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A VOICE CONTROLLED HOME AUTOMATION SYSTEM

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A VOICE CONTROLLED HOME AUTOMATION SYSTEM

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Abstract

Home automation is the process of making the home appliances operate on the voice command or the movement. For the current research work the voice-controlled home automation is considered. In the current research work the main objective is to develop a voice-controlled home automation system. The appliances like light, fan and door have been considered for making them operate on voice command. For developing the project the ESP 8266 wifi module is considered along with servo motor, toy motor, light and fan. All of the appliances are configured by using the Blynk application and IFTTT server. Finally, Arduino IDE is used configure all of the devices and to sketch the code to the WIFI module to let the appliances run from a mobile device through google assistant.

Keyword: Arduino, ESP8266, Blynk, IFTTT, Google assistant

1. Introduction

House mechanization is the control of a home contraption structure through a central control point [1]. Computerization is one of today's actual aspects, since more and more activities are done every day. Typically, the fundamental initiatives of executing on or pasting on a specific gadget, either remotely or in close proximity. The employment of a central remote data framework, such as IEEE 802.11, is a potential for the RF-based structure (Wi-Fi) [2, 3]. The notoriety of distant frameworks at home has grown in recent years, and advanced PC development has enabled the individual modernized gadget to pass on through the remote framework in the vast majority of cases [4]. As a result, it is appropriate to employ an RF-based zone affirmation system to assess the region of an individual electronic device in a home environment with high data rate transmission, which may enable sight and sound applications in WLAN [5]. A remote framework for home computerization is one of the conceivable applications. Consider a home equipped with different tools such as light, temperature and other sensors to operate different tasks such as indoor controller, security structure lighting that can be touched up by leveraging an essential controller [6]. The basic concept behind house automation is to employ various sensors to operate different equipments through the mobile or any kind of remote control.

The renovated "shrewd" home can create a safer, more pleasant, and cost-effective living environment. There are several viable responses in a keen home automation system for how and where to operate the computerization system and solitary gadget [8]. A user interface (UI) can be a PC-based structure, a mechanical switch, a single light, a speaker with a

collector, or an individual remote controller utilizing a conventional PC, PC, or table PC with stand-alone programming or electronic UI. Every electrical machine in a home will be sorted out in the near future [9,10]. The interconnection of things (IOT) is a collection of physical articles or "Things" outfitted with contraptions, programs, sensors, and framework that let these things to gather and exchange data. IoT enables objects to be identified and managed remotely over current framework systems, allowing for a more obvious blend between the real and virtual worlds [11].

1.1 Objective

- To construct a remote house robotization framework restricted by a web-connected device.
- To hook up the gadget to the controller: The overarching need that must be remembered while designing a Smart Home is that it be clever. With a simple basis, the contraption controller must be modestly organized with the devices in the house.
- To plan and carry out a cost-effective yet proficient home robotization framework.
- To design an easy-to-use and dependable structure for controlling household devices, with a focus on assisting the more prepared and vulnerable folks.

2. Proposed System

In this current research work the primary focus is to develop a voice-controlled automated home by using ESP8266 Wi-Fi module. The hardware and software requirements of this research work are enlisted below.

2.1 Hardware Requirement

The hardware required to build this project are shown in table 1.

Table 1: Hardware Requirement

Hardware Required
1. ESP8266 Wi-Fi module
2. Relay Module
3. Servo Motor
4. Connecting Wires
5. Breadboard
6. Electric Wire
7. Bulb
8. Toy Motor
9. Fan

2.1.1 ESP8266

The ESP8266 WIFI Module is a stand-alone SOC device with a coordinated TCP/IP standard stack that can connect practically any microcontroller to a WIFI network. The ESP8266 may help an application or take over whole Wi-Fi organizing capacities from another application processor. Each ESP8266 module is pre-modified with an AT order set firmware, allowing it to be linked to Arduino device and have almost the same WIFI-capacity as a WIFI Shield. The ESP8266 module is a versatile board with a huge, ever-expanding network. This module gives a large quantity of ready preparation and capacity to be coordinated with sensors and other application particular gadgets through its GPIOs with little advancement in advance and minimal stacking during runtime [12]. Its vast on-chip mix comprises little external hardware, including the front-end module, and is developed with a tiny PCB footprint in mind. The ESP8266 supports APSD for VoIP applications and Bluetooth coexistence interfaces, and it features a self-adjusted RF that allows it to run in any operating environment without the need for additional RF components. The ESP8266 has access to a virtually infinite stream of data, which has been made possible by outstanding network support. One will find a range of materials to help users to use the ESP8266 in the Reports area, including instructions on how to transform this module into an IoT [13].

