

IoT Based Integrated Home Security and Electrical Appliances Control System

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Abstract

Automatic control means controlling the equipments using various controllers such as PID controller, Micro controller, PLC and sensors without human intervention. Internet of Things (IoT) is a computing technique that depicts the interaction between physical objects over internet. IoT collects data and share it between connected things and people through internet. IoT can be used for home automation, industrial automation and healthcare system etc. In this paper we proposed IoT based control and monitoring concept for home security and electrical appliances control. The proposed system actually provides additional high end security due to camera with PIR sensor for continuous monitoring and Raspberry Pi controller. This could take image of the burglar with the help of USB camera and this image can be sent to the email and a buzzer will alert the neighbours.

Keywords: Digital camera, Internet of Things (IoT), Microcontroller, Sensor.

I. INTRODUCTION

This paper is mainly describe the integrated home security and Electrical appliances control based on IOT. Nowadays the technology is being improved and it is used for sophisticated life of people. The life is getting automated for the simplicity, security, saving electricity and time. IoT plays a very vital role in home automation because of its flexibility. IoT has the capability of embedded things to communicate with other devices to create network. This technology is used to control the electrical equipment's like fan, light, motorized door, etc. automatically. In hazardous condition, the IoT controlled devices helpful to people with disability by alerting them via alarm and passing information about situation to connected people.

In this paper, controlling and accessing the devices from the remote network also providing high end security using IoT thereby connecting the world virtually by switching on and off the devices like the fan, light and motor using the cloud connector named a REST is discussed. By create a dashboard with the desired buttons and interface for controlling the devices through a REST. Also human lives have become much more dependent on electronic devices and appliances. It has thus led to the idea of developing a home automation system. In the previous system, people can move around and switch on the light/fan from anywhere in their house but they have to work within the local network manually. So the distance is limited within the premises.

II. PROPOSED SYSTEM

This paper describes about the design and implementation of Automation for home using Raspberry Pi for mobile devices to establish necessary security to our residence and associated control operations. The proposed new home security system allows digital cameras and motion detectors to be incorporated into the web application. Raspberry Pi Processor runs and monitors motion detectors and digital cameras for tracking and remote sensing, broadcasts live video and records it for future playback, and eventually handles home electrical system operations to turn on / off.

When motion is detected, the camera will automatically start recording and the Raspberry Pi system will alert the owner of the house to the intrusion. Raspberry Pi communicates with a web application running on the client and server scripts of the mobile device operating in a database running the hardware portion of Raspberry Pi. Protection over household often charges a high price for such a price that a middle-class person can't afford. In this project SHARP, provides a greater benefit to anyone who can afford a cheap product that can provide home automation functionality to any computer that carries a web browser. Our system works by using internet as the master and Raspberry pi as hardware tool.

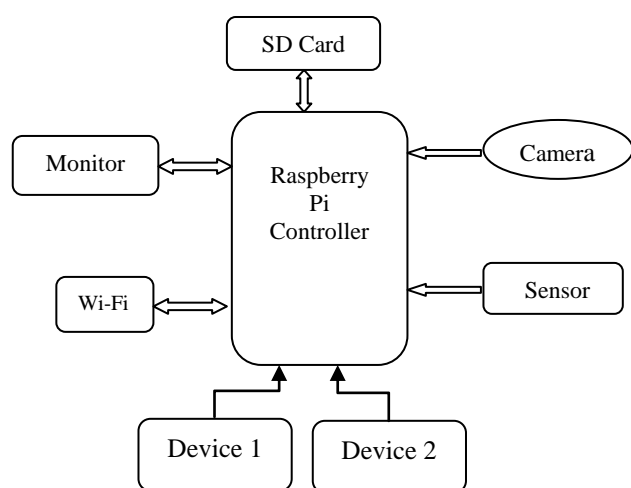


Fig.1 Proposed System block diagram

When setting up the system, one has to configure the appropriate settings. The device will be managed independently and on its own. At each power point or switch board, a custom Raspberry Pi will be installed. The custom Raspberry Pi is equipped with relays that power electrical appliances like fans, lights etc. This panel will have a wireless connection to an Internet network. Block diagram of the proposed system model is shown in fig.1.

This Internet hub is connected via LAN or Wi-Fi to the Web. As described above, the internet functions as a master since an online server-side system (ASP or PHP modules) takes care of the entire control process. During the initialization phase, the user only has to login to the designated web page and if there is a need to adjust the automation settings.

