

IOT Controlled Smart Home Automation System

Mohit Faldu¹, Kalpesh Chudasama^{2,*}, Dhruvit Patel³, Ashish Shah⁴

Abstract

The main objective of this paper is to implement the process of "Smart Home Automation" using various tools like mobile application, door security system, etc. thereby trying to increase the accessibility and comfort level of our customers while improving the security features and making the various processes cost efficient at the same time. This work mainly focused on making the accessibility of the various devices in a house easier for children, elders and disabled people. The described system uses communication, switching and relay components to monitor, control and switch on/switch off the appliances available in the house. The major component of the system is the Graphical User Interface application (GUI App) for the user, which communicates with the appliances using components like Bluetooth transceiver and Microcontroller. Here we can use IFTTT platform for use various equipment working whenever customer speaks on/off that will works.

Keywords: IOT, BLYNK, Ultrasonic Sensor, PIR Sensor, Water Level Sensor, NODE MCU 8266

INTRODUCTION

IoT based home automation included sensors like MQ-2 Smoke sensor, smoke, Passive Infrared Sensors and temperature sensor. Controlling of appliances done remotely using Wi-Fi and internet using Blynk framework. It is a simple kind of platform where you can easily control or monitor different thing like a light, motor, fan, pumps etc. in this project we use Arduino for this purpose. Different kind of Arduino boards is available. Arduino is a one kind of controller device. C language programming used for programming in Arduino. Arduino is a coding environment for programming Arduino based boards and by use of this software, we can compile and upload the program in Arduino. Arduino has a multiple I/O pins and it has Vcc and Gnd pins. Arduino is a device by which user can easily turn on off the motor, fan, led etc. In this system user can control the appliances connected to it through application or automatically through sensors. Different sensors connected with Arduino board. User have to make a programming as per the requirement and then we have to upload it on Arduino board. According to requirement user set some threshold value of sensing parameters. After that it compare the threshold value with real time value and by that Arduino board give

***Author for Correspondence**
Kalpesh Chudasama

^{1,3}Student, Department of Electrical Engineering, A.D. Patel Institute of Technology, Vallabh Vidhyanagar India.

²Associate Professor, Department of Electrical Engineering, A. D. Patel Institute of Technology, Vallabh Vidhyanagar, India.

⁴Assistant Professor, Department of Electrical Engineering, Parul Institute of Engineering and Technology, Vadodara, India.

Received Date: February 21, 2022

Accepted Date: March 01, 2022

Published Date: March 10, 2022

Citation: Mohit Faldu, Kalpesh Chudasama, Dhruvit Patel, Ashish Shah. Pandya. IOT Controlled Smart Home Automation System. Trends in Electrical Engineering. 2021; 11(3): 8–13p.

command to output pins. For IoT purpose, we use ESP-8266 Wi-Fi module to upload the data, which is available from the Arduino board to internet cloud and by making application we can monitor and control. [1]

IFTTT platform works on C language. Also this work show use of magnetic sensor for security purpose. It will work on door when the door opens then it will be sensing the door moment and it will have notified in your mobile. The ultrasonic sensor will detect the amount of waste collected in the dustbin and notify us when full. [2]

IOT (INTERNET OF THINGS)

Internet of Things is a platform that enables the electrical and electronic devices attached to it to

communicate with each other. Also allows the user to control the devices remotely along with observing the state of each device at all times. Wi-Fi module (ESP8266) used to connect the various devices with the internet using the locally available Wi-Fi network. The sensors send the data over to the cloud server which the user can view using the mobile app that is connected to the cloud server. [3]

IoT refers to a network that combines consequences, outcomes, and activities via the internet, allowing devices to send and receive data. Things connected to one other without the need for user intercession, allowing for automatic recognition of intended activities. IoT enables the sharing of data from sensors over a wireless network, as well as identification and information exchange in a public computing network and transparent system administration. Things we use in our daily lives are growing smarter because of current technology, but this will not be enough unless we link them to respond in response to changing conditions and create their own inter-network, i.e. machine-to-machine communication. [4]

OBJECTIVES OF THE SYSTEM

The first objective of this paper is to implement a simple monitoring system for smart home application.