2.1.2 Relay Module

A relay is an electrically operated switch; its principal function is to control circuits with a low-power signal or when several circuits must be restricted by a single indication [15]. The main transfer was used as an enhancer in long-distance broadcast circuits, essentially rehashing the signal received from one circuit and transmitting it into another. They were also used in early PCs to accomplish coherent tasks. The Arduino transfer module is designed for a wide range of smaller-scale controllers [16]. This module connects two transfers. The hand-off framework is accompanied by the following structures:

VCC: VCC is connected with the Arduino Board's 5V current, GND is associated with the ground, and there are two advanced data sources.

COM: channel transfer module may be thought of as a set of switches, with two normally open (NO), two normally closed (NC), and two standard Pins (COM).

2.1.3 Servo Motor

A servo motor is an electrical appliance that can drive or rotate an object with extreme precision. It is simply made up of a simple engine that passes via a servo element. If the engine is DC controlled, it is referred to as a DC servo engine. One can acquire an exceptionally powerful servo engine in small and low weight packages. Because of these advantages, they are used in a variety of applications such as toy vehicles, RC helicopters and aircraft, mechanical liberty, machines, and so on.

2.1.4 Bread Board

A breadboard is a prototyping platform for developing electronic devices. Originally, the term referred to a precise bread board, a completed piece of wood used for cutting bread. [1] The solderless breadboard (also known as a plugboard or a terminal display board) first appeared in the 1970s, and the name "breadboard" is now often used to describe them. Because it does not need to be repaired, the solderless breadboard is reusable. This makes it simple to use for developing transient models and experimenting with different circuit configuration options. As a result, solderless breadboards are becoming increasingly popular among students and in mechanical education. This was not a characteristic of the more well-known breadboard variants. Stripboard. (Veroboard) and related prototype printed circuit sheets used to make semi-permanent welded models or one-of-a-kind cases may only be reused with extreme caution.

2.2 Software Requirement

The details of software requirement for developing the project are highlighted in table 2.

Table 2 Software and Application Requirement details

Software Required
1. Arduino IDE **2.** Blynk Application **3.** Google Assistant **4.** IFTTT Server

2.2.1 Arduino IDE

Arduino is an open-source tool stage based on basic hardware and programming. Inputs such as a light on a sensor, a finger on a catch, or a Twitter tweet may be recognised by Arduino

sheets and converted into outputs such as starting an engine, turning on a Drove, or broadcasting anything on the internet. To do so, you'll need the Arduino programming language (for Wiring) and the Arduino Programming (IDE) for Preparing [17]. Thousands of activities, ranging from simple household products to complicated logical instruments, have relied on Arduino throughout the years. Figure 1,2 and 3 shows the Arduino ide configuration for ESP8266 and Blynk application [18].

