E-SMART HOME

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Abstract: Home automation has been evolving on daily basis for last decade. Different protocols like Zigbee, Bluetooth, GSM, Ethernet, RF, Wi-Fi have been used to implement the system. This project has features like turning on/off the components from any part of the world, monitor real time power consumption of the attached devices and alert the user whenever there is a security breach or fire in the house via alarm, E- mail and text SMS. Aforementioned all these benefits makes the system different from the existing conventional home automation. Also it can work with Bluetooth in limited area with just a flip of switch when no internet connection.

Index terms: Wi Fi module, Bluetooth module, Security alarm, Fire alarm.

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I. INTRODUCTION

IoT (Internet of Things) has been in talks from past few years and its application has simplified the life of a common man. Home automation is one of such application which can be implemented using IoT for better features. Traditional home automation is just limited to turning on/off the home appliances from a limited distance with the help of remote or phone. Though it satisfied the human leisure not to get up and turn on/off the switch but it didn't have any extra features.

In our proposed system, we have added features like:

➢ Controlling the appliances from anywhere in the world with the help of mobile or PC with proper internet connection. In case of no internet service the appliances can be controlled with the help of Bluetooth from a limited area.

➢ Monitoring real time power consumption of the attached appliances in the system. It will provide idea about the electricity bill and manage the expenditure of electricity. The maximum ratings have been kept as 240V AC and up to 30A, which is more enough to drive a heavy load like air conditioner.

➢ User will get informed in case of security breach or any fire with the help of loud alarm, E- mail and SMS. This will help the user to take necessary steps and protect the premises.

➢ These all features are added very cost effectively comparatively to market price of current home automation systems and also in very compact size.

Additional features can also be added depending upon the user requirement and the creativity of the designer

II. BASIC BLOCK DIAGRAM, HARDWARE AND SOFTWAREDESIGN

A. Basic block diagram

AVR microcontroller as shown in figure 1 is the heart of the system which control and manage all the parts of the system. Controller takes and gives command to WIFI for passing data such as security breached, fire alert, power consumption and receives data from WIFI for controlling the appliances
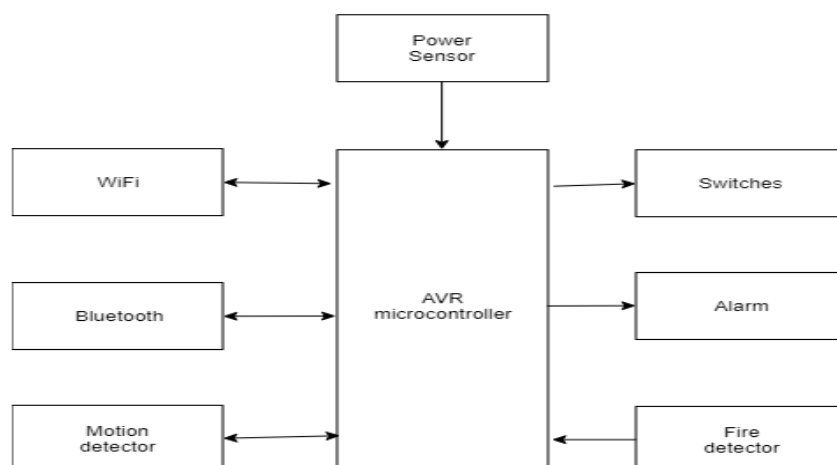

Fig. 1 Basic block diagram of E-smart home

B. Hardware Design

1. WIFI.

In this project ESP8266 WIFI module have been used for internet connectivity to our server as depicted in figure 2. ESP8266 works in 2.4 GHz band and has very small size. It has been also the most cost efficient   WIFI module   with enough technical   help available from the official sources.
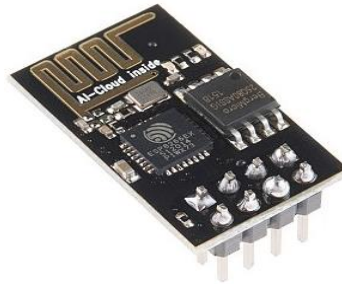
Fig.2 ESP8266 WIFI

