

SECURED WEB SERVICE FOR SMART HOME SAFETY IN IoT

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ABSTRACT - *The Internet of Things (IoT), is the internetworking of physical devices, vehicles, buildings and other items-embedded with electronics, software, sensors, actuators, and network connectivity that enable these objects to collect and exchange data. Home automation refers to the control of home appliances and domestic features by local networking or by remote control. Artificial Intelligence provides us the framework to go real-time decision and automation for Internet of Things (IoT). The Smart Home known as Home Automation, with the use of new technology, to make the domestic activities more comfortable, convenient, secure and economical. The proposed system is associated with the design and implementation of interoperability for sub-systems in smart home environment regardless of their level. In this system user can able to control home appliances from web interface in addition to that temperature sensor and gas sensor were implemented to sense the surroundings. Temperature sensor senses the environment temperature; the sensed values can be used to turn on or off the electrical appliances. Gas sensor detects the leakage of hazardous gas emissions and activates the ventilation system. Thus the proposed system is implemented for enhancing the smart home safety.*

Global Standards Initiative on Internet of Things (IoT-GSI) defined the IoT as “the infrastructure of the information society”.

The IoT allows objects to be sensed and/or controlled remotely across the existing network infrastructure, creating opportunities for more direct integration of the physical world into computer-based systems, and resulting in improved efficiency, accuracy and economic benefit. IoT is a new revolution of the Internet. IoT is can be said the expansion of Internet Services. It provides the platform for communication between the objects where objects can organize and manage themselves.

The fundamental components that make internet of things a reality are:

- **Hardware**-Making physical objects responsive and giving them capability to retrieve data and respond to instructions
- **Software**-Enabling the data collection, storage, processing, manipulating and instructing
- **Communication Infrastructure**-Most important of all is the communication infrastructure which consists of protocols and technologies which enable two physical objects to exchange data

I INTRODUCTION

1.1: IoT

The Internet of Things (IoT) is the internetworking of physical devices, vehicles, buildings and other items embedded with electronics, software, sensor, and network connectivity that enable these objects to collect and exchange data. The

1.2: Raspberry Pi

It is a microcomputer that suddenly the authors came pretty much popularity. Available in several versions, the price is about \$ 40. Despite the relatively small size, this is a microcomputer,

which is installed and operating system that works almost like a normal computer.

In addition to the standard as a computer interface, Raspberry Pi has "pin" for connecting external devices, it broadens the scope of the Raspberry Pi in automation systems and the construction of other interesting things from the wise and house robotic systems to autopilots.

The Raspberry Pi makes a better device for security: you can place it anywhere in your home and it's easy to keep out of sight. if you have model B you can also take advantage of the Ethernet port to send remote alerts when someone has tripped one of your alarms. User could also use the LCD screen to display alerts if a zone has been breached or you may want to trigger another GPIO on the Raspberry Pi. The fact that the Raspberry Pi is running Linux gives you so many opportunities for this project compared to Arduino or a similar microcontroller. After all it's quite simple to add an internet connection to the Raspberry Pi so it can keep you up to date about the sensors or you may want to log how many people walk past your house every day. Whatever your reasons are to use the Raspberry Pi as a security device, it's a very good choice.

II LITERATURE REVIEW

2.1: IoT based Temperature Tracking System

A Raspberry Pi, a System-on-a-Chip (SoC) device, is responsible for sensing temperature and streaming it to a server; the readings then are displayed in a mobile android application. The project was further developed to separate the server own responsibilities from the SoC device.

The system now supports user authentication, and both devices are connected through the Internet. This implementation

allows the temperature readings to be viewed and displayed anytime from anywhere in world since the database is hosted on a server which can be accessed over the internet.

An alert message notification was implemented in Android application so that a user is notified whenever the temperature reading reaches the preset threshold. On the other hand, the smart chair system has brilliant commercial prospects, which can be helpful to build health care products with the help of wearable sensors, intelligent refrigerator/oven temperature tracking system.

In future we are interested to develop the same project based on TI Launch Pad instead of Raspberry Pi, just so that we can gain more knowledge in hardware prototyping and further cutting the budget and energy consumption. By using this different board, we would only have to re-write the code for the TI Launch Pad to send Http POST request to our Web Service. It is very robust.

2.2: Home Automation Using Raspberry Pi through Siri Enabled Mobile Devices.

Home automation is a system that has the technology to control devices automatically in order to convene the desires of security, comfort and efficiency. On the other hand, voice-based digital assistant such as Apple's Siri provides a location independent access to the Internet and local networks. SiriProxy is installed on the Raspberry Pi as a proxy server for Siri. By developing a SiriProxy plug-in, a set of commands for home automation could be custom- made by the user.

A home automation system was implemented using Raspberry Pi that automates the 5 appliances through the use of Siri's speech recognition capability.

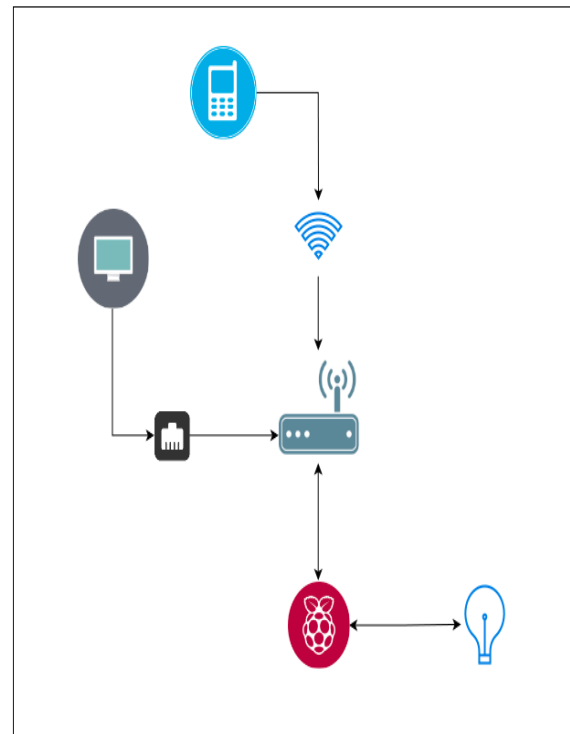
The system was able to automate the air cooler to turn off and on; the air cooler to adjust the temperature; opening and closing of the blinds and the door; turning on and off of the lights. And finally, the system successfully operated the TV to turn off and on, change channels, and adjust the volume.

