SMART HOME AUTOMATION WITH IOT AND RASPBERRY PI

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Abstract : Smart Home Automation is an approach to achieve a fully automated house. It's already been developed by some organisations. But, in this paper, I am trying to minimise their cost. Because in today's era smart devices are to must costly, and normal middle-class families can't afford this type of garbage. That's why I working on this and I try to use cheaper home appliances and make it smart by using relays, controllers and some web services, etc according to normal personal use.
The Raspberry Pi is a microcontroller that can manage numerous appliances simultaneously. It may control two or more appliances at the same time, such as washers and dishwashers. On Kickstarter, you can pre-order the Raspberry Pi module.

I. INTRODUCTION

Today, automation plays an important role in everything from work to home. The techniques are performed using a microcontroller or a computer. However, the microcontroller cannot run multiple programs at the same time [1], it is difficult to control two or more devices at the same time, so we use the Raspberry Pi module to eliminate this.

Raspberry Pi is a microcomputer development board that can be used to do Do It Yourself (DIY) [3] projects on the Internet of Things (IoT). Here we are using a Raspberry Pi board with the appropriate modules and switches to create a simple home automation project. The pi board is the basis of all connections, acts as the brain of our house, and we automate almost all the electrical and electronic components in our house, which lower part rated up to 250V 10A [3]. With that, the most important part of the whole project is about the sensors. The sensor array is used for detection and monitoring [1] while the Raspberry Pi collects data for data monitoring and relies on device management such as fans, lighting, temperature, humidity, and switching. motion.

Thus, smart home automation can include remote control of aspects of our home through a computer or phone (via a browser) [4]. Smart home automation offers benefits in terms of convenience, energy savings, and security, helping to improve quality of life. Home appliance control can be performed from a remote zone with the option from a local server, using the Internet of Things. Overall, home automation is nothing more than the connection of physical onboard devices with sensors and software. Network connections are used to collect and exchange data. It can be defined as a mechanism that eliminates as much as possible the technical and desirable human interaction in various household processes and replaces them with programmed electronic systems. . Here we have used Raspberry Pi 3 as the main module of the system, it is a little credit minicomputer consisting of an ARM-compatible central processing unit (CPU) and a graphics processor on a graphics chip. The whole system is unique because it uses the Internet of Things (IoT) [6]. All data and information received from the Raspberry Pi and circuits should be stored in a location easily accessible by the user. The Internet of Things makes it possible to use commands from anywhere in the world. Hence, it is possible to use home appliances from any region of the globe.

II. LITERATURE REVIEW

Rozita Teymourzadeh, Ceng, Salah Addin Ahmed, Kok Wai Chan, and Mok Vee Hoong used Global System for Mobile Communications (GSM) technology to control various household devices through Short Message Service (SMS). The homeowner will be notified whenever a device is turned on / off by mobile phone [12]. Ana Marie. D Celebre, Ian Benedict A. Medina, Alec Zandrae D. Dubouzet, Adrian Neil M. Surposa, and Ing. Reggie C. Gustilo used Apple's Siri voice recognition as a method of controlling home appliances. Raspberry Pi is used to communicate with devices and SiriProxy is installed on Raspberry Pi as a proxy server [1]. The limitation here is that the system is only available to Apple users. There are no apps that allow Android users to use this system. Sharon Panth and Mahesh Jivani use Bluetooth technology in their project to control things like lights, fans, etc. using relays. It can control from one to twenty-four different devices of the family [14]. However, this system only works with Android phones and because it uses Bluetooth technology, the range of control devices is very limited. Sarthak Jain, Anant Vaibhav, and Lovely Goyal designed a home automation system using a Raspberry Pi by reading the subject line of an email. The algorithm used is developed in a python environment and LEDs are used to indicate switching actions [5]. To solve some of the problems in the above systems, wifi technology must be used for a much wider range of communication. Model analysis can also be performed on the data collected by the sensors. This will make the system much more energy-efficient as it will have the ability to automatically turn on/off appliances according to normal usage.

III. TECHNICAL SPECIFICATIONS

The main part of the system will be the Raspberry Pi board, which is the brain of the system. The Pi Board installs a processor and carries a Linux application called Raspbian Jessie designed to meet IoT requirements [6]. Raspbian Jessie is a stable operating system with built-in support of Python and other programming languages such as Java, C and C ++. In our research, we mainly use Python in our automation system and other relevant development tools. Development tools are used to create a web interface so that the system can be accessed from anywhere in the Globe. The proposed approach is different from the previous one in the field in that it provides a much larger margin from the state of the household appliances, as all the details will be available directly from the home. Web browser. The Raspberry Pi, which is the heart of the system, will be connected to a router-enabled Internet.

