Shri Vaishnav Vidyapeeth Vishwavidyalaya

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Indore (MP)

Internet of Things Project

On

Home Automation

Presented To: **Presented By:**

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ABSTRACT

This paper presents an idea or a concept for home automation using ESP32 with Sinric Pro, and Alexa to control 4x4 relays with and without internet and monitor the real time feedback in the Sinric Pro. Automation of device has a wide scope for this generation as well as in forthcoming generation. In this mobile communication technology is playing a major role in the world of automation. This article is fully based on low cost and reliable home control monitoring system for accessing and controlling devices and appliances remotely using Android based smart phone application. While using this technology the system improves the living standard at home, reduce human effort, energy efficient and time saving and thus make a smart home. And also it is very helpful for providing support to disable people and fulfil their needs in home and thus they leads a normal life. This proposes system consists of Android mobile in using ESP32 with Sinric Pro, and Alexa, Manual control relays. We are a using Wi-Fi technology to monitor the device because of its accuracy, high range and instant connectivity. This module controls the home appliances with a very ease of installation and it is user friendly.

IOT or internet of things is an upcoming technology that allows us to control hardware devices through the internet. Here we propose to use IOT in order to control home appliances, thus automating modern homes through the internet. This system uses three loads to demonstrate as house lighting and a fan. Our user friendly interface allows a user to easily control these home appliances through the internet. For this system we use an AVR family microcontroller.

This microcontroller is interfaced with a WIFI modem to get user commands over the internet. Also we have an LCD display to display system status. Relays are used to switch loads. The entire system is powered by a 12 V transformer. After receiving user commands over the internet, microcontroller processes these instructions to operate these loads accordingly and display the system status on an LCD display. Thus this system allows for efficient home automation over the internet.

<u>CONTENT</u>

OBJECTIVE –

Make a Home Automation project using Sinricc Pro and 4x4 Relay Module to be used with the help of alexa voice control.

INTRODUCTION

Home automation has become more beneficial because of its safety and security. Nowadays, home automation becomes more advance and precise to monitor all the home appliances. Home automation system become energy efficient and highly approachable smart home technique. It involves basic feature to maintain the user satisfaction and comfort.

Home automation is a unique system that can control and communicate between nearly all aspects of your house. It is a term used to describe the working together of all household amenities and appliances. For example, a centrally microcontroller panel can have the capability to control everything from heating and overall electrical appliances. Home automation can include controlling aspects of our home remotely through a computer or any mobile equipment, programming electronics devices to conditions or scenario or centralizing the control of a variety of appliances in our in to a single control centre. It is essential that the different controllable appliances be interconnected and communication with each other. The main purpose of home automation is to control or monitor signals from different appliances or basic services. A smart phone and Alexa voice control can be used to control the home automation system.

SYSTEM REQUIREMENTS

Hardware Specifications

- Wifi Module (ESP32-WROOM)

- Relays (4X4 module)

- Light Bulb

- Socket

- Fan

- Fan Adapter for connecting fan

- DataCable (B-type)

Software Specifications
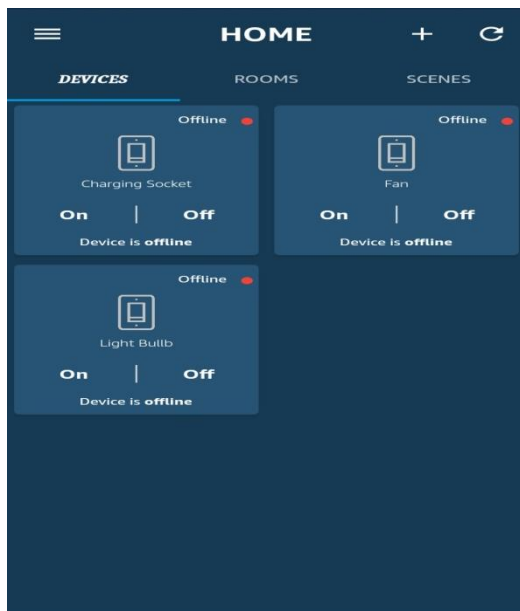
- Arduino IDE (version 1.8.5)

WORKING

Home automation is a network of hardware, communication, and electronic interfaces that work to integrate everyday devices with one another via the Internet. Each device has sensors and is connected through WiFi, so we can manage them from our smartphone or tablet whether we're at home, or miles away. This allows us to turn on the lights or fan, or even turn down the heat, no matter where we are.

There are three main elements of a home automation system: sensors, controllers, and actuators.

