SMART HOME MONITORING SYSTEM

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Abstract - The Project is about building a low-cost home automation system. It mainly focuses on creating an Internet based home automation system that can be automatically configured to run based on various conditions or that can be used to control multiple components through the internet. Wireless technology is used to enable remote access from a smartphone, PC, manually and voice command. The system is an accessible interface, affordable construction, and easy installation made it easier for controlling household electrical appliances and devices. The created system supports wireless control of lights, fans, air conditioners, televisions, Alarm, security cameras, electronic doors, computer systems, audio/visual devices, and more. It can be combined into a single portable unit. It is user friendly.

Key Words: Wireless Control, Wi-Fi, Microcontroller, ESP RainMaker, Relay, Controlling of appliances, Monitoring.

1.INTRODUCTION

Improving Home networking and increasing safety and efficiency are the main concepts of home automation technology. For example, offer more precise temperature monitoring and electricity usage monitoring.

IoT sensors can be used by systems to control the devices at home, while IoT smoke detectors can identify smoke in that Particular range. Security cameras, water leak detectors, Temperature sensing and door locks are a few examples of home security systems that may identify and notify homeowners when they occur.

Internet of Things (IoT) deals with device which are assigned to an IP address and through that IP address users can access that device on internet. Recent technological advancements that allow for the usage of wireless controlling systems, including as Bluetooth and Wi-Fi, have made it possible for many devices to link to one another.

The Arduino/ESP Rain Maker would use the Wi-Fi shield as a gateway to communicate with the internet, and it would require a wireless router or hotspot connection to be made. In light of this, a web-based home automation system is created that

allows for remote control and status monitoring of household equipment. The development of wireless technology has led to the availability of numerous types of connections.

Home Automation Systems are primarily designed to save electricity and save human labor. This is also designed to assist the elderly and disabled who have trouble walking and turning on and off household appliances.

The primary driving force behind this project is development is to improve peoples' quality of life and ease of living. It will provide individuals with the convenience of using voice commands to operate systems while remaining stationary. In this study, voice commands or an Android application are used to control home automation appliances.

BACKGROUND

The system control and monitor the status of the devices and the updated data is send to the consumer. The system controls the alarms, security cameras, and several appliances. In most of the existing works on home automation systems Arduino or NodeMCU8266 is used.

Further the NodeMCU8266 have several extensions such as ESP32 WROOM with advances features compared to NodeMCU8266.The Home automation system can enhance the efficiency of the devices, security, friendly user interface.

Home Automation Systems are becoming more advanced and trending in the market, increasing the number of consumers. Despite many benefits the home monitoring systems have few drawbacks such as internet outages, Installation cost etc.

2. METHODOLOGY

Automation of household appliances the use of different control system strategies is known as home automation. There are numerous control methods available for the electrical and electronic appliances used in homes, including fans, lights, outdoor lights, fire alarms, kitchen timers, etc. Home automation based on the Internet of Things (IoT) offers a different way to control appliances.

Home automation powered by ESP32 Dev kit board, accessing home automation via Wi-Fi using Android apps on any

smartphone. Designed and manufactured as dual-board microcontrollers and microcontroller kits, EasyEDA is an open-source hardware and software project and user community that provides the means to create digital devices and interactive things that are capable of sensing and controlling items in both the real and virtual worlds.

The suggested approach makes use of relay drivers as well. Relay drivers, sensors, controllers, and other devices connected to the relay drivers make up the suggested system. To operate the system, the mobile phone must have Bluetooth or Wi-Fi enabled. The system is managed by the Controller.

The Android mobile can be used to manage the system via the online. The system status can be altered by using a variety of sensors. Lights, fans, and other household appliances can be controlled remotely with the use of the suggested system to turn them on or off.
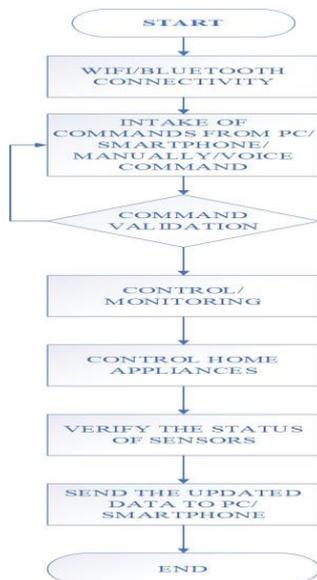
Fig.1 Flow Chart

