

Home Automation through Smart Phone using ESP8266 Wi-Fi Module by IOT

Anilkumar B¹, Lakshmidivi N², Praneeth Choudary³

^{1,3}*Department of ECE, GMRIT*

²*Department of CSE, GMRIT*

Abstract—the automation of any industry or home is possible by controlling the appliances remotely and automatically. This is possible through wireless communication; the most popular RF technology suitable with worldwide range in remote control is wifi through internet. The Internet of Things (IoT) refers to the use of intelligently connected devices and systems to leverage data gathered by embedded sensors and actuators in machines and other physical objects. Home automation is the process of controlling home appliances automatically using various control system techniques. The electrical and electronic appliances in the home such as fan, lights, outdoor lights, fire alarm, kitchen timer, etc., can be controlled using various control techniques. In this state of art paper we have controlled three electrical appliances through IOT in real time and in the control unit, interfacing wireless part and graphical user interface 8051 microcontroller, ESP8266 and ubidots are used

Keywords— Internet of Things; Home automation; 8051 Microcontroller; wifi module; ubidots; Graphical user interface;

I. INTRODUCTION

Automation is the process of self-control and reactive nature of any real time application. These applications are controlled through integrated electronic chips called microprocessor/controller. The communication module in the automated control system plays a major role to monitor the system remotely. The automation system must be reactive and real time in nature. These systems should be remotely monitored and controlled through the commands. Automation is the use of various control systems for operating equipment such as machinery, processes in factories, boilers and heat treating ovens, switching on telephone networks, steering and stabilization of ships, aircraft and other applications and vehicles with minimal or reduced human intervention. Some processes have been completely automated.

Wireless technologies represent a rapidly emerging area of growth and importance for providing ubiquitous access to the network. These technologies make difference in range of coverage, speed and type of communication. The latest innovations in wireless technology made more impact on automation and remotely control concepts. With improving range of proximity control area, the applications are controlled from anywhere in this world. The Internet of things (IoT) is the inter-networking of physical devices, vehicles, buildings, and other items—embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. With the automation and remote controlling of any system process can be controlled through the concept of internet of things from any place in the world.

II. SYSTEM DESIGN AND DEVELOPMENT

The block diagram of this project is shown in Figure. 2. In this project the automation of home is done 8051 based main control unit. The temperature, intruder detection through the PIR sensor and Smoke and gas sensors are installed on the embedded board. Outputs of these sensors are given to microcontroller.

Temperature and other analog output are given through ADC to the microcontroller. Microcontroller is triggered by the input sensors and it will initiate the action through the actuators.

The ESP8266 wifi module is interfaced to the main control unit through RS232 UART in 8051 microcontroller. By using wifi module, home appliances can be controlled through internet anywhere in this world.

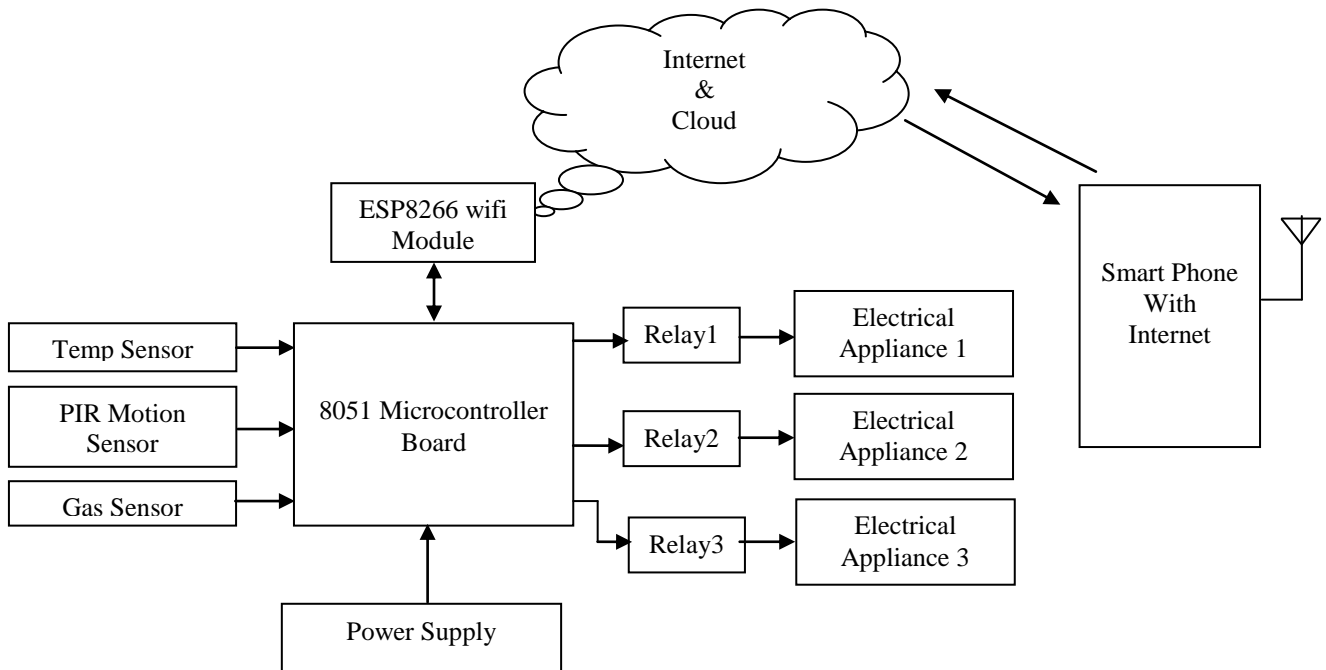


Figure 2. Block diagram of the Home automation system

Table 1 represents different stages and their output. This project mainly makes the home automation through self-controlling and remotely controlled through IoT concept.