A web server on its platform. The web server will host the web interface and communicate with device controls.
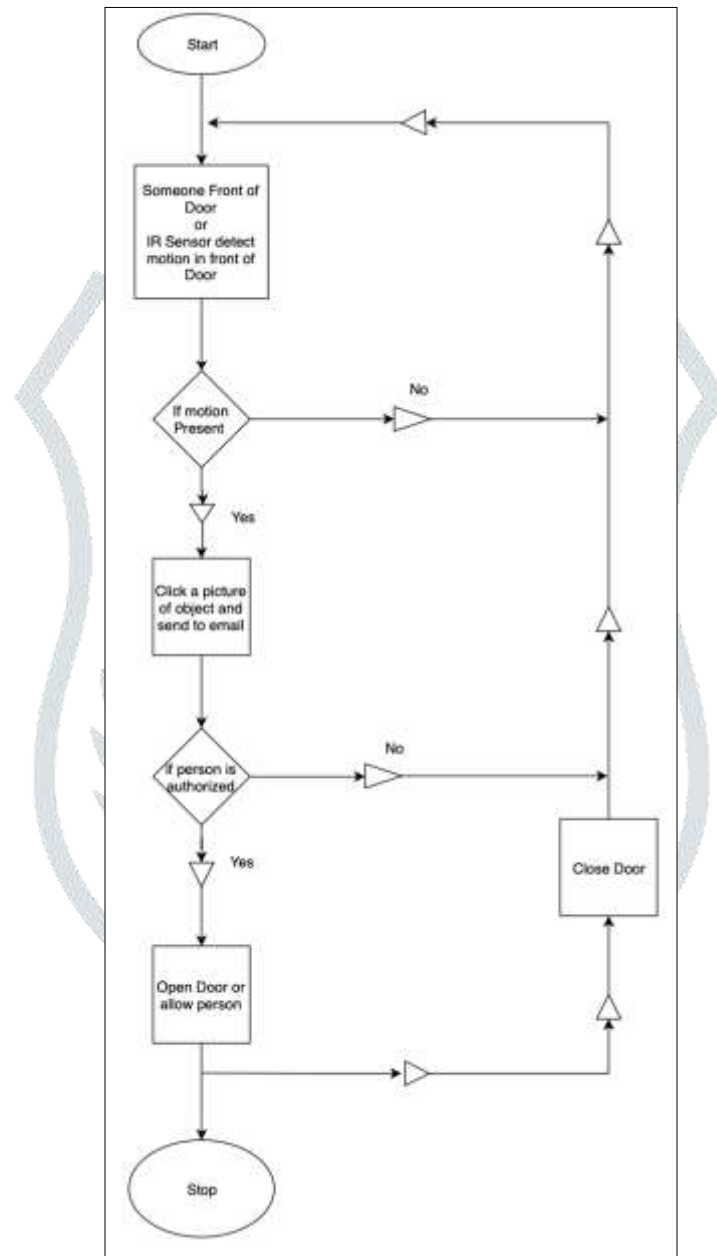
IV. IMPLEMENTATION

figure 1: Flow Chart

The operation of the whole project has three separate, interconnected phases. System functionality is established by flow [2]. The sensor part will be considered as the first function followed by performance management and the Website. The process is shown in this flowchart (figure 1).

Sensors Used:
- Temperature and Humidity Sensor (DHT11)
- Light Dependent Resistor (LDR)
- Passive Infrared Sensor (PIR)

All sensors were heavily connected to the Raspberry Pi GPIO pins to produce the desired effect.

The operation is performed in a way that assumes that there is a PIR (Motion Sensor) [7] installed at the door, will detect incoming and outgoing movements and the doors will open properly, once someone has entered the home, the next DHT11 sensor will begin to sense home temperature. home will automatically open or CLOSE (in case there is no one at home). In the same way, LDR will be used to feel the amount of light available in a home. If the outdoor light is sufficient for home use then the existing home lights will be automatically turned off. In all the steps we see we have set out some ways.

How to control house major appliances using IoT?

Some listed sample devices we can try:

- ON/OFF Air Conditioner
- ON/OFF Fridge
- ON/OFF Water Motor, etc.

The three most widely used devices were controlled using the Raspberry Pi. The code you want is written in Python and the control part is managed with the Raspberry Pi.