2. Bluetooth.

Here HC05 Bluetooth module as shown in figure 3 have been used which can work in both modes i.e. master and slave mode

Fig.3 HC05 Bluetooth

3. Current sensor.

Figure 4 shown ACS712 current sensor which has 3 variants for 5A, 20A and 30A. In this project 30A variant is used ,as there is no major price difference compared to others and it can be used with heavy duty appliances like AC which consumes up to 15-18 ampere.
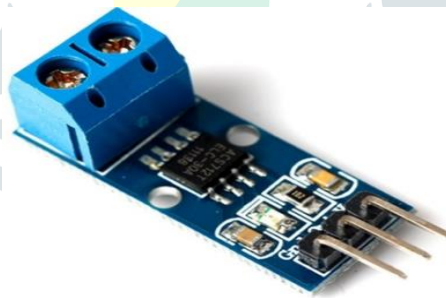
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Fig.4 ACS712 current module

4. Motion detector

Because of precision and high reliability ultrasonic motion detector has been used in this project which is depicted in figure 5.

Fig.5 Ultrasonic motion detector

5. Temperature sensor

Fire alert has been detected by using DHT22 as shown in figure 6.It has high accuracy and enough range for detecting a fire.

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Fig.6 DHT22 Temperature sensor

6. Relay

Relay has been shown in figure 7 which operate on 6V and has capability of handling current as high as 30A. It has been tested and found that this relay can also work on 5V.

Fig.7 Relay

C. Software design

In this project Adafruit server have been used to host our data as shown in figure 8. This server have been chosen because, it supports MQTT protocol which is required for our project. It also gives us free 10 feeds which is enough for our system.
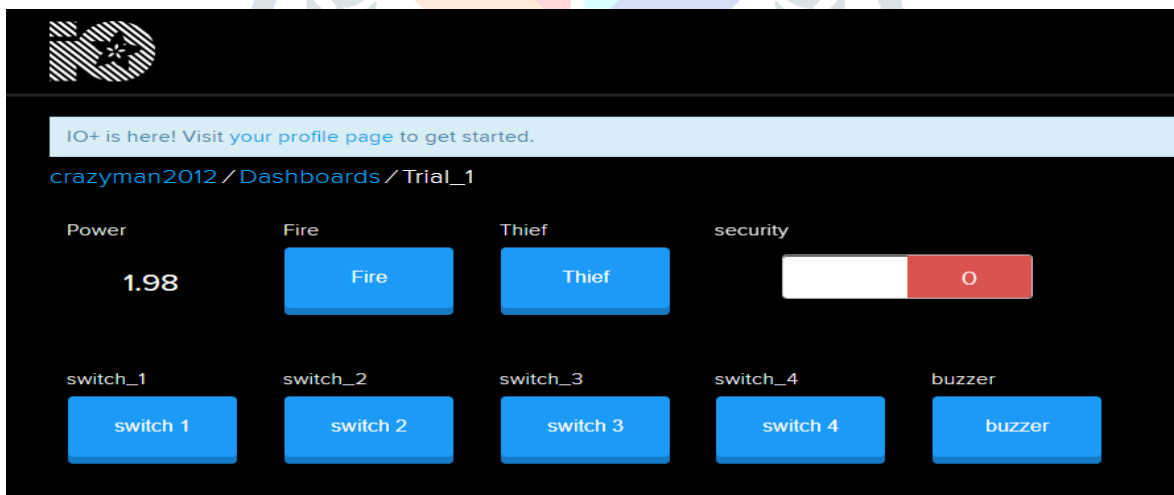

