IARJSET ISSN (O) 2393-8021, ISSN (P) 2394-1588

International Advanced Research Journal in Science, Engineering and Technology

ISO 3297:2007 Certified ⁜ Impact Factor 7.12 ⁜ Vol. 9, Issue 11, November 2022

DOI: 10.17148/IARJSET.2022.91115

IOT-Based Home Automation Through Web Server

Sanket Disale[1], Digvijay Wagh[2], Digvijay Suryawanshi[3], Khushi Dighe[4], Dipasha Shetiya[5]

Department of Engineering, Science and Humanities (DESH) Vishwakarma Institute of Technology,

Pune 411037, Maharashtra[1-5]

Abstract: We are living in the fourth industrial revolution. Our life is becoming more comfortable and smarter with the help of rapid upgrade of technology. The Internet of things (IoT) is playing a massive role in this. One of the major sides of IoT is a smart home. As we are in the era of never-ending growth of the internet and its application, smart home systems or home automation systems are highly increasing to provide comfort in life and improving the quality of life. In this paper, we present an IoT based low-cost smart home automation system. This system is based on a web portal which is controlled by an ESP32 Wi-Fi module. Also, a custom-made private home web server is developed for maintaining the current state of home appliances.

This paper describes the overall notion of the IOT based sensing systems and monitoring systems for implementing an automated home. The proposed prototype uses Node MCU board with internet being remotely controlled by Android OS smart phone. Node MCU is the heart of this system and it can perform as a micro web server and it acts as an interface for the wide range of hardware modules. To control lights, fans and other home appliances which are connected to the relay system, the system offers switching functionalities.

Keywords: Home Automation, IoT, ESP32 Module, Relay Module, Cloud Server

I. INTRODUCTION

We are moving towards the world of the Internet. Where every physical object will be controlled and communicated with the internet. Research shows that, Internet of Things (IoT) connected devices installed base worldwide from 2015 to 2025 will be 75.44 billion [1]. With the advent of vocal recognition software, such as Amazon Alexa, there is a large demand for home automation [2]. Our main goal is to develop a way to efficiently and affordably transform a pre-existing home into a smart home. In this paper we proposed a low cost, less power consumption IoT based system. By using this system, the registered person can control his/her home appliances from anywhere anytime. Also, the registered person can monitor his/her home electrical appliances.

We created a custom-made private server for monitoring and controlling the system. The server is communicated with the ESP32 Wi-Fi module. By assessing the server, the registered person can turn on/off his home appliances. And as it is a private home server it is also secreted. The world home automation system market is expected to grow from USD 32.11 Billion in 2015 to USD 78.27 Billion by 2022, at a CAGR of 12.46 between 2016 and 2022 using IoT systems [3]. So, it is important to feel the change of the upcoming era and make the changes. That's why in this paper we proposed a system where users can use a cost-effective smart home automation system. The IoT-grounded home robotization corresponds to several smart biases for different operations of lighting, security, home entertainment etc. All these biases are integrated over a common network established by gateway and connected in a mesh network. This means that it gives druggies the inflexibility to operate one detector grounded followed by the action of the other.

II. METHADOLOGY

1. NodeMcu ESP8266:

NodeMCU is an open-source Lua based firmware and development board specially targeted for IoT based Applications. It includes firmware that runs on the ESP8266 Wi-Fi SoC from Espressif Systems, and hardware which is based on the ESP-12 module. The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects. The NodeMCU Development Board can be easily programmed with Arduino IDE since it is easy to use.

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Programming NodeMCU with the Arduino IDE will hardly take 5-10 minutes. All you need is the Arduino IDE, a USB cable and the NodeMCU board itself.

2. 5 v Relays:

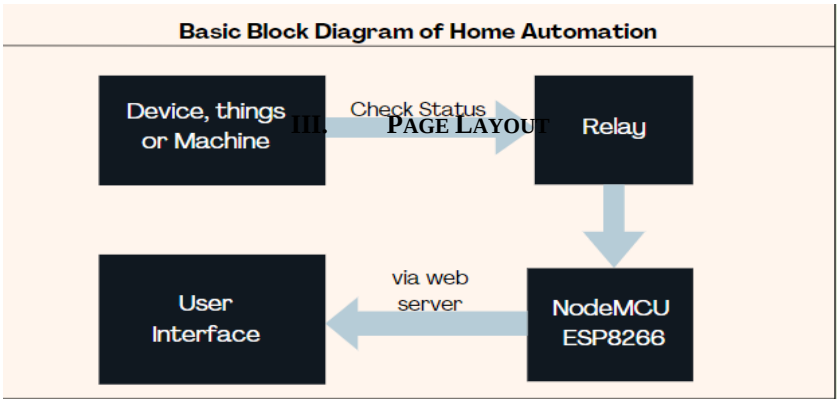
A 5v relay is an automatic switch that is commonly used in an automatic control circuit and to control a high-current using a low-current signal. The input voltage of the relay signal ranges from 0 to 5V. The relay module with a single channel board is used to manage high voltage, current loads like solenoid valves, motor, AC load & lamps. This module is mainly designed to interface through different microcontrollers like PIC, Arduino, etc. The output terminal of the relay module is located at the left-hand side, used to fix an AC/DC load & AC/DC i/p power source. Every o/p connector's terminal is connected through NC, COM pins & NO of the relay. The relay module consists of screws that are used to connect wires & cables. The max current supported by this module is 10A & the max contact voltage is 250V AC & 30V DC. Thick main cables are mainly used whenever high voltage & current load is used.

