International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 09 Issue: 03 | Mar 2022 www.irjet.net p-ISSN: 2395-0072

A Comparative Study of Internet of Things Based Home Automation System

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Abstract - *The functions of a home automation system to computerize bulk of technological along with electrical chores in a household. To control and manage appliances and gadgets inside a home, this requires a combination of hardware and software. The primary goal of using the Internet of Things (IoT) to track electrical gadgets in the current world is to manage them according to situational demands. With the advent of technology, there is a growing demand for efficient monitoring because it improves efficiency and reduces power and resource waste. This method can be used to prevent turning on lights during the day. In the field of home automation, Node MCU is quite popular. Its Wi-Fi capabilities and Arduino IDE support make it ideal for IoT applications. This paper contains an example of how to control home/office appliances from anywhere and at any time, even while the user is not at home or at work. A PHP web page with few toggle buttons is included in this article, allowing you to manage the outputs (on/off) of your household appliances from anywhere.*

Keyword – Sensors, Micro-controller, Web Hosting service.

I. Introduction

Any smart house's home automation system plays an important part in today's environment; it not only enables living more pleasant as well as luxurious, but it additionally cuts utilization of energy, reducing the demand for power generation. In this quickly changing world, the demand as for power generation is increasing, therefore home automation can help to cut and remove unnecessary power usage. Although the notion of home automation is still new to the globe, numerous important works have already been completed in this area. This work lowers the amount and creates a home automation system with more versatility, allowing to the user to simply comprehend and apply PIR and PIEZO sensors are efficient sensors for automation.

This smart window, which combines automated and manual controls as well as a rain sensor, would be a fantastic advancement because of its high sensitivity, clear design, and inexpensive cost. When it rains, a decent smart window automation and controlling system closes the windows, preventing rainfall from entering and damaging inside property. When rain falls on the sensor, the sensor sends a signal to the microcontroller, which tells the microcontroller to tell the servo motor to lower the window; when the rain sensor dries, the window rises. This smart window may be controlled from inside or outside your home.

There is also a manual technique in this article where we may use a Web dashboard to control all of our household appliances. Microcontroller was used to operate all of the appliances (ESP8266). We are employing a Web dashboard with some toggle buttons that will allow you to operate your appliances from anywhere in the world, even if you are not at home. The toggle buttons will update the input/output states to the database server, which will then transfer GPIO states to the microcontroller. The ESP8266 Wi-Fi Micro-Controller is always linked to a Router with Internet connectivity.

II. Literature Survey

P. Siva Nagendra Reddy Et.al [1] gave "Home Automation Using Android Application" (2016) He described how to use an Android application to control all of your household appliances in this setup. All of the appliances were controlled using an Arduino Mega and a Wi-Fi Module. The Wi-Fi Module was used to accept commands from the smart phone, which Arduino then processed. The Wi-Fi module's IP address is linked to the smartphone application, and the text are sent to the Arduino microcontroller via the Wi-Fi module. The characters are assigned to the home appliances in the code so that the intensity of the lights, fans, and rainfall situation can be changed by transmitting those codes through the application. This study used a rain sensor, a temperature sensor, a buzzer, and a servo motor.