- Sensors can monitor changes in daylight, temperature, or motion detection. Home automation systems can then adjust those settings (and more) to your preferences.
- Controllers refer to the devices — personal computers, tablets or smartphones — used to send and receive messages about the status of automated features in your home.
- Actuators may be light switches, motors, or motorized valves that control the actual mechanism, or function, of a home automation system.
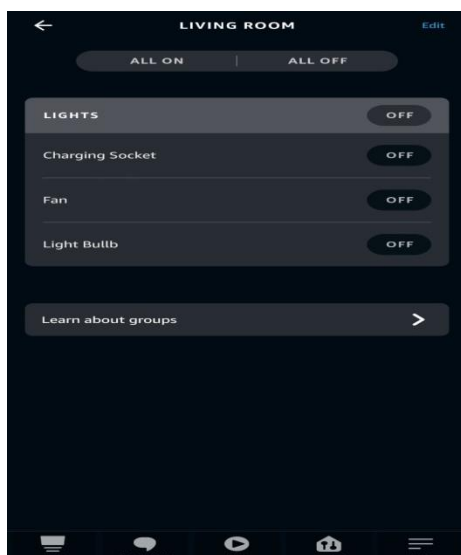
Working of model on Sinric Pro:

A)

B)
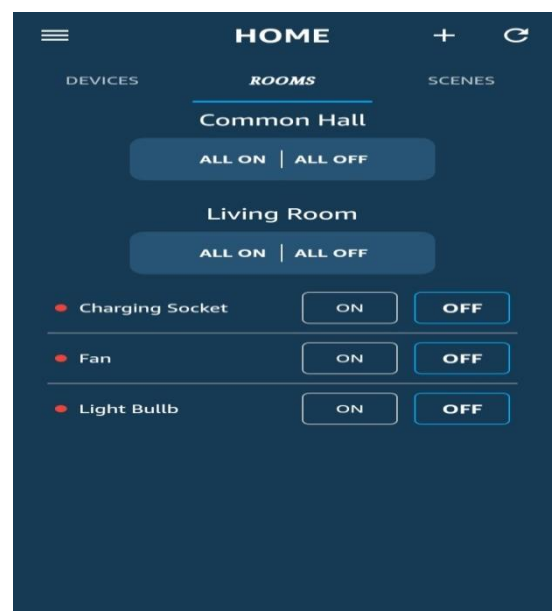
Working of model on Amazon Voice Control:

SOURCE CODE:

Firstly, we have to upload code on Arduino IDE version 1.8.5

```
// Uncomment the following line to enable serial debug output

//#define ENABLE_DEBUG

#ifdef ENABLE_DEBUG

    #define DEBUG_ESP_PORT Serial

    #define NODEBUG_WEBSOCKETS

    #define NDEBUG

#endif

#include <Arduino.h>

#ifdef ESP32

    #include <WiFi.h>

#endif

#include <SinricPro.h>

#include <SinricProSwitch.h>

#ifdef ESP32

#define RELAYPIN_1 21

#define RELAYPIN_2 22

#define RELAYPIN_3 23

#endif
```

```cpp
struct RelayInfo {

  String deviceId;

  String name;

  int pin;

};



std::vector<RelayInfo> relays = {

    {"6326e77e36b44d06d4be93d2", "Relay 1", RELAYPIN_1},

    {"6326e7a3fa69c39e7ccd373e", "Relay 2", RELAYPIN_2},

    {"6326e7e6fa69c39e7ccd3775", "Relay 3", RELAYPIN_3}};



#define WIFI_SSID  "OnePlus 7"

#define WIFI_PASS  "hhcy1115"



#define APP_KEY     "03f22596-11e1-47a6-85d7-3deefd3e492a"      // Should look like "de0bxxxx-1x3x-4x3x-ax2x-5dabxxxxxxxx"

#define APP_SECRET "5633d2d6-2259-4983-ab8c-203b1abf26b8-8883d522-db68-42f1-87ae-f6c321167d27" // Should look like "5f36xxxx-x3x7-4x3x-xexe-e86724a9xxxx-4c4axxxx-3x3x-x5xe-x9x3-333d65xxxxxx"



#define BAUD_RATE  9600      // Change baud_rate to your need



bool onPowerState(const String &deviceId, bool &state) {

  for (auto &relay : relays) {                              // for each relay configuration
```

```cpp
    if (deviceId == relay.deviceId) {                                    // check if deviceId matches

      Serial.printf("Device %s turned %s\r\n", relay.name.c_str(), state ? "on" : "off");      // print
relay name and state to serial