- Other objective is to create a hardware for monitor temperature, detect motion in a room, and control motors using water level sensor. Third objective is to upload Arduino Programming with hardware.
- Work uses a computer-based signal acquisition system. Analysis made by the system can be efficient using Arduino and IoT and it is cost-effective method for smart home monitoring.
- Implementation of notification system, which notifies when door opened or closed, done using IFTTT protocols interfaced with the Blynk Framework.
- Control of appliances with speech using Google Assistant interfaced with IFTTT done.
- PIR sensor used to control the appliances in the room based on motion detection.

METHODOLOGY

Here, Node MCU 8266 board used as basic microprocessor with PIR sensor, ultrasonic sensor and temperature sensor. The overview of the system is mentioned in Figure-1 while the prepared circuit is described in Figure-2. Here ultrasonic sensor sense the movement of human body and it will transmit the data in Node MCU. PIR and temperature sensor sense the human body and temperature and it will send the data from Node MCU. Then Node MCU connected with relay and it will control the electrical equipment. Here also use Blynk cloud app it will send the data via Wi-Fi internet in Node MCU. So Blynk app through control the light or any other equipment.

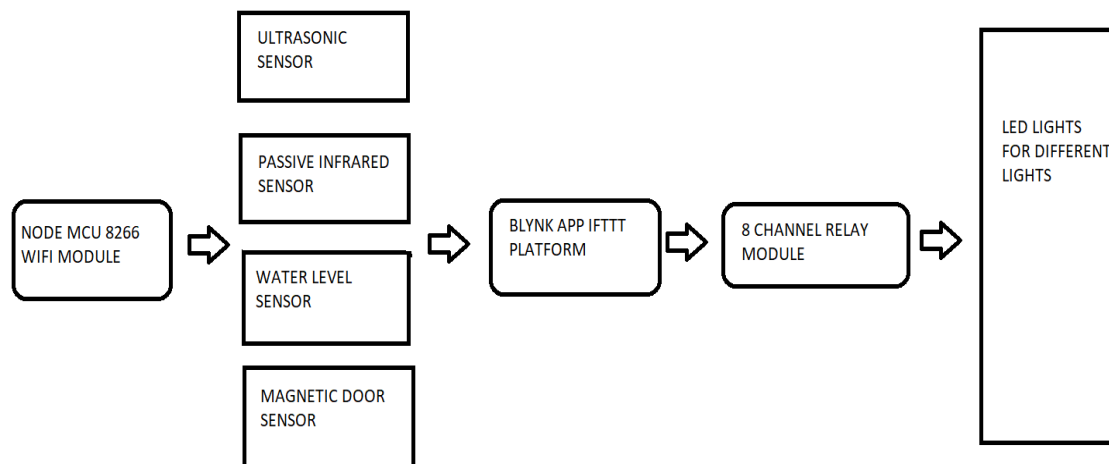


Figure 1. Block diagram of system [1,3, 4].