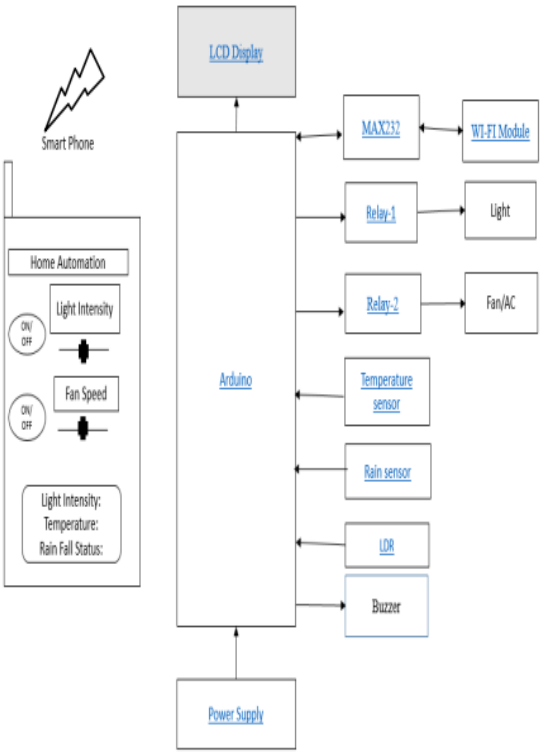

Figure 1. Block Diagram of Home Automation System

Usman Ali. Et. al [2] gave, "A Real-time Control System for Home/Office appliances automation, from mobile device through GPRS network " (2014) This article shows how to handle home and office appliances from any location and at any time, even while the user is not at home or at work. To run home and office appliances, the process flows from the mobile phone to the computer via the GPRS network, and then from the computer to hardwired virtual circuits via the computer adapter. As a result, this article describes a system that allows users to utilize a cellular phone device to operate their home and office equipment from anywhere. The client/server architecture is used for communication over a GPRS network. A high-level language was employed to program a PC-parallel connector for dealing with hardwired decoders in home and business products. A Java program was used to control all of the home and workplace equipment.

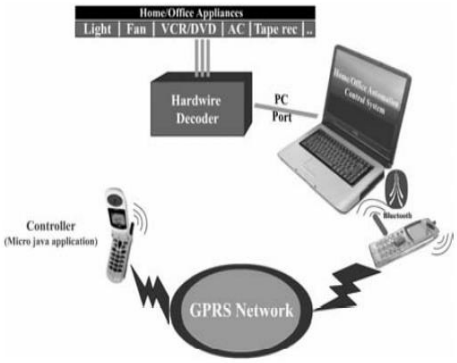

Figure 2: The control flow diagram

Satyendra K. Vishwakarma Et. Al [3] "Smart Energy Efficient Home Automation System Using IoT" created a system that can be operated using a web application and Google Assistant the Google Assistant was used to control and monitor a smart house in this project's working system, and in the event of a noisy environment, the system may be connected via a web-based service. This project incorporated a security system that uses the Google Assistant to ask for a user access code to authenticate, preventing illegal access.

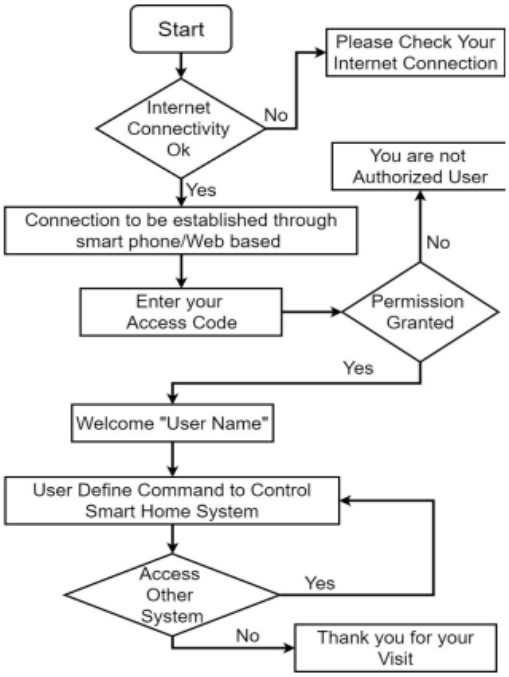

Figure 3: Architecture of the smart home automation system using Google Assistant as a flow diagram

Michael Horn, et al. [4] is "Single-element weather sensor for automatic windows", developed a system A basic weather sensor affixed to a window delivers information for the automated opening and closing

function of windows in workplaces and private homes in the event of strong wind, rain, or snow. When an ohmic electrical device is employed with sufficient high voltages and currents, the electrical power heats up the device and alters its resistance value.

Abhilash Reddy, et.al [5] "Automatic rain sensing car wiper ", An automatic car wiper system detects rain and begins to work on its own in this article. When raindrops fall on the sensor, the sensor recognizes their intensity and automatically adjusts the wiper speed. The faster the rotational speed, the more rain will fall. Controlling the wipers will no longer require physical involvement. The Arduino is used in this project, as well as a rain sensor, a 16x2 LCD module, and a servo motor. The rain sensor's analogue output pins are used to monitor moisture levels, and when a moisture threshold is surpassed, the wiper begins to rotate.