      digitalWrite(relay.pin, state);                                      // set state to digital pin / gpio

      return true;                                                        // return with success true

    }

  }

  return false; // if no relay configuration was found, return false

}


void setupRelayPins() {

  for (auto &relay : relays) {    // for each relay configuration

    pinMode(relay.pin, OUTPUT);    // set pinMode to OUTPUT

  }
}


void setupWiFi() {

  Serial.printf("\r\n[Wifi]: Connecting");

  WiFi.begin(WIFI_SSID, WIFI_PASS);


  while (WiFi.status() != WL_CONNECTED) {

    Serial.printf(".");

    delay(250);

  }
  Serial.printf("connected!\r\n[WiFi]: IP-Address is %s\r\n", WiFi.localIP().toString().c_str());
```

```
}

void setupSinricPro() {

  for (auto &relay : relays) {                    // for each relay configuration

    SinricProSwitch &mySwitch = SinricPro[relay.deviceId];    // create a new device with deviceId from relay configuration

    mySwitch.onPowerState(onPowerState);              // attach onPowerState callback to the new device

  }


  SinricPro.onConnected([]() { Serial.printf("Connected to SinricPro\r\n"); });

  SinricPro.onDisconnected([]() { Serial.printf("Disconnected from SinricPro\r\n"); });


  SinricPro.begin(APP_KEY, APP_SECRET);

}


void setup() {

  Serial.begin(BAUD_RATE);

  setupRelayPins();

  setupWiFi();

  setupSinricPro();

}

        void loop() {

          SinricPro.handle();

        }
```
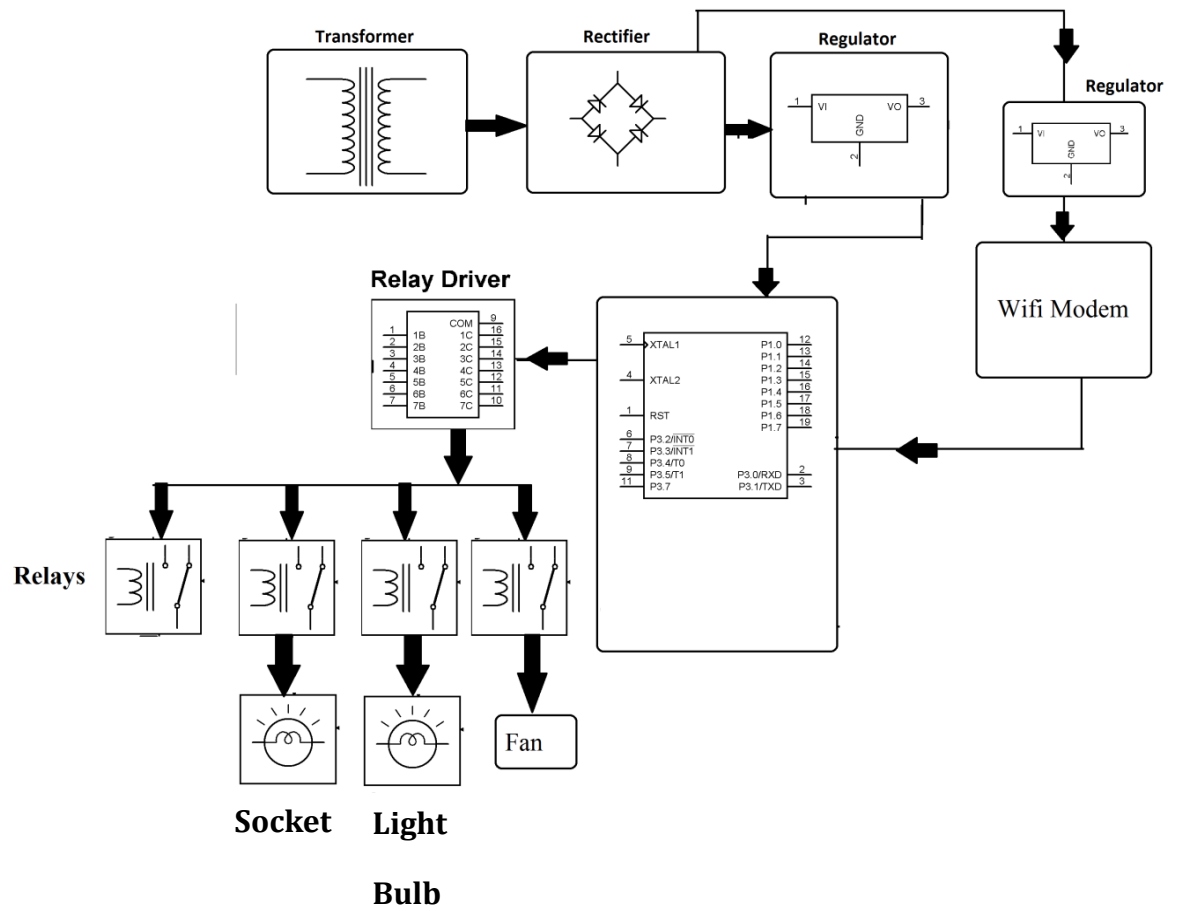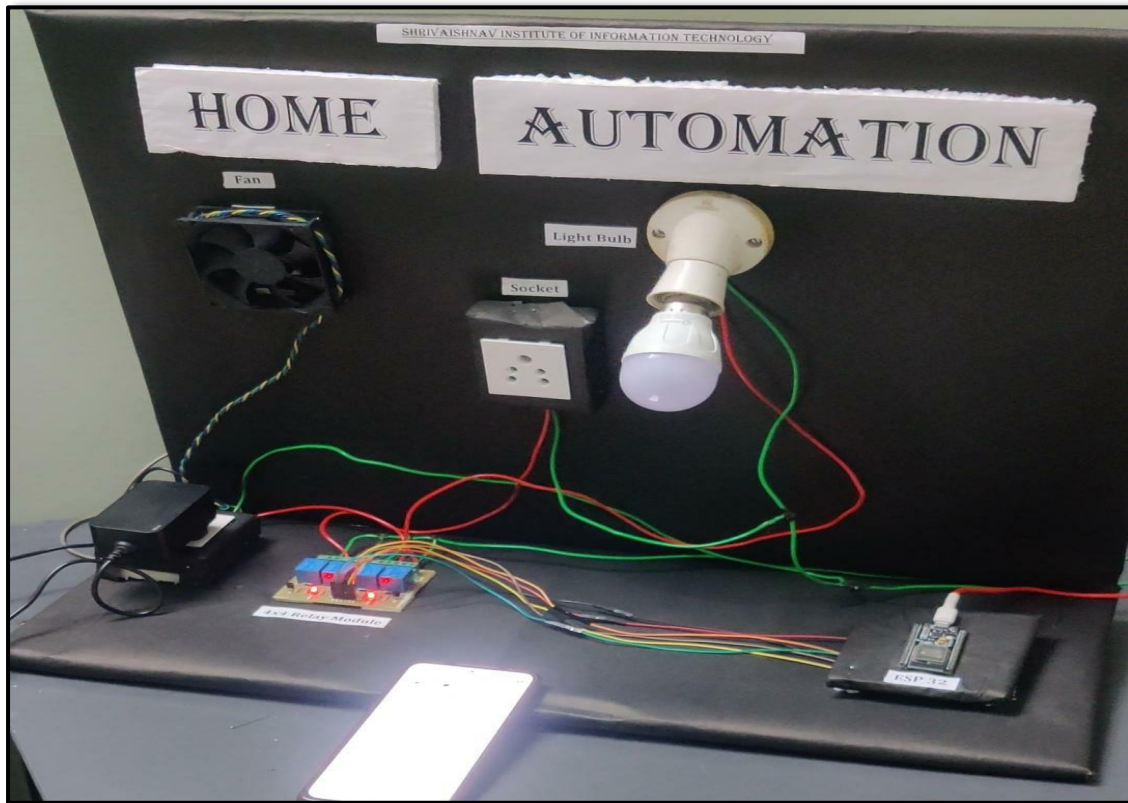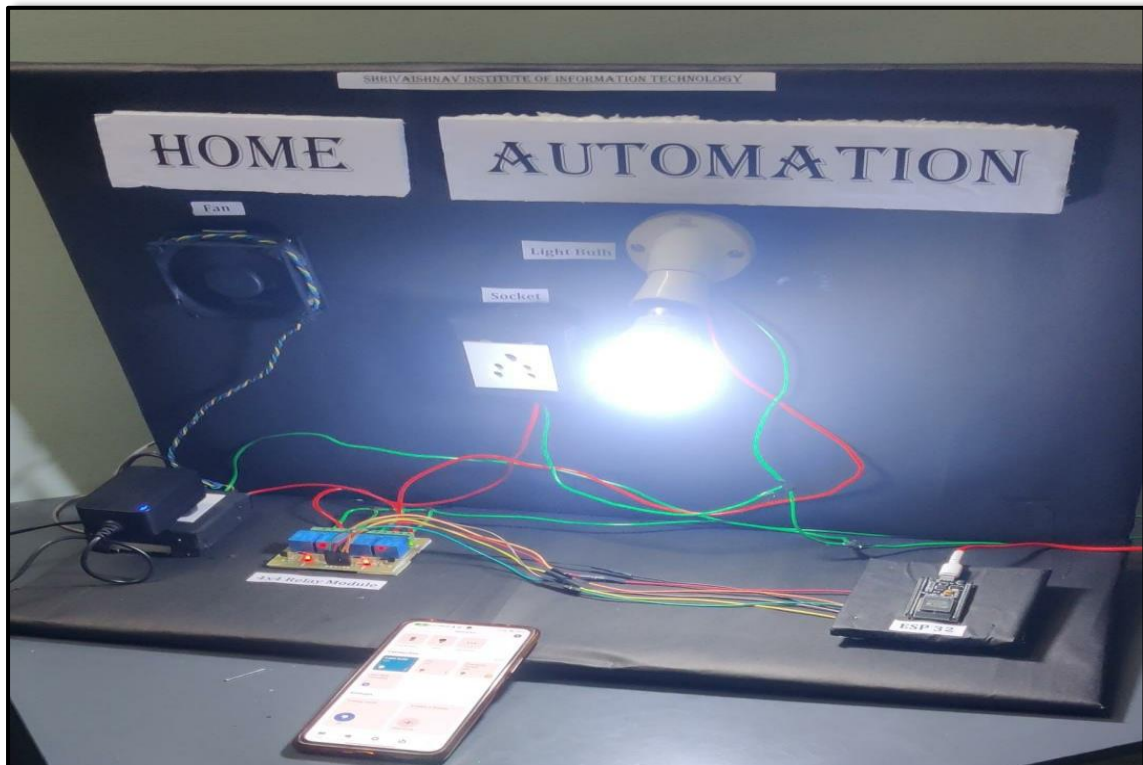
CIRCUIT DESIGN

