the relay are managed by another circuit. There are two terminals in relay NO and NC; whenever the coil of the relay is electrified, the

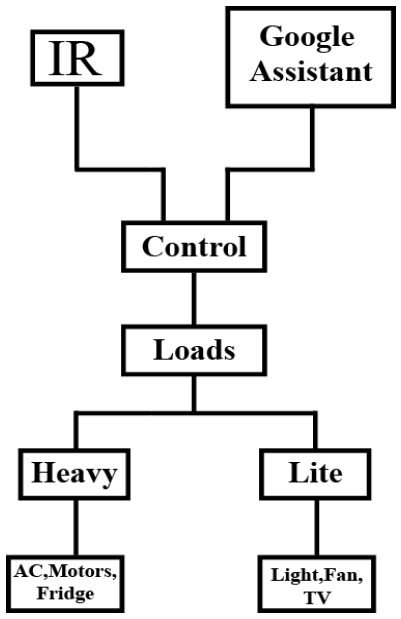

Fig. 4 System Block Diagram

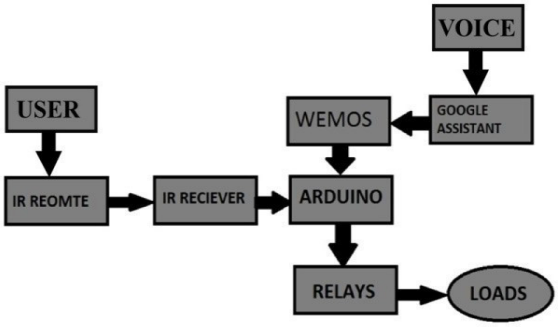

Fig. 5 System Data Flow Diagram

contacts shifted from NO to NC, and when the coil is not electrified, the contacts shifted from NC to NO.

IV. SYSTEM BLOCK DIAGRAM

The system block diagram (in fig 4) shows how the data will send or received. If the user is using a remote than the signal will send with the help of IR receiver and if the user uses a smartphone, then the signal will send through the Google Assistant for Smartphone WIFI will be used and will work on voice commands and on IR user only need to press buttons on the remote.

V. SYSTEM DATA FLOW DIAGRAM

The system data flow diagram (fig 4) shows how the data will flow through two different points. The user has two options remote and voice control as if the user chooses remote; then, remote will send the data to the IR receiver, then the IR receiver will send that data to the Arduino board, then Arduino forward that data to relays then load will turn on. If the user chooses voice control through Google assistant, then data will flow to wemos then wemos will send to Arduino board then it

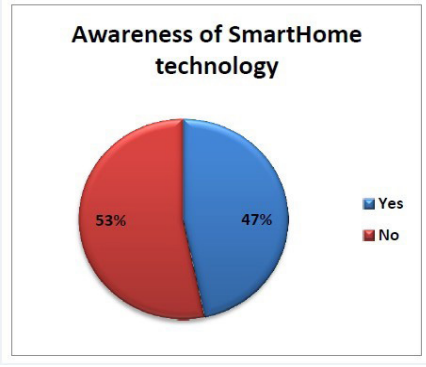

Fig. 6 Overall Awareness of the System

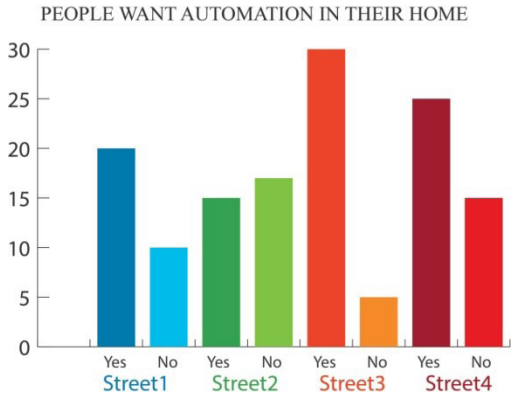

Fig. 7. Survey People Want Automation

will flow to relays then the load will turn on This diagram shows the two connections of IR remote and voice control using a smartphone we have also shown lite and heavy loads. The main difference between our project and old automation project is we're making it easier for the owner to use this system with two different controllers, and also user can connect the heavy load to control with this system and user doesn't need any applications on the phone to connect with this system.

VI RESULT

The result of this project to control any load from voice and remote after a short survey asking people about smart home and automation systems. 53 percent of peoples were not aware of this technology as shown in fig 6. The diagram above shows the percentage of people who have awareness related to the automation project. If we compare our project with already developed projects, our project is more reliable and affordable. In this project, the owner will have two options to use for controlling appliances. This project is designed to help human beings to have control over things. For the best performance, it requires a good WIFI connection so that it remains connected to the internet and can be able to read voice command send via Google assistant from a mobile

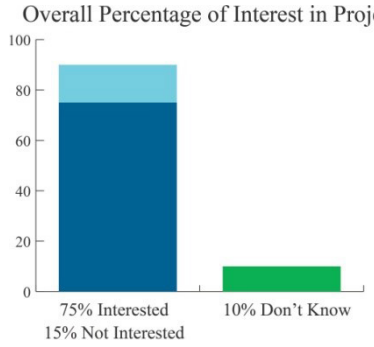

Fig. 8. Overall good

phone. Also, it requires a electrical connection without any fluctuations so that it works flawlessly and makes life easier.

After a survey from different people's that they want the automation system in their home, many people say yes they Percentage of Interest want automation system, but they didn't want to change their old Appliances also many of them say that it's not possible with their old appliances. Many people show interest in our project that it's affordable and easy to use as shown in figure 7.

The graph in fig 8 shows the overall interest of the people in our project 75 percent like our project and shows their interest in buying our automation system for their home. 15 percent didn't like our project; they feel this project very risky. The last 10 percent don't have knowledge about this type of technology, and they don't know how to use this system.

VII. CONCLUSION

In this project, a system is proposed for Home Automation using IR Remote and Google voice assistant. This system will make daily life easier for a common man as it will give more control over the home appliances, and it also will help in reducing power consumption as it is possible to control the appliances from outside the house and from anywhere. The system proposed is both efficient and cheap in cost as there are two ways of controlling rather than one, so if anyone of the way of controlling is unavailable, the appliances can still be turned on and off by using the other technology. Lacking of our project is IR receiver because IR receiver has range so in future we will try to get alternate of IR receiver to get long-range working for remote, and also we can add more things in this project like door lock, Cameras, Temperature sensor, We can also connect electric meter with this system to get how much units used it will send message with GSM technology. Also, this technology will be used in the industrial sector to control machines; one person can easily control more machines with just voice or remote.

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