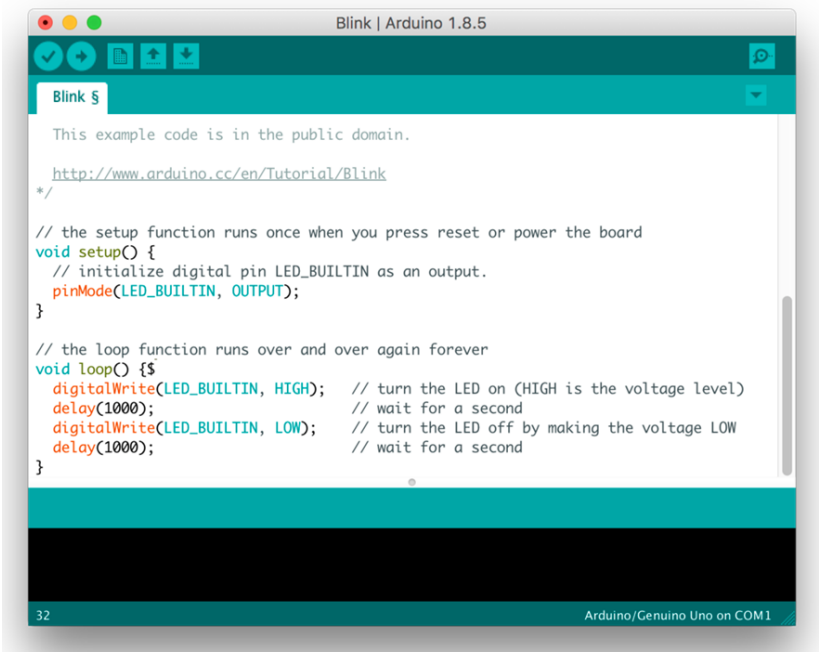

Figure 1: Arduino IDE work space

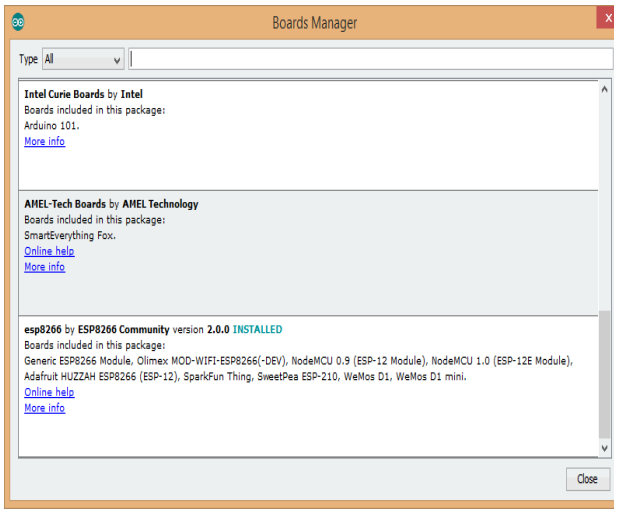

Figure 2: Installing ESP 8266 in Arduino IDE

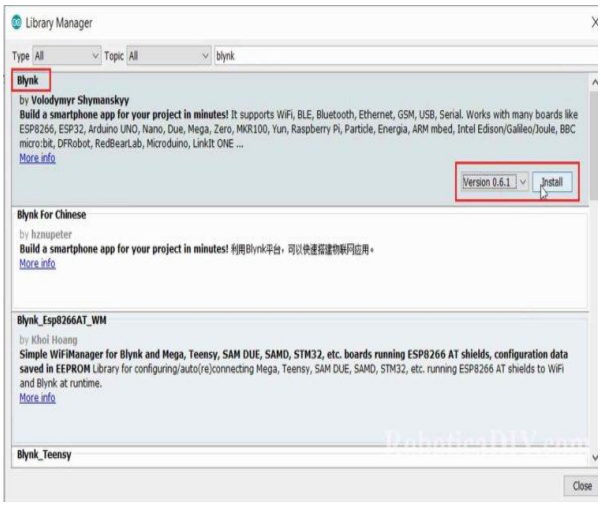

Figure 3: Installing Blynk library in Arduino IDE

2.2.2 Blynk Application

The Blynk application has been developed for the IoT concepts. It has the capabibility to handle the equipment remotely, display sensor data, save data, visualize it, and do a variety of other fascinating things [19]. Figure 4 shows the Blynk application setup. The stage is divided into three major sections:

- Blynk Application - enables you to create user friendly interface to perform any kind of activities by utilizing various gadgets that we provide.
- Blynk Server: It is in charge of all communications between the mobile phone and the equipment. Users have the option of using the Blynk Cloud or running their own private Blynk server locally. It has the ability to control a vast number of devices such as the Raspberry Pi.
- Blynk Libraries - It helps in establishing the communication in between the server and different processing devices.

Procedure to connect with the Blynk application is as follows

- Sign in to application.
- Provide a project name
- Token authorization through the email.
- Add corresponding device
- Replace the device token in code snip set.
- Run Blynk-server from command prompt.

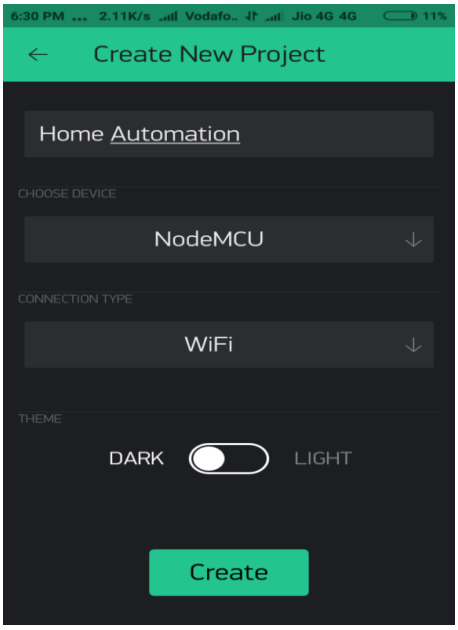

Figure 4: Configuring Blynk ESP8266

2.2.3 IFTTT Server

IFTTT is a free electronic tool for creating chains of simple restrictive explanations known as applets and triggered from various web services such as Gmail, Facebook etc. Changes those services can reflect in the applet. For example, an applet may send an email message if a client tweets with a hashtag or copy a snapshot on Facebook to a client's file if a client is labelled in a photograph. In this case, IFTTT is used to connect Google Assistant with Blynk application management. As a result, I use Google's right hand to control the lights in the house by giving a voice command such as, "OK Google, turn the light on or off." At that moment, IFTTT will take the voice command as the input and transmit it to the squint application dashboard as a valid order to the created feed. Figure 5 shows the IFTTT configuration [20,21].