OUTPUT

Image before of the model that has not been turned on;

In this image, we can see that the model is working and the light bulb, fan and the charging socket has been turned on using the alexa voice control.

ADVANTAGES AND DISADVANTAGES

Advantages:

Energy efficient - Smart homes are very efficient in energy savings. And dimming of lights saves energy. Almost all smart devices have timers, which minimises energy consumption.

Ease of access - A smart home provides many conveniences by allowing users to control multiple devices and smart features through a single device.

Customisation for user comfort - Smart homes allow flexible user preferences. With automation, a user can transform almost every aspect of their lifestyle.

Convenience for the elderly and differently-abled - Smart home automation offer support and flexibility for the older and differently-abled. One can simplify everyday chores by connecting smartphones with other smart appliances and voice commands (such as alexa and google home).

Disadvantages:

Installation cost - Although the installation cost is high initially, the investment does pay off in the long run. The home automation industry is growing rapidly today and coming up with cost-effective smart options like free maintenance services.

Internet dependency - A strong and reliable connection is necessary for all the tasks by smart voice command technology such as Alexa and Google Home.

Privacy concern - There are certain practices that users must abide by when it comes to smart homes. Although the internet is a safe data sharing space, there is still a chance of data breach.

Complicated user interfaces - If not done right, automation can be intimidating for a technologically challenged homeowner. Too many complicated logics, multiple button presses, and unreliable products sometimes end up creating undesired effects opposite to what the homeowner had wanted, which was simplicity.

CONCLUSION

In this paperwe have introduced design and implementation of a low cost, flexible and wireless solution to the home automation. The system is secured for access from any user or intruder. The users are expected to acquire pairing password for the Arduino BT and the cell phone to access the home appliances. This adds a protection from unauthorized users. This system can be used as a test bed for any appliances that requires on-off switching applications without any internet connection. The home automation using Internet of Things has been experimentallyproven to work satisfactorily by connecting simple appliances to it and the applianceswere successfully controlled remotely through internet. The designed system not only monitors the sensor data, like temperature, gas, light, motion sensors, but also actuatesaprocessaccording to the requirement, for example switching on the light when it gets dark. It also stores the sensor parameters in the cloud (Gmail)in a timely manner. This will helpthe user to analyze the condition of various parameters in the home anytime anywhere.