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IOT Based Smart Home

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***Abstract* - In 21 St century Digital devices in our home are increases rapidly. And we all affixed to the mobile phones and laptops. As it becomes need, so this project may helpful to use this habit to get easy and safe life. Home automation provides user friendly access by mobile phone using android application. This project is focuses on controlling devices instead of only monitoring of environment**

***Keywords:* Internet of things, raspberry pi-3 module, android application, web page.**

1.INTRODUCTION

Now a days our life is becoming very busy. Not only men but women are also start working and taking burden of work and home. So in this situation they need a system which keeps their home secure.

In this paper we described about our Home automation system. In which we can control home application through internet from anywhere and any time.

2.HARDWARE USED

System consists of

2.1 raspberry pi module

Raspberry pi module is used as a development board. Which consist of inbuilt Wi-Fi module. This modem act as a controller of the system which sends the control signal via GPIO pin to the relay circuit. As the raspberry pi module get information of controlling through cloud.

2.2 relay circuit

We used 4 channel 12V relay card circuit which has a driver IC. Light, fan, and motor is connected to the relay and supply. As bulb is directly connected to the Ac main and the other devices are connected to 12V DC supply by using multi power supply circuit. As the controlling signal come from raspberry pi, relay coil switches to Ac or DC supply according to high signal on pin. Then particular devices get ON or OFF.

3.1Comparison of Wireless Systems

SR NO	SYSTEM	COMMUNICATION INTERFACE	CONTROLLER	USER INTERFACE
1	Wi-Fi based using the arduino Microcontroller	Wireless LAN and Wi-Fi shield	Hardware interface module	Web based Application
2	Web service and android app based using raspberry pi	Web server and interface card	Raspberry pi	Android Application
3	Cloud based using zigbee microcontroller	Zigbee wireless network	Smart socket	PC or Android Phone
4	GSM based using PIC microcontroller	SMS	PIC16F877A	Mobile phone
5	Bluetooth based using arduino	Bluetooth	Arduino	Python supported mobile
6	Cloud based using hadoop system	Cloud based data server uses hadoop technology	Home gateway and router	Smart device

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3.2 Comparison Table Of Various Development Board

SR NO	PARAMETERS	ARDUINO UNO	RASPBERRY PI 3 MODEL B+	INTEL EDISON
1	Price	500	3000	10000
2	Size	7.6*1.9*6.4 cm	8.5*5.6*1.7 cm	3.55*2.5*.39 cm
3	Clock speed	16MHz	700MHz	500MHz,100MHz
4	GPIO	14	40	40
5	Memory	0.002MB	512MB	1GB
6	Multitasking	No	Yes	No
7	Flash Memory	32 Kb	Micro SD Card	4 GB eMMC
8	USB	One,Input Only	Four,Peripherals Ok	One,Peripherals Ok
9	Input Voltage	7V-12V	5V	3.3V-5V
10	Operating System	None	Linux	Yocto linux v1.6

4.Software Languages Used:

For raspberry pi board require python language which is very easy to learn and implement. Python is a high level programming language accessible for many operational systems. And Java programming is used for developing Android application using android studio software.

Block diagram of Home Automation:

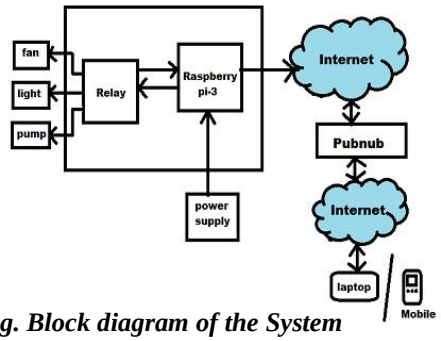

Fig. Block diagram of the System

4.1Software Requirements

We will use the following sdks and tools

1. RPi GPIO , GPIO Python library for Raspbian OS
2. PubNub Python SDK
3. PubNub Javascript SDK

We will create two subsystems. One will be the controller, a basic web application in the form of a web page which can display the current status of device and send control messages to it, and the second one is the actual device such as light,fan,water tank and gas and controlled via Raspberry Pi.

As raspberry pi uses a gas sensor to sense gas in environment. After sensing, the raspberry pi immediately sends a this data to server for storage and later retrieval. For this we need a web service to which our device can send its data. Conveniently there is free service, Pub nub which does exactly this. It provides web based interfaces for storing and accessing feeds.

