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A Smart Home Automation System with Arduino Uno using IoT

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ABSTRACT: Smart products are widespread in many sectors in our everyday lives, including industrial automation, home automation (smart home), and so on, thanks to the fast expansion of the automation industry and the introduction of the Internet of Things and Artificial Intelligence. Since the previous several years, mobile gadgets have been a part of our daily lives. As a result, mobile devices, offering facilities and security is becoming more important. The Purpose of this paper is to develop such system that interact with wifi and that wifi should also communicate with the android mobile phone. And then with the help of both android phone and wifi we can able to connect our different systems which are available in our home to save the time to ON/OFF the switch. Examples like electric fan, lights and AC, etc

KEYWORDS: Internet of Things (IoT), Smart Home, Automation System, Arduino Uno.

I. INTRODUCTION

In today's world, technological advancements and changes occur on a regular basis, while people's living standards continue to rise. Mobile phones have become an inspirable aspect of people's lives today. The mobile phone has become the most crucial component of people's lives in recent years. With the help of these smart gadgets, humans can perform a variety of tasks, both with and without the internet, such as making our homes and businesses smarter and more luxurious. We presented a new technique that allows mobile phones to talk with and control electrical appliances such as fans, air conditioners, and lights. With the use of an Android app and a Wi-Fi module The Wi-Fi transmitter uses radio waves to transmit the data provided by the application. The data to be sent through Wi-Fi is turned into an electromagnetic signal, which is then sent using the antenna, and Wi-Fi works on radio waves technology. The Arduino controller receives this signal. The Arduino then manipulates the data and performs operations on it. After creating the magnetic field, this controller can be connected to the Relays of various switches to pass the current. In the future, we may be able to use routers for wide-area access, such as in Smart City projects. New appliances can be added to the system at any moment, ensuring the system's reliability.

In the world of electronics, automation is the most commonly misspelt term. Many existing technologies were revolutionised as a result of the desire for automation. Because of its user-friendliness, these were given greater weight than other technologies. These can be used to replace old switches in the home that cause sparks and, in some cases, fires. To operate the appliances in the house, an innovative automation system was designed using Wifi-benefits [1].

II. RELATED WORK

An IoT-Based Smart Home Automation System:

In this paper, a system is presented for integrating sensors, actuators, and other data sources for multiple home automations. The system is known as qToggle, and it operates by utilising the flexibility and power of an Application Programming Interface (API), which serves as the foundation for a simple and common communication mechanism. A system is presented for integrating sensors, actuators, and other data sources for multiple home automations. The system is known as qToggle, and it operates by utilising the flexibility and power of an Application Programming Interface (API), which serves as the foundation for a simple and common communication mechanism [2].



Comfy Smart Home using IoT:

In this paper, the Internet of Things is used to connect various devices and how it can be implemented. It also describes the working of a face recognition system using machine learning and how it can be embedded in security locks, as well as how the entire system can be controlled remotely and in person using a mobile application [3].

A Smart Home System based on Internet of Things:

The Internet of Things (IoT) is a network infrastructure that connects identifiable objects to communicate data over the Internet. Smart home is the application of internet of things. Household appliances might be monitored and controlled remotely in a smart home. The limitations in existing IoT smart home systems were studied in this research, and we proposed modifications to overcome them by including critical system modules and improving user registration and log-in authentication [4].

Smart home lighting system using IoT technologies:

Smart house lighting system prototype using various web development, Internet of Things (IoT), And software development technologies. System prototype development using more economical hardware and software appliances to operate household 12 Volt lighting devices with limited functionality while keeping the aspect of continuous common communication between devices in IoT systems

The project's development revealed that IoT systems employ a wide range of technologies, as well as a large number of variables, while producing use cases for desired outcomes. The produced smart house lighting system prototype was a successful, less priced, and simpler alternative to the present smart home management system consumer market, but it lacked the plug-and-play aspect of systems like Apple Homekit or Fibaro, which are both pricey and less accessible [5].