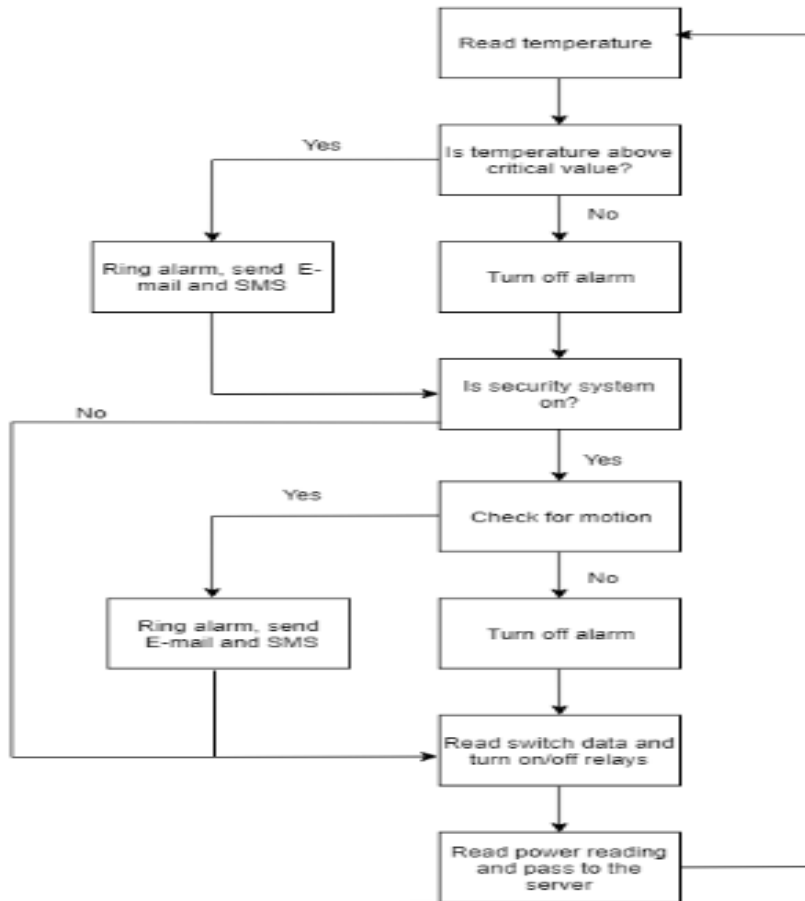Fig.8 Block diagram of Adafruit server

III. DETAILED BLOCK DIAGRAM

Fig.9 Detailed block diagram of E-smart home

Figure 9 describe complete detailed block diagram of E-smart home system. At first the system has been checked for temperature and if it is found higher than the critical value, then it will ring alarm and ask WIFI to send E-mail and SMS. If the security system is turned on by the user then it will check for any motion and if any motion is detected then it will ring alarm and inform WIFI to send E-mail and SMS. Then it will read the incoming messages from WIFI to turn on/off the switches as per data received from the server. Also user can check real time power consumption and send the data to the server.

This process will keep on repeating itself.

Following two platforms have been used to control the switches and security system.
1) Website.
2) Mobile application.

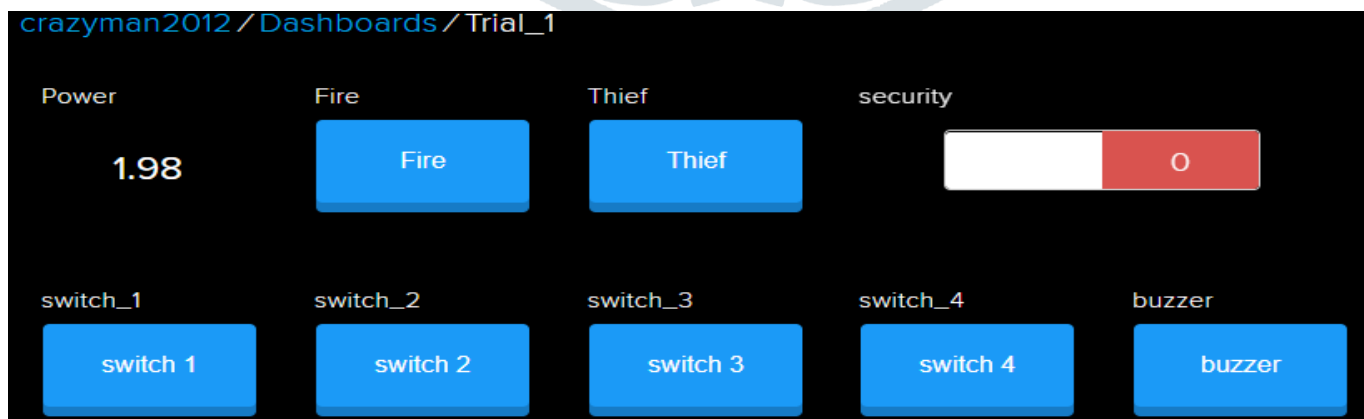In Website application io.adafruit.com have been used and its interface is as below:

Fig.10 Web application

Following is the interface for mobile application

Fig.11 Mobile application

IV. RESULTS AND DISCUSSION

Design layout of PCB have been prepared for size 100x100 mm. as shown in Figure 12.
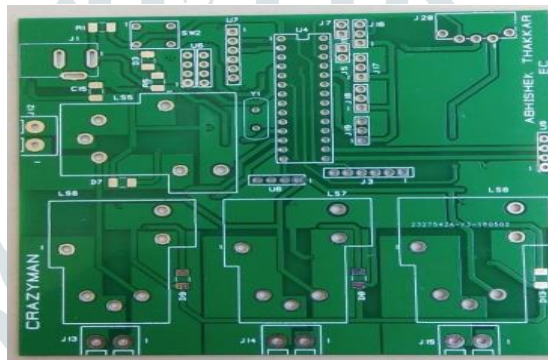

Fig. 12 Layout of project PCB

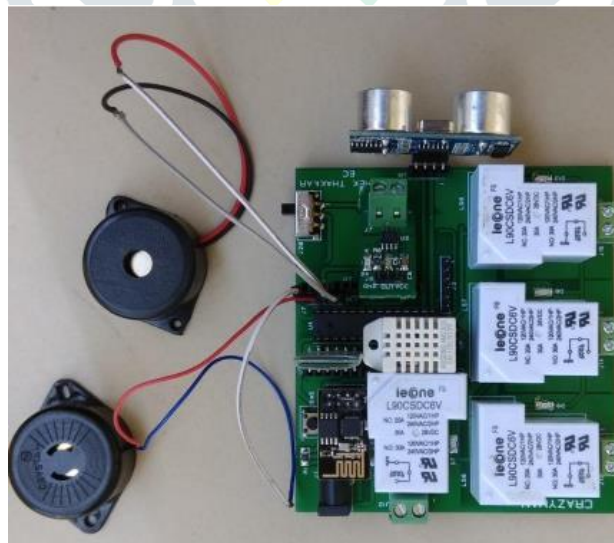After placing and soldering every component it looked like figure. 13

Fig.13. Loaded PCB

This project is able to turning on/off the components from any part of the world, monitor real time power consumption of the attached devices and alert the user whenever there is a security breach or fire in the house via alarm, E- mail and text SMS Also it can work with Bluetooth in limited area with just a flip of switch when no internet connection.

Functions can also be modify by selecting appropriate crystal rates and code compiling

I. CONCLUSION

From this project it can be concluded that, the system worked adequately as per our expectation and is being liked by common people. We have designed the system compact in a mere size of 100x100 mm which is very cost effectively comparatively to market price of current home automation systems.

This project has features like

- ➢ Turning on/off the components from any part of the world
- ➢ Monitor real time power consumption of the attached devices
- ➢ Alert the user whenever there is a security breach or fire in the house via alarm, E- mail and text SMS.

Aforementioned all these advantages makes this system different from the other existing conventional home automation system. Also it can work with Bluetooth in limited area with just a flip of switch when no internet connection.

Home Automation is very vast field and can be expanded with many advance things such as Artificial Intelligence, Voice recognition and Face recognition for security.

II. REFERENCES

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[5] http://www.ijecs.in/issue/v6-i3/53%20ijecs.pdf
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