The web page is designed in such a way that through the automation process, such as timing and requirements for the automation process, it gives the user complete control.

III. WORKING OF THE PROPOSED SYSTEM

We used PIR sensor to detect the presence of any person and Pi camera for capturing images. At whatever time intruder comes in the PIR sensor range, PIR Sensor triggers the Pi Camera by means of Raspberry Pi. The commands are sent to Pi camera to click Picture and save it. The saved images are sent via mail to the defined mail address. The mail contains message and picture of the person entered as an attachment. The mail is created by the Raspberry Pi. In our project we have created a message "Please find the attachment". But this message can be changed at any time, since the provision is given in the software coding. Real time SMS also possible in this. We have used WAY2SMS service for sending real time SMS. Once all these activities over means the buzzer will be activated for alarm.

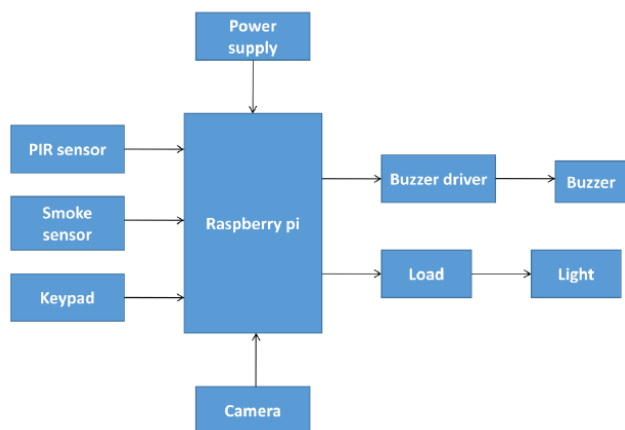


Fig.2 Block diagram of the home automation system

PIR and smoke sensors are interfaced with the microcontroller. Smoke sensor will sense the smoke level. Block diagram of the home automation and security system shown in fig.2. If sensor senses any of the movements or smoke, message and email notification will be given to the user (owner of home) mobile. Keypad is used to turn on and off the light manually. Buzzer will give an alert to nearby surroundings when anything is unusual.

IV. HARDWARE DESIGN AND IMPLEMENTATION

We used Proteus 7.0 for Virtual System Modeling (VSM) simulation. This incorporates simulation of circuits, animated modules and prototypes of microprocessors. VSM co-simulated the entire design of the microcontroller. For creating physical prototype we can use this tool to test the microcontroller designs in real time. The implemented project hardware with processor, controller and sensor is shown in the fig 3.

We have used python programming. Python is a high-level interpreted programming language. Python has a dynamic system of design and an integrated memory management system. This supports multiple programming paradigms, including object-oriented, imperative, functional and procedural paradigms, and has a large and detailed standard library. For many operating systems, Python interpreters are available. Python, Python's reference implementation, is open source software with a community-based development model, as do almost all of its implementations of variants.



Fig.3 Hardware setup

The following hardware components are used to design the proposed system:

Table.1. Hardware components detail

S.No	Hardware type
1	Raspberry pi3 model B
2	PIC Microcontroller
3	IR sensor
4	PI camera module
5	Wi-Fi module
6	Smoke/fire sensor
7	SMPS
8	Gas detector
9	Buzzer/Alarm
10	Smartphone

We have used relay channel for on/off control of the load and we have used SMPS for DC power supply. The specification of the relay panel board is given below.

- Output: Two SPDT relay
- Relay specification: 5 A @ 230 VAC
- Trigger level: 2 to 12 VDC
- Header connector for connecting power and trigger voltage
- LED on each channel indicates relay status
- Power Battery Terminal (PBT) for easy relay output connection

Flow chart for the security process and automation control process is given below in the fig 4.