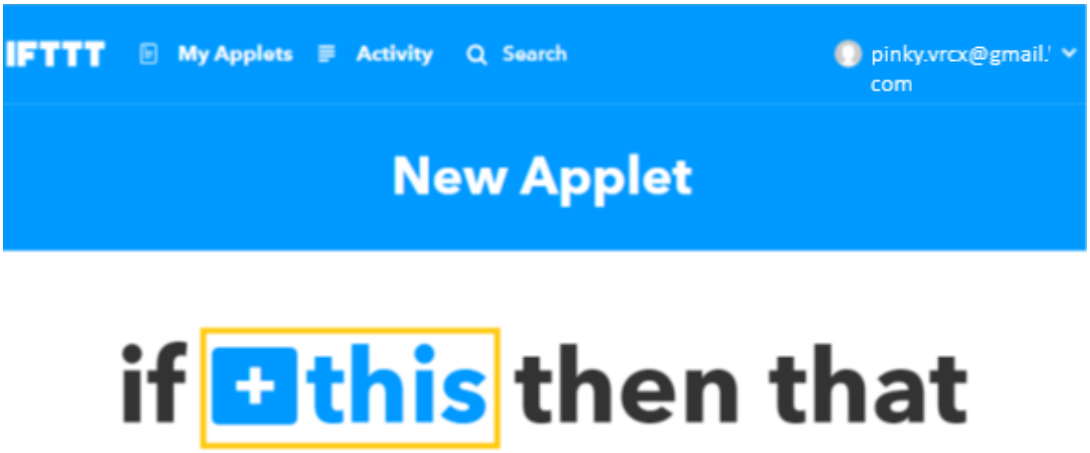

Figure 5: IFTTT configuration

3. Implementation and Result

Figure 6 and 7 shows the proposed work methodology along with code snip set in Arduino ide for developing the project. First the ESP 8266 is initialized with Arduino IDE. Next, the Blynk application is configure for the ESP 8266 device. Then the IFTTT is configured for the configured with for the Blynk application configured device with input command to perform the desired operation. Provide the mobile device SSID and PASS to the Arduino IDE for establishing the connection between the device and server. The code is sketched to ESP 8266 module and finally the device is instructed by using the google assistant to do the job. Figure 8-143 shows the output of the current research work.

```
#define BLYNK_PRINT Serial
#include <ESP8266WiFi.h>
#include <BlynkSimpleEsp8266.h>
char auth [] = "e022ggdhsdh767@3%$gdf%";
char ssid [] = "priyanka";
char pass [] = "******";
void setup ()
{
Serial.begin(9600);
Blynk.begin(auth, slid, pass);
Blynk.syncAll(); //This will sync the last state of your device
}
void loop ()
{
Blynk.run ();
}
```

