SMART HOME: IOT Based Home Automation Using Raspberry Pi 3

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Abstract

In present, individuals like additional of automatic systems instead of manual systems. With the influence of web in people's life various new technologies are turning out. One among the newest, rising and trending technologies is that the 'Internet of Things'. This technology is predicted to rule the globe inside a number of years. Home Automation System uses the technology of web of Things for watching and dominant of the electrical and electronic appliances reception from any remote location by merely employing a Smartphone. Implementation of an occasional value, versatile home automation system is bestowed. It enhances the employment of wireless communication that provides the user with remote of assorted electrical and electronic appliances.

Keywords: *Raspberry Pi, Internet of things, Sensors, Mobile App, Web App.*

1. INTRODUCTION:

The Internet of Things (IoT) refers to the ever-growing network of physical objects that feature an IP address for internet connectivity, and the communication that occurs between these objects and other Internet-enabled devices and systems. IoT extends internet connectivity beyond traditional devices like desktop and laptop computers, smart phones and tablets to a diverse range of devices like sensors relays, motors etc. and everyday home appliances like fans, lights, ACs etc. that utilize embedded technology to communicate and interact with the external environment, all via the Internet. Now a days, people like further of automatic systems rather than manual systems. With the influence of internet in people's life numerous new technologies are bobbing up. One in all the latest, rising and trending technologies is that the 'Internet of Things'. This technology is foretold to rule the world within variety of years.

Sirsath N. S[1] proposes a Home Automation system that employs the integration of multi-touch mobile devices, cloud networking, wireless communication, and power-line communication to provide the user with remote control of various lights and appliances within their home. This system uses a consolidation of a mobile phone application, handheld wireless remote, and PC based program to provide a means of user interface to the consumer. Deepali Javale [2] developed a system which assist handicapped/old aged people. It gives basic idea of how to control various home appliances and provide a security using Android phone/tab. The design consists of Android phone with home automation application, raspberry pi. User can interact with the android phone and send control signal to the raspberry

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pi which in turn will control other embedded devices/sensors. Deepali Javale[3] and S. V. A. Syed Anwaarullah[4] were implemented home automation using Adriano board and wifi module.

We developed a IOT Based Home Automation using Raspberry Pi 3 because Raspberry Pi provides a flexible environment to the IOT. Home Automation System uses the technology of internet of Things for observation and dominant of the electrical and electronic appliances reception from any remote location by just using a Smartphone. It enhances the use of wireless communication that has the user with remote of varied electrical and electronic appliances.

2. MATERIALS AND METHODS:

IoT Based Home automation System all components centralized with Raspberry Pi3 Mode as represented in the block diagram shown in the figure1. Raspberry pi 3 model B connected to connect the LDR Sensor, LM 35, l293D Driver IC as inputs. These inputs are in the analog system and outputs are in the digital form. So for converting the analog to digital form we can use the ADC converter. Then by using the mobile app we can operate the electrical and electronic appliances in home.
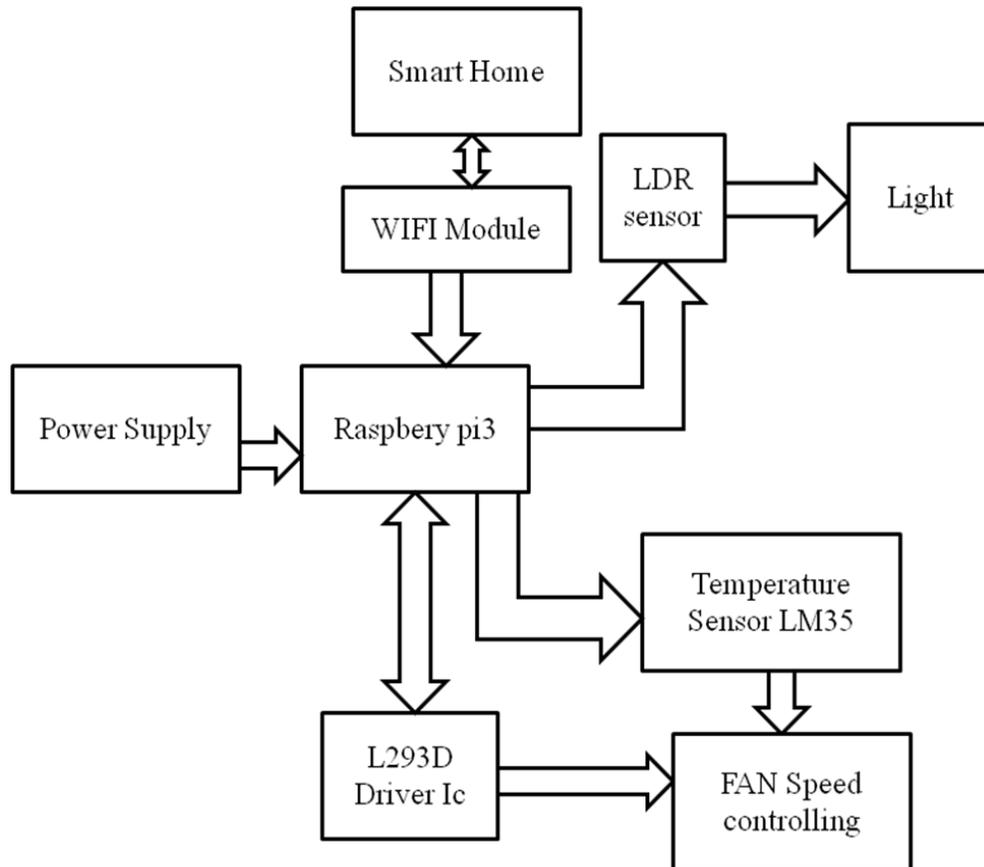