In our diagram, the house represents the Raspberry Pi house with the lights, fan, MQ 6 Gas sensor and dc water pump. Using PubNub, we can power bidirectional communication between the devices at home and our mobile/browser:

- Read the sensor data, status of water tank, lights and fan in house on a real-time web UI.(SENSOR/LIGHT /FAN/WATERTANK—-> BROWSER/MOBILE DEVICE)

- Monitor the same devices, and send control messages to them, to turn them on/off, to check their state and to take any action on them.(BROWSER/MOBILE DEVICE —-> SENSOR/LIGHT)

This information is sent from one device to the other, without having to open any ports on the devices, through firewalls and irrespective of the network they are on. PubNub is the key communication component between all the things in the Internet of Things.

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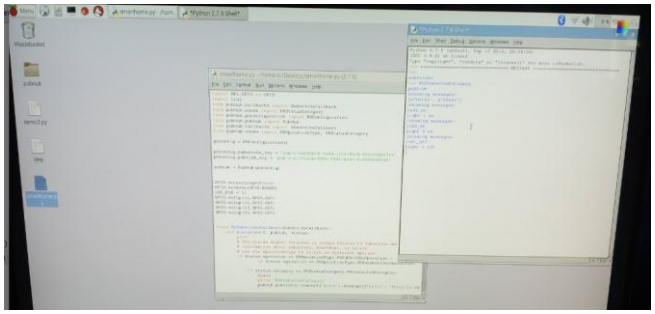
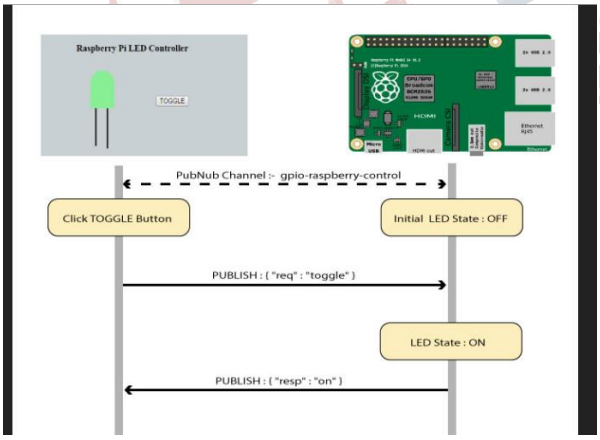


Image.4.1.1 Raspberry pi Programming

4.2 What is PubNub doing here?

The Raspberry Pi smart home is all about IoT, and IoT is all about the devices communicating with each other in real time via Internet. PubNub powers that communication between devices. Whether it's a mobile device or a web browser talking to embedded devices, sensors or any other device, PubNub glues them together.

first we need to sign up for PubNub Account, to get our unique publish and subscribe key. Once we sign up, we can get our unique PubNub keys in the PubNub Developer Dashboard. Their free Sandbox tier provides us all the bandwidth we need to build and test app with the PubNub API.



PubNub Publish/Subscribe

In order to view the status of device on our web UI, We will need to publish them on a specific channel using PubNub. The browser will subscribe to the same channel, and hence receive the message. Here They are formatting the data to two decimal places, forming a message to be sent over PubNub, and finally publish the message. We initialize an instance of PubNub by inputting our publish/subscribe keys. Our channel is where we publish the message to, so choose a unique name for that.

In our project we are using both a web browser and mobile device to communicate with the sensors and the Raspberry Pi. The sensor sense the data and sends it back over PubNub, allowing us to visualise it on our browser in real-time. Our Web UI is the control station for the Raspberry Pi smart home. This is where we can check the status of connected devices, and can control and trigger action, all in real-time. We are running the Python script on the Pi, we'll notice the changing status of the devices. The UI updates as the data changes This is a very simple web page with a visual indicator for the device and a button to toggle the on/off state of LED. The dashboard gives a user complete control and monitoring of the Raspberry Pi smart home. In addition to basic controls including turning on and off lights, fans, water tap.

All communication between the Raspberry Pi smart home and the GUI control dashboard is powered by PubNub. Behind the scenes, we have the PubNub Javascript API that performs two operations upon receiving certain events.

1. Sends a request message to toggle the state of the device.

2. Receives response with the current state of the device.

Button Click Event

When the TOGGLE button is clicked, the webpage sends a Toggle request message to the device via 'gpio-raspberry-control' channel.

PubNub Channel Subscribe Callback Event

On receiving the toggle request, the Raspberry Pi toggles the state of the LED and sends a response back to the web page with the current state. Web page updates the visual indicator for the LED based on the received state information.