The LM393 op-amp is used only in this module. The rain sensor sends the data it collects to Arduino. The Arduino is a microcontroller board based on the Atemga8. Arduino, a platform for developing the working of electronic devices, can be used to design and manufacture interactive electronic gadgets. It has an on-board power supply as well as a USB connector for connecting to a computer. The acquired data from the rain sensor is analyzed by Arduino, which then uses the processed data to operate the servo motor. The rain sensor is located on the outside of the car, to the side of the windscreen. The servo motor is attached to the rain sensor.

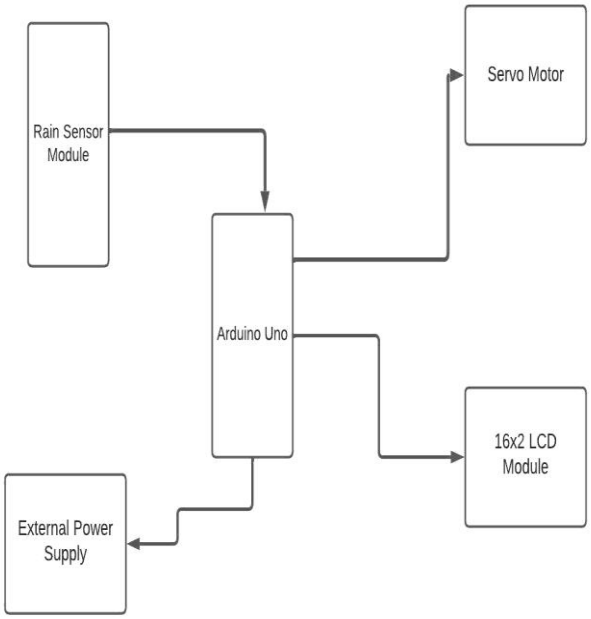

Figure 4. Architecture Diagram

III. Methodology

Step 1: Firstly, there are some toggle buttons that sends the GPIO states to the database to manually control the home appliances and window.

Step 2: Next, the ESP8266 will make HTTP Get request to the server through the Arduino IDE.

Step 3: Sensor values are evaluated if H1 (PIR Sensor), H2(Rain Sensor) equals to one and H3 (Piezo Sensor) equals or exceeds high.

Step 4: After checking the values, the light gets on and window get close.

Step 5: If any of the sensors' values are low, the lights will remain off.

Step 6: When the rain sensor dries out, the window opens.

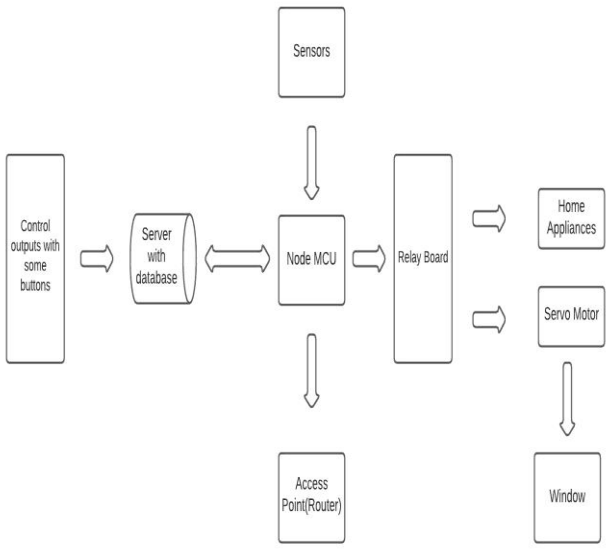

Figure 5: Architecture Diagram of Home Automation System

IV. Conclusion

This project purposes a low cost, secure, remotely controlled system that can be access universally. This project is also quite adaptable; you can quickly control multiple outputs and even connect boards to your server using your web application. It consists of a motion sensor and a pressure sensor that are controlled by an ESP8266 microcontroller. A hosted PHP web application will allow you to operate your home utensils or turn on and off lights from anywhere.

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