COMPONENTS USED:

ESP32 DEVKIT BOARD**:**

ESP32 is one such microcontroller that can be used to start learning IoT and making IoT circuits. It is crucial to understand the pins' arrangement as well as the functions and applications of each pin. The pin arrangement of the ESP32-WROOM 30-pin microcontroller is described in this article first. After that, a description of the various ESP32 pin types is given. Numerous uses for ESP32 exist, such as WIFI, serial peripheral interfaces, Analog and digital devices, transmitters, receivers, and an abundance of sensors.

This is how an ESP32 with a 30-pin microcontroller looks. The ESP32-WROOM 30 pin microcontroller comprises 30 pins total, with 15 pins on each side. There are 15 Analog to digital converters in ESP32. There are two 12C interface pins of ESP32 are used to communicate between ESP32 and sensors. There are two Digital to Analog converters DAC Pins in

ESP32.There are nine touch pins in ESP32 namely T0 to T9 in which T1 is excluded. There are three Universal Asynchronous Receiver Transmitter (UART) Pins but only UART2 are considered as safe to use.

RELAY:

A Relay used a switch which is electrically operated. It consists of contact terminals and input terminals. The combination of terminals in a relay gives the on/off state of the relay. The Electrical signals from external sources are received by the relay and operates the opening and closing the circuit.

DHT11 SENSOR:

DHT11 is a temperature and humidity sensor. It is easy to access the sensor and gives the update on temperature and humidity for every two seconds. These sensors are mostly used in automations and improving the surrounding conditions.

IR RECEIVER**:**
The radiations from the IR transmitters are detected by Infrared receiver or Infrared sensors. The data is received and decoded and transmitted from infrared remote control to other devices.

SOFTWARE USED:

Arduino IDE

EasyEDA

ESP Rainmaker

Google assistant

The design and fabrication of the PCB Board is done with the help of EasyEDA software. EasyEDA is an opensource software that provide the user to design fabricate and test the designed project. The code which is used to connect the controller, components to appliances and ESP RainMaker app is extracted from the Arduino IDE which is an opensource platform for IoT where the code is developed. The code is extracted from Arduino IDE and dumped into ESP32.The Each individual component on the PCB board is controlled according to the commands written in the code. The ESP32 is connected to Bluetooth or WIFI.
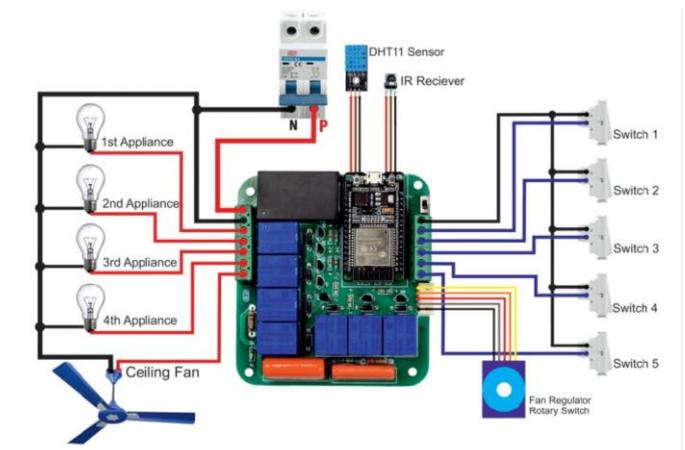
Fig.2 Circuit diagram

ESP RAINMAKER:

The ESP RainMaker is an opensource Cloud based platform that provides the users to develop IoT based automations. Firstly, the ESP RainMaker app is installed on the smartphone and linked with the Bluetooth or WIFI which is given in the code dumped in the controller. The ESP32 and ESP RainMaker app is now interconnected.

Open the app on the smartphone allow the permissions required. The number of appliances with their names are displayed on the screen which we assigned in the code. Now, we can control the devices through the ESP RainMaker application, and we also get the updated temperature and humidity status on the screen.