Figure 1: BLOCK DIAGRAM OF SMART HOME

A. HARDWARE DETAILS :

The Raspberry Pi 3 (read R-pi3) shown in the figure2, is a series of low-cost, credit card-sized single-board computers. It is just like any other computer and features built in Wi-Fi, Bluetooth and 1GB RAM. We connect a keyboard, mouse through USB or Bluetooth and a display monitor through HDMI cable and start using it just like a normal computer. But the real power of R-pi3 is realized in embedded systems. The R- Pi3 has the ability to interact with the outside world. Hence it is well suited for the IOT technology and has been used in a wide array of digital maker projects, from music machines and parent detectors to weather stations and tweeting birdhouses with infra-red cameras. It has 40 GPIO Pins. Out of 40 pins, 26 pins are Input and Output pins, 8 pins are ground, 2 pins are 5V, 2 pins are 3.3V and 2 pins are ID_SD and ID_SC used in I2C communication. The Product information can be accessed though Raspberry website[4].
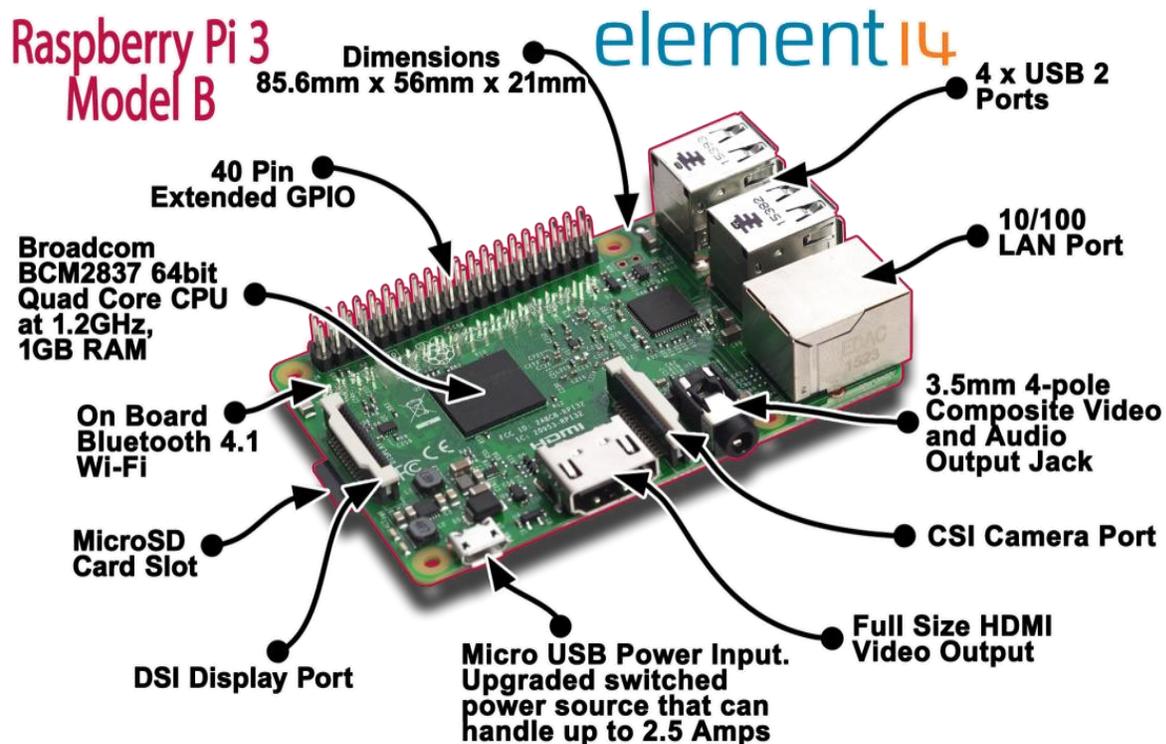