S.No.	Stages	Output
1.	Temperature Sensor	Analog Electric signal
2.	PIR Sensor	Analog Electric signal
3.	Gas Sensor	Analog Electric signal
4.	8051 Microcontroller	Digital Values
5.	GUI	Visual User interface
6.	Wifi module	Digital Values

Table 1. Individual signals and Outputs

Temperature sensor is connected to P1.1 of 8051 microcontroller, if the PIN status is detected HIGH microcontroller will activates appropriate output device. PIR sensor is connected to P1.2 of 8051 microcontroller; status of this PIN will become HIGH when any moving object is detected in the proximity area of sensor. Gas sensor is connected to P1.3 of 8051 microcontroller; status of this PIN will become HIGH when any abnormality observed in the air.

ESP8266 wifi module is interfaced through serial communication to the 8051 microcontroller. This module is interfaced accessing and controlling home appliances through internet.

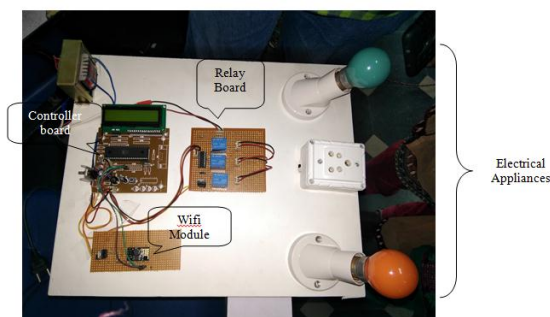


Figure 3. Home Automation System

Figure 3 shows the working model of Home automation system. The main control board is designed with 8051 microcontroller; all electrical appliances are controlled through this board only. Ubidots website is used to create a dash board; through this we can control the home appliances anywhere in this world.