GOOGLE VOICE ASSISTANT:

The devices are also controlled through the voice command given via smartphone. Install Google home app on the smartphone. Open the app and setup the device and allow to work with the google and sign in to your ESP RainMaker app.

ADVANTAGES:

- Low cost and power consumption.
- It is very convenient to control the devices.
- It saves time.

DISADVANTAGES:

- Issues with internet connectivity.
- Complex in structure.
- More installation cost.

3. RESULTS

The updated status of the sensors is displayed on the app. The data from the temperature and humidity sensors are continuously updating. The connections given to the cloud server are secure and all the appliances connected to the server are controlled and monitored. The appliances are controlled through voice command, remote control, through smartphone and through manually.

The voice commands are given through the google voice assistant. The IR remote is used to control the ON/OFF of the devices.

The ESP RainMaker app enables the controlling and monitoring of the appliances through smartphone or PC. The appliances are also connected to the main switch board and that are operated manually in the absence of internet connectivity.
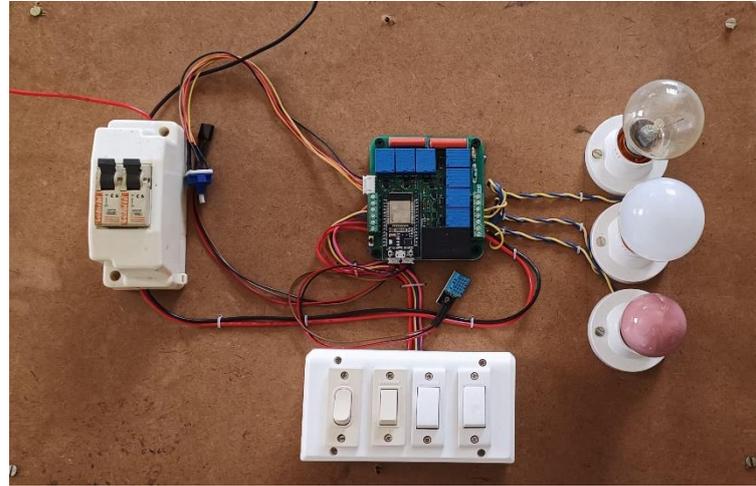
Fig.3 Results
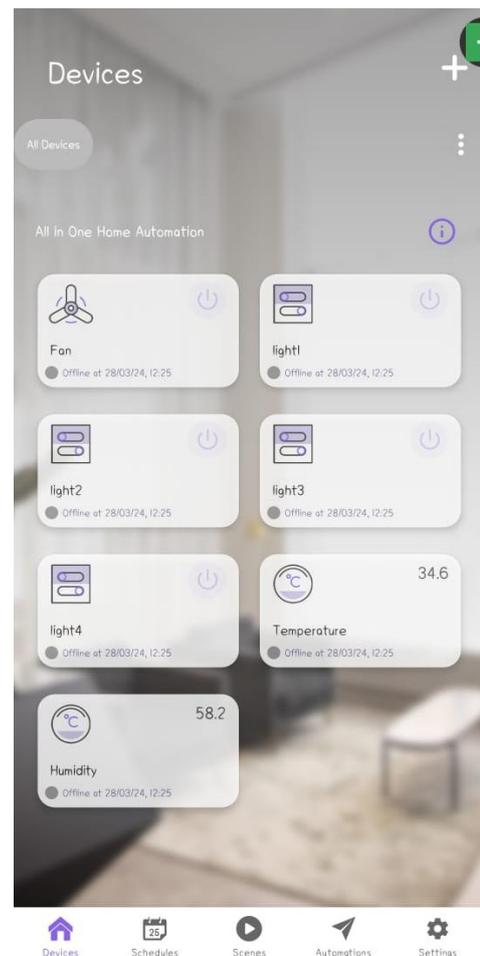
Fig.4 ESP Rainmaker App Showing Updated Data

CONCLUSION AND FUTURE SCOPE

The Improvement of wireless technologies help the users to save energy and also it is helpful in lowering the price of the electricity consumption.

As the automation technologies are improving and new industries are developing results in mass production of the automation products.

The automation technologies are now trending in the market and lower price of it makes people attracted and majority of the people can afford these products.

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