Figure.2: RASPBERRY PI 3 MODEL B

A photo resistor (or light-dependent resistor, LDR, or photocell) is a light-controlled variable resistor. The resistance of a photo resistor decreases with increasing incident light intensity; in other words, it exhibits photo conductivity. A photo resistor is made of a high resistance semiconductor. The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device is rated to operate over a −55°C to 150°C temperature range, while the LM35C device is rated for a −40°C to 110°C range (−10° with improved accuracy). The MCP3208 12-bit analog-digital converter (ADC) combines high performance and low power consumption in an exceedingly little package, creating it ideal for embedded

management applications. The detector is analog and to convert it into digital, so we have used the ADC or IC-MCP3208. **D**ual H-bridge motor driver integrated circuit acts as current amplifiers, takes low current control signal and provides higher current signal. Motor driver is used to drive the motor.

B. SOFTWARE DETAILS:

Python could be a easy programming tool on used for Raspberry Pi. Python is a wide used high-level artificial language for general programming. Python encompasses a style philosophy that emphasizes code readability and a syntax that permits programmers to specific ideas in fewer lines of code compared to different languages.

ThingSpeak details accessed from the website[6] is associate degree IoT analytics platform service that permits to mixture, visualize and analyze live knowledge streams within the cloud. ThingSpeak provides instant visualizations of knowledge announce by devices to ThingSpeak. With the flexibility to execute code in ThingSpeak easy to perform on-line analysis and process of the information.
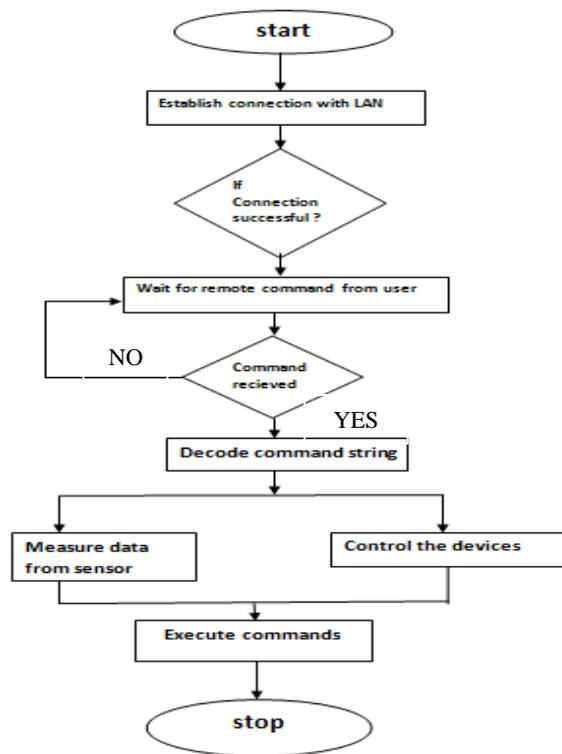
C. METHODOLOGY:

Figure.3: FLOW CHART OF HOME AUTOMATION

The projected home automation system has the capabilities to manage the subsequent parts in users home and monitor the subsequent alarms they're temperature and humidity, Motion detection smoke detection, and light intensity level. The projected home automation systems will management the subsequent appliance Lights on/off/dim, Fan on/off, On/off totally different appliance.