III EXISTING SYSTEM

3.1: Existing System Explanation

Described the steps to build our prototype. Additionally, we will detail the experience we have performed with a group of people who tested our solution and describe the most important feedbacks, regarding scalability, integrity and security. Our proposal is based on using free hardware technologies, which are:

- Raspberry Pi version B
- Cables
- LED
- Lighttpd as web server
- PHP 5.3
- PostgreSQL 8.3: Relational Database who supports Lighttpd, plus it has a big community.
- Raspbian: Debian based distribution, officially supported by Raspberry Foundation.



3.2: Drawbacks of Existing System

- Intranet Accessibility Only (Locally Controlled).
- As it is a first approach system it does not speak about the
- Scalability
- Security
- It only controls the Devices not Sense the Environment.

IV PROPOSED SYSTEM

4.1: Proposed System Explanation

The proposed system mainly focus on the secured home automation based on Pattern Authentication and OTP (One Time Password) and sense the Temperature and Gas using sensors. Using Raspberry pi 3 Model B which

controls Temperature sensor (DS1820) and Gas sensor (MQ2).Electrical devices are controlled directly by Raspberry Pi. Temperature sensor senses the Environment Temperature and enable/disable the Electrical devices or it can be controlled by switching on or off by clicking the button in the web page. Gas sensor used for detecting the leakage of hazardous gases like LPG, Co2, CH4, etc. Whenever leakage occurs the Auto ventilation and Siren will get activated.

In proposed system, Web User Interface is secured using Pattern Authentication and One Time Password. If One Time Password is correctly entered then it redirect to Pattern Authentication where user have to give valid pattern code to get into the Home automation engine, which provides Web User Interface, a very good UI consist of state of the system whether the modules are running or not and authenticated user can manually control the electrical devices and sense the environment, by using this option Gas and Temperature values are monitored if gas leakage occurs alarm will be Initiated and electrical devices like Fan, AC, etc., can automatically turned on/off as increase or decrease of temperature values. Apache server is installed in Raspberry Pi and a web page is hosted. To access the Webpage through global network an Internet connection is required by Raspberry Pi then the Pi's IP is Port forwarded in Router.

4.2: Advantages of Proposed System

- Control Home devices through any Web Enabled System.
- Web UI is secured with Multifactor Authentication(i.e.) OTP and Pattern Authentication
- The Web UI is globally accessible user can control it from anywhere in the world.

- Electrical devices are controlled manually through Web UI.
- Temperature Sensor controls devices like Fan, AC either it can be manually controlled by web or automatically turned on/off using sensed values.

VMODULE DESCRIPTION

5.1: Working with Temperature Sensor

A temperature sensor is a device, typically, a thermocouple or RTD, that provides for temperature measurement through an electrical signal.The function of Temperature sensor is to sense the environment temperature and signals the range in electrical signal.

In our setup a seperate connection made between Raspberry Pi and Temperature sensor. As increase in temperature values FAN/AC connected with Raspberry Pi's Relay board should turned on. If the value of temperature doesn't meet the threshold limit the electrical device should remain off.

5.2: Making Web UI using PHP

The concept of fourth module is to design a Web UI(User Interface) page using PHP as front end. This page has two options;one is automatic and another by manual. In automatic method all the sensors are activated and enables automatically according to surroundings. In manual method the user's work is to turn on or turn off the respected electrical devices and sensors (Temperature and Gas).

5.3: Port Forwarding the Raspberry Pi

A port forward is a way of making a computer on your home or business network

accessible to computers on the internet, even though they are behind a router. Port forwarding or port mapping is an application of Network Address Translation (NAT) that redirects a communication request from one address and port number combination to another while the packets are traversing a network gateway, such as a router or firewall.

Here Raspberry Pi is connected to a wireless LAN, and the Port of the Raspberry pi is forwarded in router. In order to access the Raspberry Pi hosted web page through the Internet(i.e. to access from global network)

5.4: Security Function

Pattern Authentication

Pattern Authentication(PA) is second security implementation to prevent unauthorized access to Home automation engine. After successful authentication through OTP, user is redirected Pattern authentication page. Here user must use sequenced patterns to access the Web UI deployed in Raspberry Pi to control Home.

VICONCLUSION

Priority for the automation is automatic or remote control of appliances and equipment in the house. But the high price of these systems, forcing seek alternative cheaper solutions that could afford each user. One of these decisions can be based on a system mini-computer Raspberry Pi. The constant evolution of Internet and IoT, enable us to create new solutions to common problems that people has. The access to Internet and computer technologies has become in a real alternative and, if at first it was practically impossible to access them, today the access to these technologies is massive. The proposed idea is to utilize nodes as an alternative to regular Switch boards in traditional home, thereby effectively converting it into Smart Home with secured web

UI automates home Electrical devices and with Temperature implemented the secured web services for smart home safety in IoT. This project achieves the Security that is not available in the existing system.

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