3. Jumper wires:.

A jump wire (also known as jumper, jumper wire, DuPont wire) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering.

4 AC appliences :

AC is also the more popular current when it comes to powering electric motors, a device that converts electric energy into mechanical energy. Some household appliances that we use that rely on this are, but aren't limited to: refrigerators, dishwashers, garbage disposals, and toasters,TV



III. PAGE LAYOUT

For the User Interface, We created a website with the help of HTML, CSS and Javascript. There we have embedded four buttons for different devices which enable you to turn on/off the appliances by clicking on them. By using Arduino IDE, we uploaded code in the NodeMCU ESP8266, where we declared the wifi name and its password through code.

So when we turn on the NodeMCU, it will automatically get connected to the wifi and it will give one IP address on the serial monitor. Once we get an IP address by NodeMCU, it will get connected to the relay which is further connected to the appliances which we are controlling.

IV. RESULT AND DISCUSSION

The main objective of this project is to design Hardware and Software based home automation system for controlling home appliances according to commands given by the user. This model is based on ESP8266.This model enables users to automate one's home which can be managed by website.

Coding part of this website is performed on Arduino IDE.

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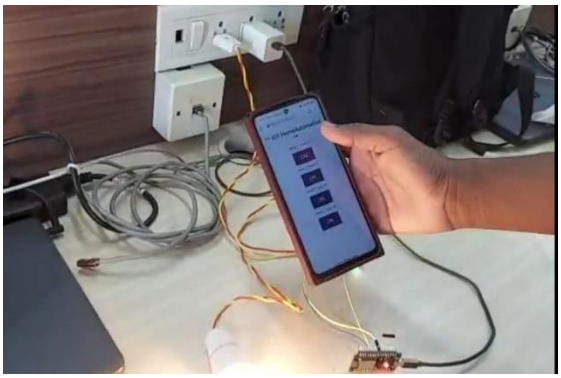

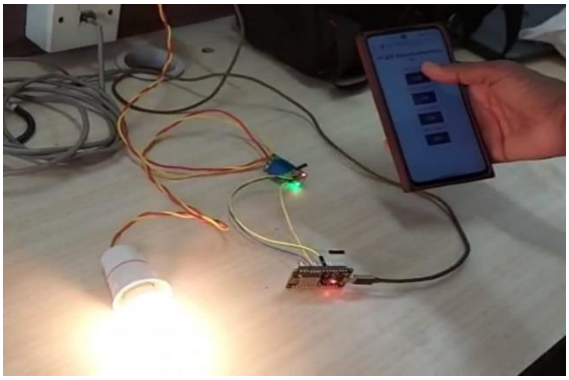

Code of this project you can access from :

V. FUTURE SCOPE

Future homes will be able to offer almost all required services, e.g., communication, medical, energy, utility, entertainment, and security. As we move into the next generation, more and more devices will begin to connect to one another. The dream is a future in which data is communicated between devices and humans without relying on manual input of individual bytes. Computers that can automatically mine data and then use that data to change aspects of the home environment is the future. For example, a smart thermostat that is able to automatically gauge the temperature of a room and then adjust the central heating and cooling units as necessary or a washing machine that automatically detects its contents and programs itself to be finished washing at a specified time. These are all goals that engineers are working toward and depend not only on advances in data-mining technologies but also in big data computing. Pert is the next generation home automation innovation that lets you control, monitor and secure your home with your smartphone. The future healthcare service provider will consider the smart home an effective way of providing remote healthcare services, especially to the elderly and disabled who do not require intensive healthcare support. As technologies continue to advance, you can expect the house of tomorrow to be even more automated than that of today. More smartness can be added to this proposed project for making this smart home highly automated by using artificial intelligence. A camera can also be connected to micro controller so that suspect photograph can be taken and can be forwarded to the police if needed. Also voice call feature can be included to this system through which user can control the home appliances.

VI. CONSLUSION

The main objective of this system is to make human Life is easy and comfortable by using IoT. Nowadays people are so busy with their work pressure so they will be looking for a smarter lifestyle. Here IoT plays a big role. In this proposed system users can change the load number according to their requirement through the web portal. And if the server is hosted on a public IP then the user can control this server and monitor this server from anywhere in this world. Though many future updates can further improve this proposed system. The server can be made more user friendly. More than one house can be connected into the server from there is possibility to monitor power consumption of an area. Further work is still going on. We believe that by using this Internet of Things we can create a difference between normal life and smart life.

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