In this flow chart shown in the figure3, we can see the work of the server and client of the system. By using the internet client give the input to the server so that server can give the output by using the internet. Here ThingSpeak act as an serever.

RESULT:

When the connection is established it will start reading the parameters of sensors like p1, p2, p3 etc. The threshold levels for the required sensors are set as t1, t2, t3 etc. The sensor data are sent to the ThingSpeak server and stored in the cloud. The data can be analyzed anywhere any time.
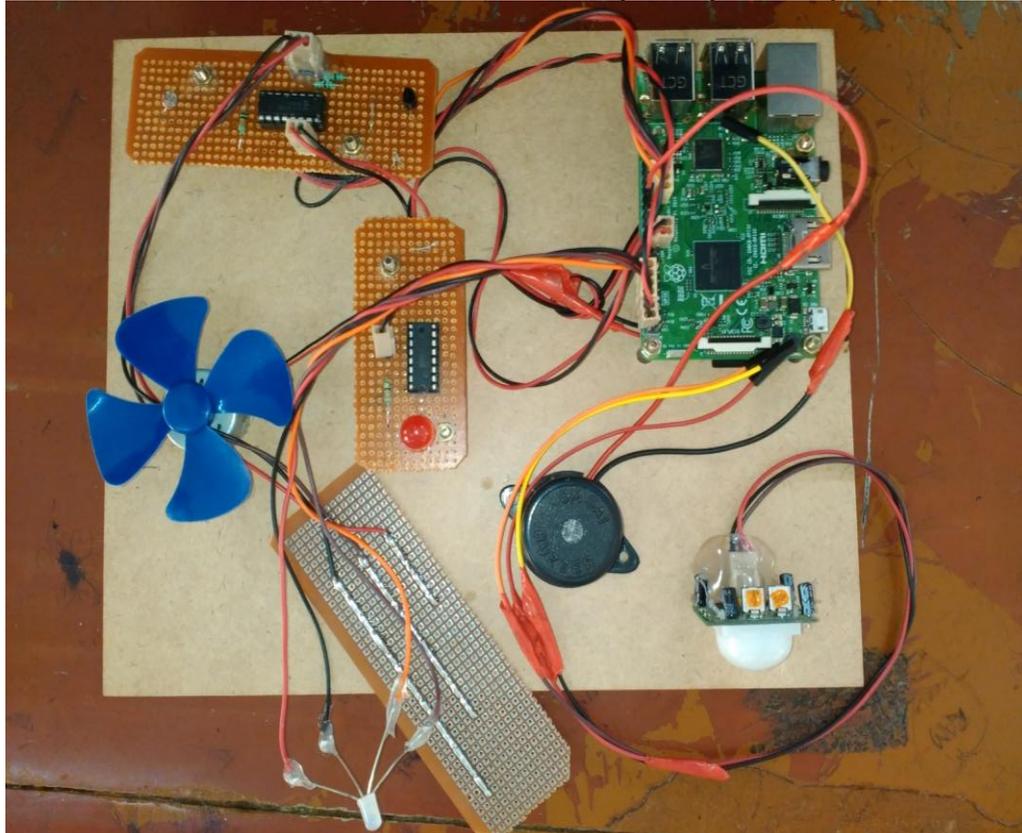