In addition to the regular headlights/fans, some heavy heavy objects have had to be controlled that one forgets to turn off or on. Here AC / Fridge / Water Motor control is done. Terms are set to the Raspberry Pi, which sends and receives information as needed and performs this function with the help of the Web interface.

Using web application control major devices

The current plan for the project says the project will run on Wi-Fi or Bluetooth. Wi-Fi or Bluetooth usage led to a major setback i.e. distance. Here usage area is limited. The user interface and hardware component must be within range of the operating system network. But in our proposed system this limit has been completely removed. We have created a Web Interface (Website) to control all the devices in a particular home. Website links are made in such a way that they are easy to use. Users can have their ID and password used to log in to their home control panel. After the login option users can control their homes from anywhere. Below are summaries of the website.

We create a text file on the server and keep the ON / OFF value after selecting ON or OFF Options by the user and every 3 seconds our python file is stored in Raspberry pi check the text of this file using HTTP protocol again properly ON / OFF Equipment.

For house main door security

We are using an IR sensor to detect user movement in front of the door. If someone moment detected in front of the door. Then, PICam will be activated and capture object image after that using SMTP protocol object image share with the owner by email. Then, the house owner can decides he/she can allow this user to enter a house or not. It depends on the motion detected in front of the House.

This module also uses for detecting unwanted activity in front of a door or someone observing family member movements. After collecting evidence house owner can inform a near police station for this unwanted activity in front of their house.

V. CONCLUSION

In-home automation means the integration of all electronic devices such as smartphones, personal computers, tablets and their monitoring, controls, and warnings in unpredictable ways. These types of Home Automation systems are necessary because one can make the mistake of forgetting to turn off electrical appliances when not in use and in this case, they are useful for energy-efficient and safe use. This plan can be proven as the future of artificial intelligence and a robust and reliable system where the goal of energy efficiency and efficient use of energy resources can be achieved soon.

The Raspberry Pi is a smart platform that uses many devices that can be connected and can be controlled from a long distance because the connection to be used will be online. Because of the equipment, it can be easily accessed. The Home Automation Program is a step forward in advancing technological development in the utility industry and another way in which human error and energy consumption can be avoided.

Therefore, the proposed system is better off from panic, flexibility, and security outlook than existing automated commercial automation systems.

REFERENCES

[1] Baris Yuksekkaya, A. Alper Kayalar, M. Bilgehan Tosun, M. Kaan Ozcan, and Ali Ziya Alkar "A GSM, Internet and Speech Controlled Wireless Interactive Home Automation System", 2006, IEEE Transactions on Consumer Electronics, Vol. 52(3) , pp. 837 - 843.

[2] Rozita Teymourzadeh,Salah Addin Ahmed,Kok Wai Chan and Mok Vee Hoong , "Smart GSM Based Home Automation System", 2013, IEEE Conference on Systems, Process & Control, Kuala Lumpur, Malaysia.

[3] A. Alheraish, "Design and Implementation of Home Automation System", 2004, IEEE Transactions on Consumer Electronics ,Vol. 50(4) , pp. 1087-1092.

[4] M.Van Der Werff, X. Gui and W.L. Xu, "A Mobile based Home Automation System, Applications and Systems", 2005, 2nd International Conference on Mobile Technology, Guangzhou, pp.5.

[5] Mahesh.N.Jivani, "GSM Based Home Automation System Using App-Inventor for Android Mobile Phone", 2014, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 3(9), pp. 12121-12128.

[6] Faisal Baig, Saira Baig, Muhammad Fahad Khan, "Controlling Home Appliance Remotely through Voice Command", 2012, International Journal of Computer Applications , Vol. 48(17), pp.1 - 5.

[7] S.R.Bharanialankar, C.S.Manikanda Babu, "Intelligent HomeApliance Status Intimation Control and System Using GSM", 2014, International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 4(4), pp.554 - 556.

[8] Rozita Teymourzadef, Salah Addin Ahmed, Kok Wai Chan, Mok Vee Hoong, "Smart GSM Based Home Automation System", 2013, IEEE Conference on Systems, Process & Control, Kuala Lumpur, Malaysia, pp.306 - 309.

[9] Home Automation System via Bluetooth Home Network", 2003, SICE Annual Conference, Fukui, Vol. 3, pp. 2824 - 2829.

[10] H. Brooke Stauffer "Smart Enabling System for Home automation", 1991, IEEE Transactions on Consumer Electronics, Vol. 37(2) , pp. 29-35.

[11] Eddie M C Wong, "A Phone Based Remote Controller for Home and Office Automation", 1994, IEEE Transactions on Consumer Electronics, Vol. 40(1), pp. 28-34.