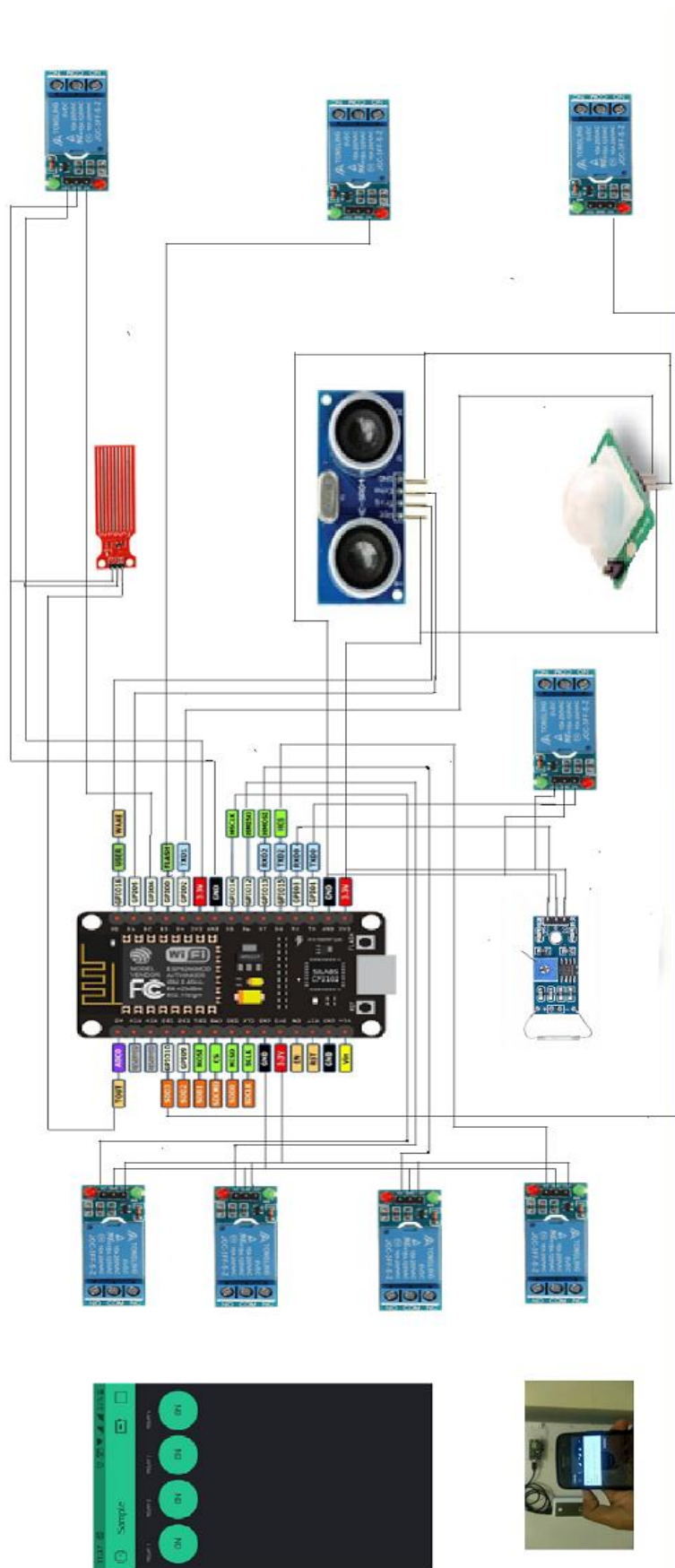


Figure 2. Circuit diagram of system [1,3,4].

COMPONENTS AND ITS SPECIFICATIONS

(A) ESP 8266

A Wi-Fi module uses the SSID and Password to access the internet through hotspot. It was configured to execute logic statements according to the developer's requirements. The ultrasonic sensor measures the distance between the water's surface and sends the information to ESP. When connected to the internet, the ESP transfers this information to a cloud database. Also, it gets some database settings set by the user in the android application. The ESP 8266 is shown in Figure-3. [2, 4-5].



Figure 3. ESP 8266.

(B) Ultrasonic Sensor (HC SR04)

The basic mechanism of an ultrasonic sensor is simple as shown in Figure 4 [4]. The sensor sends out ultrasonic sound waves and waits for them to reflect back. The sensor senses distance in various ways after receiving reflected sound wave, often called as echo. The detection of ultrasonic waves inside an item depicted. The HC-SR04 ultrasonic ranging module has a non-contact measurement range of 0 cm to 100cm. Ultrasonic transmitters, receivers, and a control unit are among the modules. Other kinds of ultrasonic sensors used to extend the range. [5-6]



Figure 4. Ultrasonic Sensor.

(C) BLYNK

Blynk is an IOS and Android platform for managing Arduino, ESP8266, and other Network devices. It is a digital platform where you may develop a system's graphic interface by drag & drop

widgets. There are two mode of these app is described in Figure 6. Everything is very simple to set up, so user will be experimenting in much less than 5 minutes. Blynk is not bound to any particular board or shield. Instead, it is also about allowing you to use whatever gear you want. Blynk will get you online and ready for the Internet of Things, whether user hooked up to the internet by Wi-Fi, Ethernet, or this new ESP8266 chip. [5,7]

IMPLEMENTATION AND DESIGN:

Here the mechanism of system is described in Figure-5. The complete procedure of complete system provided the value of resulted threshold frequency on different parametric values as mentioned in Table 1.