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We are going to use the Raspberry Pi GPIO Python library to send the control messages to Raspberry Pi GPIO ports. This library works well with the python environment available by default with Raspbian OS. When a toggle request is received, the application checks the current state of the GPIO driving pin of the LED, toggles its state and then sends the new state back to the web application as a response message. The exchange of messages between the web application and Raspberry Pi can be visualised as follows

Receiving Data to Pi to Control LED

Whenever the value is changed by a user, browser sends data like {brightness: 10}via PubNub, then a python code to talk to Pi to receive the data and control the LED .

5. Android application development

According to your imagination power you can design a GUI of Application. We used Android Studio software to develop it. In this you have to create a new project in which you can select design window as per your requirement, and you can give appropriate name to apk file. The login activity is includes the login page, by giving input to this page it goes to navigation activity. This access the Home page of the system. Manifest file access the permission to login that page for the user.

Image 5.1: Screenshot of Android Application when devices OFF

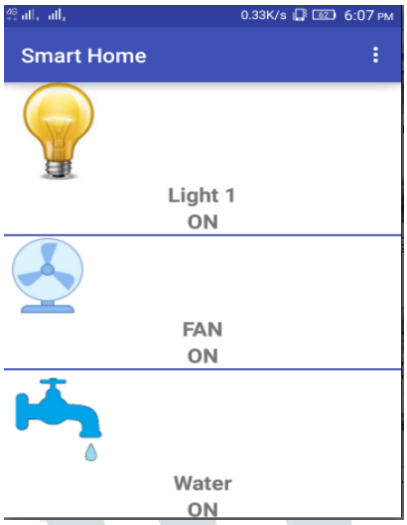

Image 5.2: Screenshot of Android Application when devices ON

6.Actual Implementation of System:

Image.6.1.Raspberry pi connected with Relay.

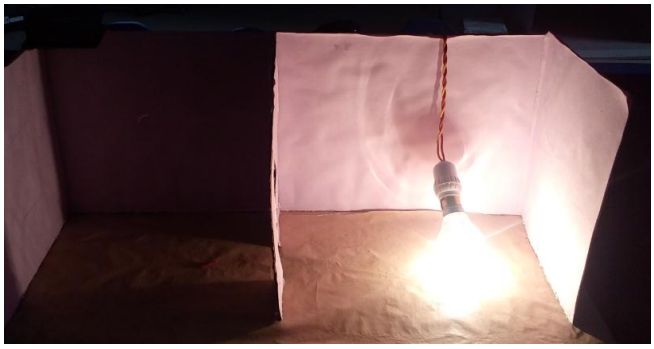

Image.6.2.When Light turn ON by android app or web-page

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Image.6.3.When fan turn ON by android app or web-page

Image.6.4. When Pump turn On by android app or web-page

7.APPLICATIONS

- Can be used for the safety of Home.
- Get easy access to devices in home or industry.
- To help handicapped people.
- Where less energy consumption is major factor.

8. ADVANTAGES

I. Android mobile phone which can be easily carried by everyone.
II. Wireless connectivity.
III. Energy saving.
IV. Fast response.
V. Compact in size.

9.CONCLUSION

In this paper we have provide system of internet based Smart home. The main purpose of this system is a to get easy access, low cost and energy saving. And providing alternate mechanism in case of any emergency situation.

10. FUTURE SCOPE

We can use camera as a continuous monitoring at home to head off from theft. We can also run washing machine by using this technology in the middle of the day by taking the output from solar panel to save electricity.

11.REFERENCES

[1] C. Chiu-Chiao, H. Ching Yuan, W. Shiau-Chin, and L. Cheng-Min, "Bluetooth-Based Android Interactive Applications for Smart Living," in Innovations in Biro-inspired Computing and Applications (IBICA), 2011 Second International Conference on, 2011, pp. 309-312.

[2] Carelin Felix, I. Jacob Raglend, “Home Automation Using GSM”,Proceedings of 2011 International Conference on Signal Processing, Communication, Computing and Networking Technologies (ICSCCN 2011).

[3] Sharon Panth, Mahesh Jivani “Home Automation System (HAS) using Android for Mobile Phone” International Journal of Electronics and Computer Science Engineering, ISSN- 2277-1956.

[4] Kaushik Ghosh, Rushikesh Kalbhor, Disha Tejpal, Sayali Haral “Wireless home automation technology (WHAT) using internet of things (IOT).Volume 3, Issue 6 (November-December, 2015), PP. 161-164.

[5] Dhakad Kunal, Dhake Tushar, Undegaonkar Pooja, Zope Vaibhav, Vinay Lodha, “Smart Home Automation using IOT” International Journal of Advanced Research in Computer and Communication Engineering Vol. 5, Issue 2, February 2016.