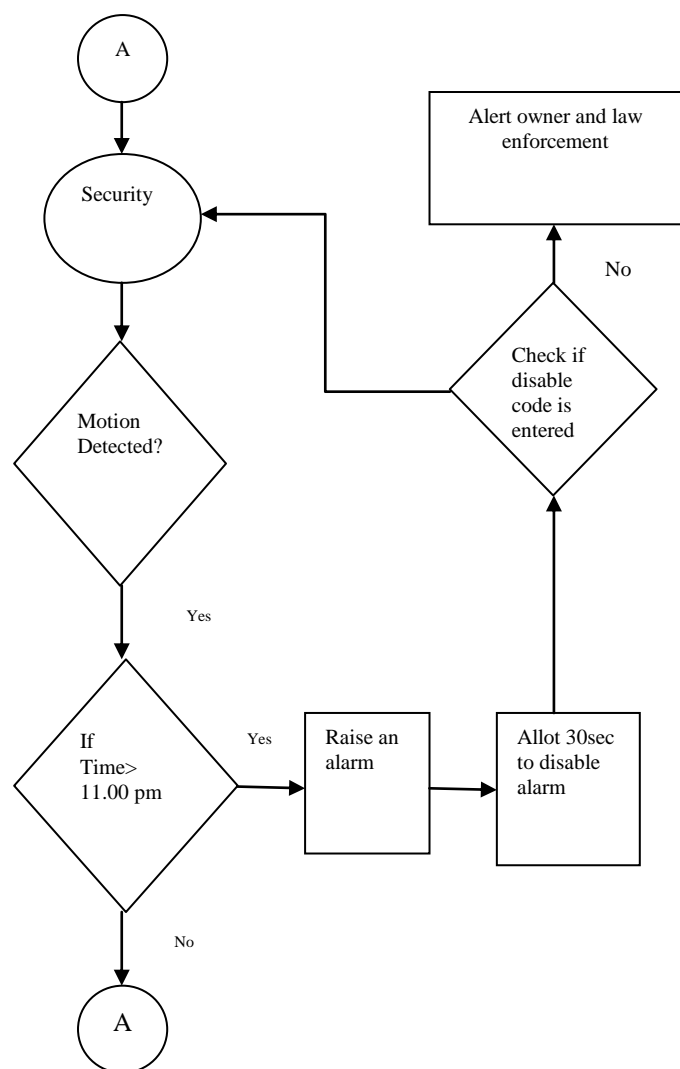


Fig.4 Flow chart for security process

V. CONCLUSION

In the implemented home automation system can be used for intruder monitoring, Mail & SMS alert and alarm generation using Raspberry pi, camera module and PIR sensor. Here we explained the Raspberry Pi is useful as a microcomputer in the field of embedded system. So easily innovative projects can be made using Raspberry Pi. In this modern world either we directly or indirectly depend on computation or information technology. So we can say that Raspberry Pi is a smart, economic and efficient platform for implementing the home automation. Due to the code provided is flexible, this approach is therefore better than any other form of home automation. For home automation based on the Web server, this approach removes the layout of the web

server and the space required. A demonstration is provided through this project that how easy it is to make innovative things based on the Internet of Things and using Raspberry Pi at a very low cost and time.

REFERENCES

- [1] M. Maksimovic, V. Vujovic, N. Davidovic, V. Milosevic and B. Perisic, "Raspberry pi as internet of things hardware: performances and constrains and design issues", vol. 3, p. 8, 2014.
- [2] H.-Q. Nguyen, T. T. K. Loan, B. D. Mao, and E.-N. Huh, "Low cost real-time system monitoring using raspberry pi," in Ubiquitous and Future Networks (ICUFN), 2015 Seventh International Conference on. IEEE, 2015, pp. 857–859.
- [3] F. Cuomo, E. Mibuari, K. Weldemariam, and O. Stewart, "Leveraging raspberry pi for interactive education," in Proceedings of the 4th Annual Symposium on Computing for Development. ACM, 2013, p. 16.
- [4] S. Jain, A. Vaibhav, and L. Goyal, "Raspberry pi based interactive home automation system through e-mail," in Optimization, Reliability, and Information Technology (ICROIT), 2014 International Conference on. IEEE, 2014, pp. 277–280.
- [5] C. W. Zhao, J. Jegatheesan, and S. C. Loon, "Exploring IoT application using raspberry pi," International Journal of Computer Networks and Applications, vol. 2, no. 1, pp. 27–34, 2015.
- [6] G. Vennila, Dr. D. Arivazhagan, Dr. R. Jayavadeivel, "Experimental Analysis Of RPL Routing Protocol In IOT", International journal of scientific technology research volume 8, issue 10, October 2019.
- [7] G. Jegadeeswari, "Design of Three Phase Inverter Fed Induction Motor Drive Using Neural Network Predictive Controller", International Journal of Research in Engineering and Technology (IJRET), April 2014/ Volume 3, Issue 4/ Page no: (765-769)/ eISSN: 2319-1163, pISSN: 2321-7308/ Impact factor: 1.962
- [8] K. R. Anupriya & T. Sasilatha, "Ship Intrusion Detection System - A Review of the State of the Art, Communication in Computer and Information Science (CCIS), CCIS 837, pp. 147–154, 2018.