Figure 6: Code snip set Arduino IDE configuration

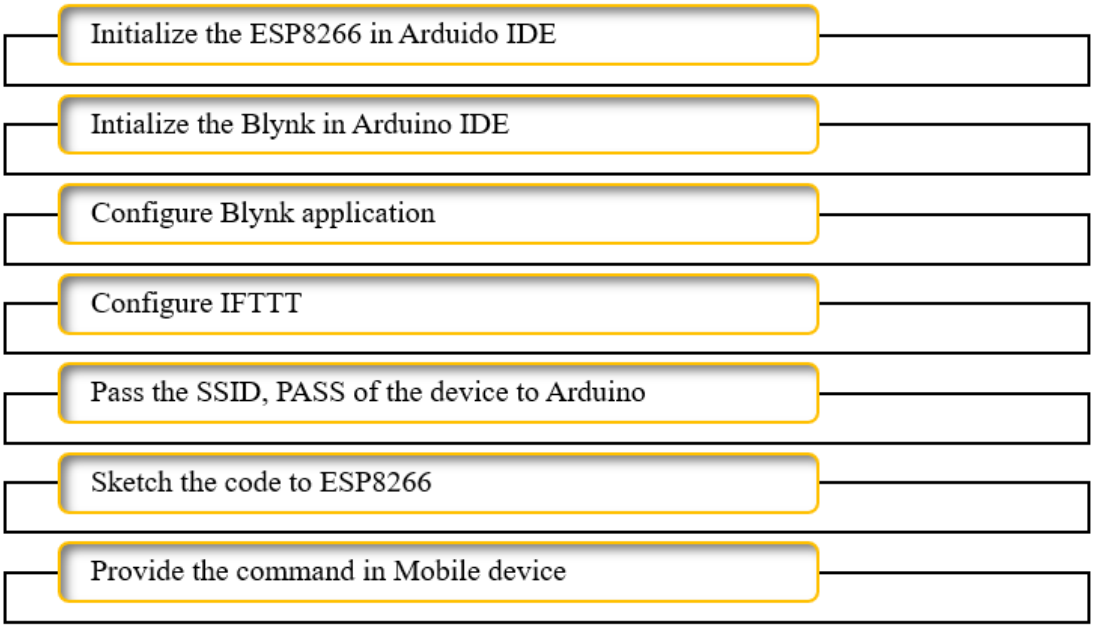

Figure 7: Workflow of the project

Figure 8: IFTTT configuration for fan on

Figure 9: IFTTT configuration for fan off

Figure 10: IFTTT configuration for light on

Figure 11: IFTTT configuration for light off

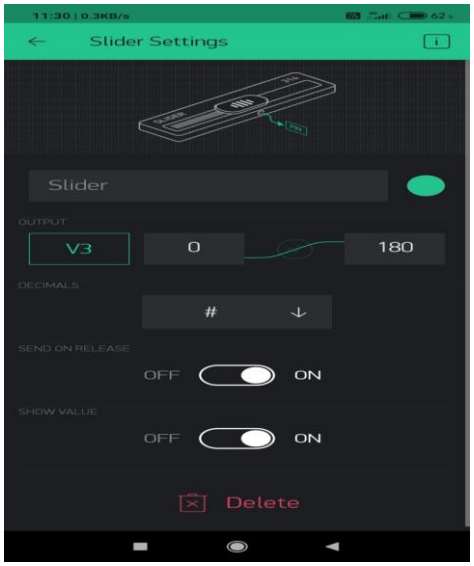

Figure 12: Servo Motor configuration in Blynk application for door open and close

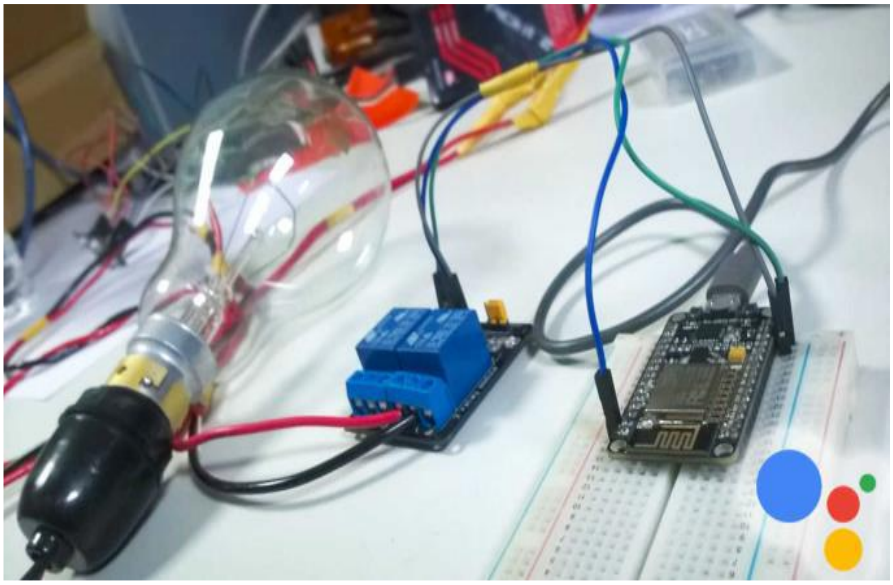

Figure 13: Home automaton project setup.

4. Conclusion

In this research work a voice controlled home automation system has been developed. The equipment such as light fan and door are controlled by giving the voice commands through the google assistant. The commands received from the google assistant are forwarded to the IFTTT server via the Adafruit account to make the device work as per the instruction. The current research work has been developed by using the WIFI module ESP8266. First the devices are configured through the Blynk application and then it is corradiated with the IFTTT server through Adafruit. Then the device SSID and PASS are set to make that corresponding device as the controlling device. In this case of home automation, the customer has given commands to the Google Assistant. The given commands control home appliances such as light bulbs, fans, and doors, among others. The commands received from the Google partner are encoded and then delivered to the microcontroller, which controls the transfers. The gadget linked with the independent transfer was switched ON or OFF based on the client's request to the Google Assistant.

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