Figure.4: EXPERIMENTAL KIT OF HOME AUTOMATION

.   Using this system,we can control the temperature, light intensity & colour, fan speed, door open/ close and water tank level. By using this mobile app represented in the figure5, we can control the input to the sensors and it gives the output. Sensors, or things, sense information and generally act regionally. ThingSpeak allows sensors, instruments, and websites to send information to the cloud to store during a channel. Once information is during a ThingSpeak channel, we can analyze and visualize it, calculate new information, or act with social media, net services, and different devices. By using the Web app we can visualize the input to the devices and the output of sensors on graphs as shown in the web app figure6.
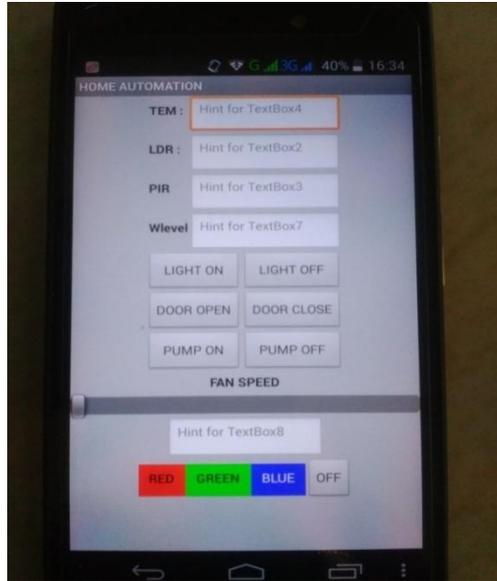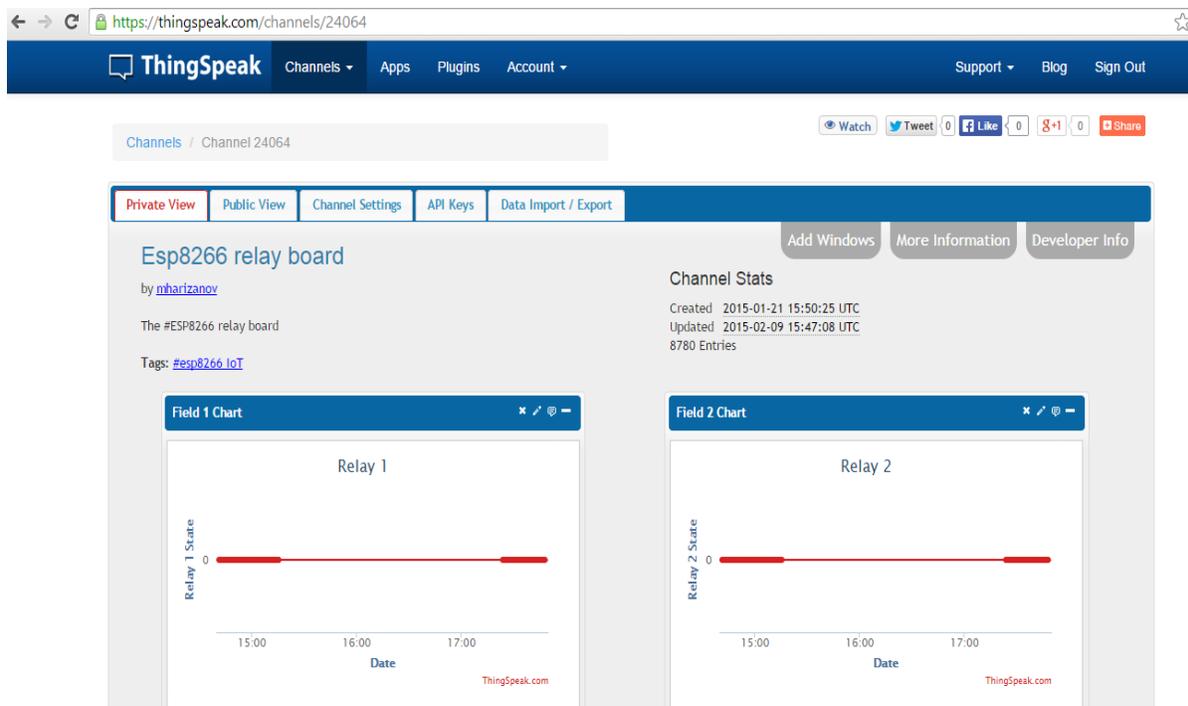
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Figure.5: MOBILE APP FOR HOME AUTOMATION

Figure.6: WEB APP FOR HOME AUTOMATION

4. CONCLUSION AND FUTURE WORK:

In this paper, a novel architecture for low cost and flexible Iot Based home control and monitoring system using Android based Smart phone is proposed and implemented. The home automation system using internet of Things has been tested to figure satisfactorily by connecting the appliances and therefore controlling the appliances remotely through web. When a Wi-Fi connection is not available, mobile

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cellular networks such as 3G or 4G can be used to access the system. The designed system monitors the values of temperature, gas, light, motion sensors etc. This system include home security feature like capturing the picture of someone infront of the house and storing it onto the cloud. This information stored in the CCTV camera which can record all the time and stores it. The system will be expanded for energy watching, or weather stations. This sort of a system with several changes will be enforced within the hospitals for disable individuals or in industries wherever human invasion is not possible or dangerous, and it may be enforced for environmental watching and the implementation of voice commands for controlling the application via voice.

5. REFERENCES:

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