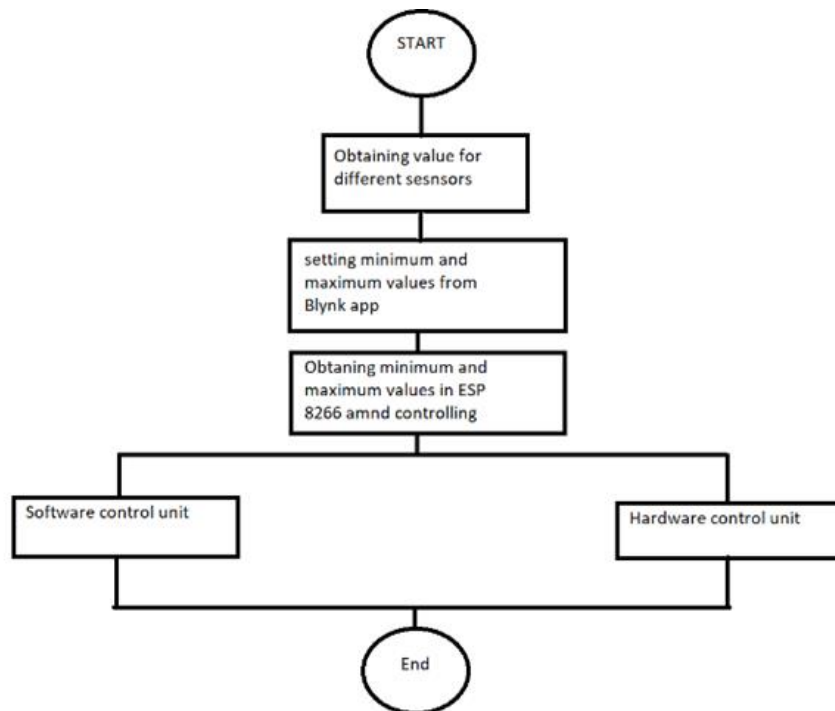
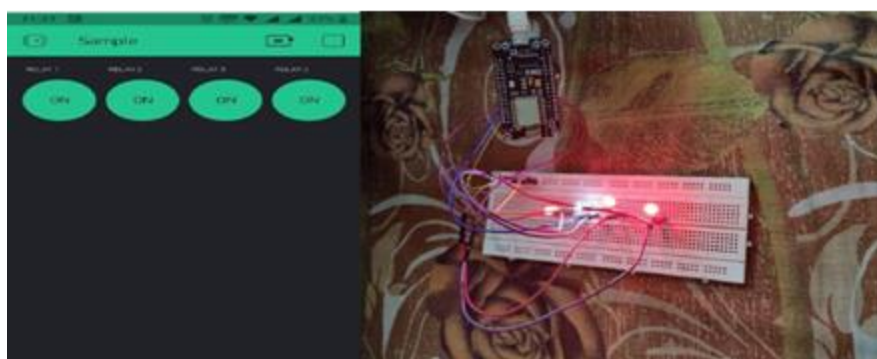


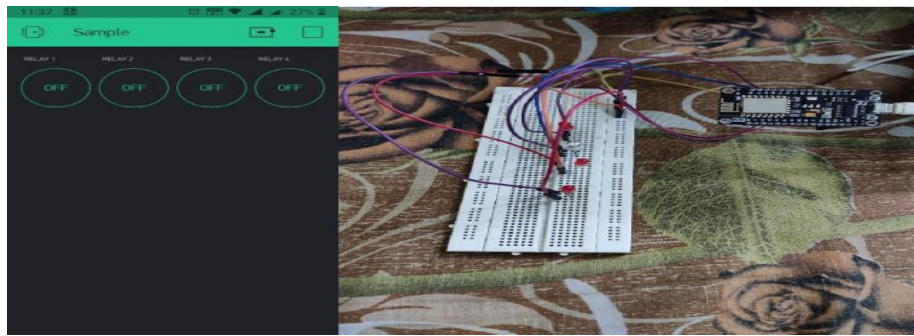
Figure 5. Working of system (Flow chart) [1,5].

Table 1. Measured results. [1, 4]

S.N.	Set Threshold value	If real value is >threshold	If real value is <threshold
1	Blynk Switches	Light on	Light off
2	Ultrasonic Sensor (HC SR04)	Light off	Light on
3	Motion is detected	Light on	Light off
4	33c (For temperature)	AC on	AC off
5	Max water level	Motor off	Motor on
6	Magnetic Door sensor	LED on(open)	LED off (closed)



(a). Blynk App on [2].



(b). Blynk App Off [2].

Figure 6. On/Off status with Blynk APP.

CONCLUSION AND FUTURE SCOPE

The building and development of the system discussed in the above paper included the various aspects of design engineering and design thinking. Various situations and problems that faced by the customers were considered in the product and its redesign and re-evaluations. The system requires a considerable amount of investment in its building and implementation but when implemented we believe that the product would be worth the investment made in it by the customer and would stay true to its objectives on which it was built and developed.

Acknowledgments

Acknowledgments recognize the contribution of funding bodies and anyone who has assisted in the work.

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