Internet of Things (IoT) of Smart Home: Privacy and Security:

Sensitive and personal data is managed in smart homes, security and privacy solutions should be implemented to secure users'/businesses' data from unauthorised access while still ensuring the supply of dependable services. The study's findings and recommendations add to a larger understanding of users' developing attitudes about privacy in smart homes as IoT home devices grow more prevalent [6].

IoT based Smart Home Design using Power and Security Management:

The system uses real time monitoring and voice control. With or without an Android app, control electrical equipment and switches that are monitored remotely. It uses a number of sensors to keep track of your devices in real time while also maintaining the security of your home [7].

III. COMPONENTS

Arduino Uno: Arduino Uno is a microcontroller board based on ATmega328P. There are 14 digital input/output pins on the Arduino Uno, including 6 PWM output pins, 6 analogue input pins, a power connector, an ICSP header, a 16 MHz quartz crystal, a USB connection, and a reset button. It includes everything you'll need to get started with the microcontroller; all you have to do is hook it into a computer through USB or use an AC-to-DC converter or battery to power it [8].

Fig (1). Shows how Arduino Uno looks like



Fig (1) Arduino Uno

Wi-Fi Module: The WiFi Module is a self-contained SOC with an inbuilt TCP/IP protocol stack that can provide access to your Wi-Fi network to any microcontroller. Wifi module contain 16 GPIO, I2C serial communication protocol, and analog-to-digital conversion, 2.4 GHz WiFi (802.11 b/g/n, WPA/WPA2), 2.4 GHz Wi-Fi (802.11 b/g/n, WPA/WPA2) (10-bit ADC). Each module comes pre-programmed with AT command set firmware, so you can just plug it into your Arduino and receive about as much WiFi functionality as a WiFi Shield. The ESP8266 module is a low-cost wireless transceiver that can be utilised in IoT end-point applications.

Fig (1). Shows how Wifi module looks like



Fig (2) Wifi Module

IV. WORKING AND CONNECTIVITY

There are some written steps for esp8266-01 we need to follow but the exact pins used for the other devices are easy to discover lets write the arduino uno in breadboard with the simple steps are given down below.

Connect the red wire on a breadboard to the Arduino's 3v3 (3.3V) output. Because the ESP8266 runs on 3.3V rather than 5V, this is required. If you wish to add more 5V components to the breadboard, connect the 5V output to the other red line, but make sure the two are not connected. The blue line should be connected to the RES or RESET pin. When the reset pin is grounded, the Arduino becomes a dumb USB to serial connector, which is what we need to



communicate with the ESP8266. Connect blue line to the GND (ground). Connect the Arduino's RXD pin to the ESP8266's RX pin. Connect the VCC pin to the red line and the GND pin of the ESP to the blue line. Connect the Arduino's TXD pin to the ESP32's TX pin (green colour in the picture). we have to connect the TX pin of the one of the RX of the other, only if we want two things to communicate. However, instead of the Arduino communicating with the ESP8266, our computer communicates with it through the Arduino. Arduino Wifi module will use the ESP-01 and ESP-03. In this scenario, it seemed sense to split CH PD from the rest of the gadget so that the user could switch it off when not in use (to save power).

Because we aren't uploading anything to the ESP8, we don't need to choose a board in the Arduino IDE. Simply go to Tools Serial Monitor and select the proper port from the Tools menu. Then set your baud rate to 115200 (which is the default for the ESP8266 firmware) and your line ends to both NL and CR. It should answer with OK if you type AT in the message area and hit enter. Since we're on the subject of the CH PD pin, keep in mind that if you want to flash the ESP8266, you'll need to connect the GPIO0 pin to GND (blue line), which will put the ESP into flash mode.

V. CONCLUSION

Today's houses have powerful computing and communication capabilities because to the fast growth of Internet and communication technologies. An IoT-based smart home is gaining traction as a key component of the smart and intelligent cities that are being proposed and built all over the world. This system made by us is very user friendly and very easy to operate. This technology would be very helpful to the disable and old age people. And also this system cost effective.

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