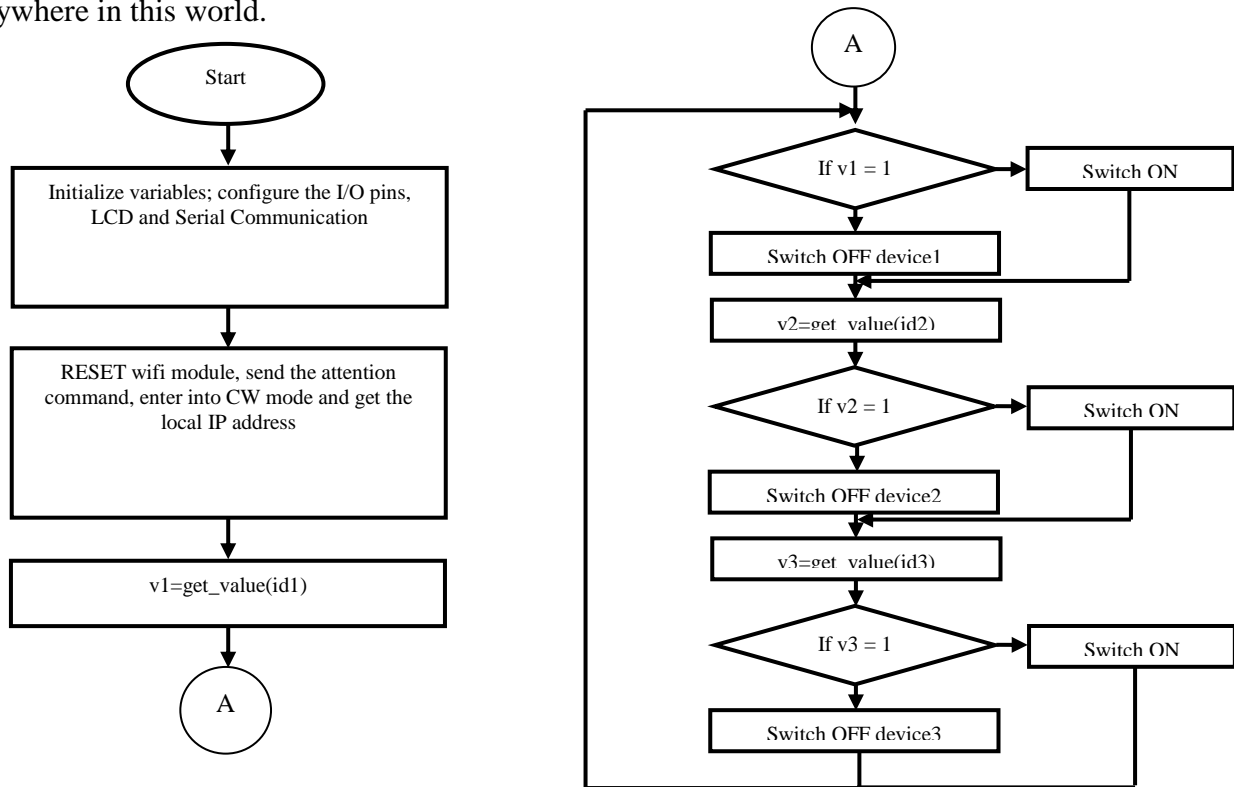


Figure 4. Flow chart Home Automation System

Figure 4 shows the flowchart of home automation system. Initially main control unit searches for the sensor triggering input and takes action according to the input signal. Then it will search for any control input through wifi module and takes action according to the wifi module input signal.

III. RESULTS

The response of the Home automation system for different input sensors and GUI controlled input are discussed in this section.

3.1. GUI Case 1

In GUI case1 is all devices OFF, Figure 5 (a) shows the GUI control input for case 1 and Figure 5 (b) shows real time output response in Home automation system.

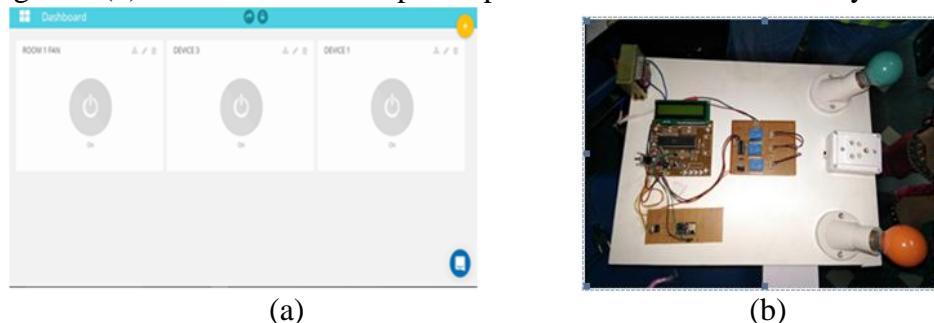


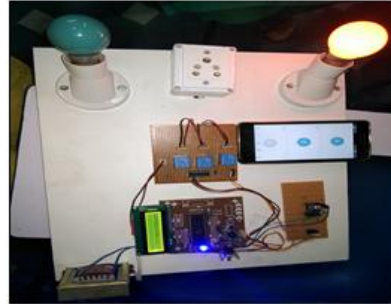
Figure 5. (a) GUI case1: all devices OFF, (b)Real time output for case1

3.2. GUI Case 2

In GUI case 2 is device1 ON, device 2 and device 3 is OFF in this case a control signal is given through the GUI through internet. Figure 6 (a) shows the GUI control input for case 2 and Figure 6 (b) shows real time output response in Home automation system.



(a)

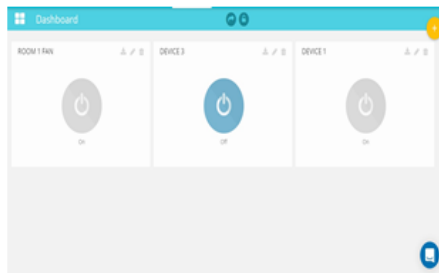


(b)

Figure 6. (a) GUI case2: Device1 ON, (b)Real rime output for case2

3.3. GUI Case 3

In GUI case 3 is device 2 ON, device 1 and device 3 is OFF in this case a control signal is given through the GUI through internet. Figure 7 (a) shows the GUI control input for case 3 and Figure 7 (b) shows real time output response in Home automation system.



(a)



(b)

Figure 7. (a) GUI case3: Device2 ON, (b)Real rime output for case3

3.4. GUI Case 4

In GUI case 4 is device 3 ON, device 1 and device 2 is OFF in this case a control signal is given through the GUI through internet. Figure 8 (a) shows the GUI control input for case 4 and Figure 8 (b) shows real time output response in Home automation system.



(a)



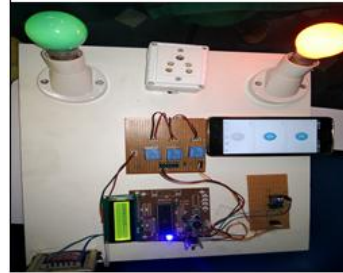
(b)

Figure 8. (a) GUI case4: Device3 ON, (b)Real rime output for case4

3.5. GUI Case 5



(a)



(b)

Figure 9. (a) GUI case5: All Devices ON, (b)Real rime output for case5

In GUI case 5 is All devices ON in this case a control signal is given through the GUI through internet. Figure 9 (a) shows the shows the GUI control input for case 4 and Figure 9 (b) shows real time output response in Home automation system.

IV. CONCLUTION

The home automation increases luxurious flexibility and security in different aspects. The IoT based home automation is designed to provide flexible operations at home and remotely monitor all the electrical appliances. This project provides security in different aspects to home and residents of it. IoT extends the proximity monitoring region and controlling. By this increasing region of monitoring people can observe and control different events of his/her home anywhere from this world.

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