IOT Based Monitoring and Control System for Home Automation

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Abstract:

The project proposes an efficient implementation for IOT (Internet of Things) used for monitoring and controlling the home appliances via World Wide Web. Home automation system uses the portable devices as a user interface. They can communicate with home automation network through an Internet gateway, by means of low power communication protocols like Zigbee, Wi-Fi etc. This project aims at controlling home appliances via Smartphone using Wi-Fi as communication protocol and raspberry pi as server system. The user here will move directly with the system through a web-based interface over the web, whereas home appliances like lights, fan and door lock are remotely controlled through easy website. An extra feature that enhances the facet of protection from fireplace accidents is its capability of sleuthing the smoke in order that within the event of any fireplace, associates an alerting message and an image is sent to Smartphone. The server will be interfaced with relay hardware circuits that control the appliances running at home. The communication with server allows the user to select the appropriate device. The communication with server permits the user to pick out the acceptable device. The server communicates with the corresponding relays. If the web affiliation is down or the server isn't up, the embedded system board still will manage and operate the appliances domestically. By this we provide a climbable and price effective Home Automation system.

Keywords

Arduino; Internet of Things; Web Server; Home Automation.

1. Introduction

The Internet of Things (IOT) is still in its infancy and as such there is not yet a consistent all-embracing definition of it. However at the most simplistic level it relates to the connection of a variety of devices to the Internet and the Machine-to-Machine (M2M) interfaces used between these devices. These interfaces will provide new opportunities through the additional sharing of data from the devices to inform government processes and services. One of the earliest examples of this can be seen in the Health domain and the TGF Health Profile v1.0 highlights how there is an increasing use of remote sensors and devices in the provision of Home and Community healthcare.

Depending on who you talk to, the Internet of Things (IOT) is defined in different ways, and it encompasses many aspects of life—from connected homes and cities to connected cars and roads (yes, roads) to devices that track an individual's behavior and use the data collected for "push" services. Some mention one trillion Internet-connected devices by 2025 and define mobile phones as the "eyes and ears" of the applications connecting all of those connected "things." Depending on the context, others give examples that are less phone-centric, speak of a class of devices that do not exist today or point to Google's augmented-reality smart glasses as an indication of things to come. Everyone, however, thinks of the IOT as billions of connections (a sort of "universal global neural network" in the cloud) that will encompass every aspect of our lives. All of this public discussion suggests the IOT is finally becoming a hot topic within the mainstream media. Many recent articles point to the IOT as the interaction and exchange of data (lots of it) between machines and objects, and now there are product definitions reflecting the same concept.

Arudino Board

The Arduino is a family of microcontroller boards to simplify electronic design, prototyping and

experimenting for artists, hackers, hobbyists, but also many professionals. People use it as brains for their robots, to build new digital music instruments, or to build a system that lets your house plants tweet you when they're dry.

Arduinos (we use the standard Arduino Uno) are built around an ATmega microcontroller — essentially a complete computer with CPU, RAM, Flash memory, and input/output pins, all on a single chip. Unlike, say, a Raspberry Pi, it's designed to attach all kinds of sensors, LEDs, small motors and speakers, servos, etc. directly to these pins, which can read in or output digital or analog voltages between 0 and 5 volts. The Arduino connects to your computer via USB, where you program it in a simple language (C/C++, similar to Java) from inside the free Arduino IDE by uploading your compiled code to the board. Once programmed, the Arduino can run with the USB link back to your computer, or stand-alone without it — no keyboard or screen needed, just power.

Motivation

Nowadays office and building automation systems are used more and more. On one hand, they provide increased comfort, results in a smarter home and is used to provide a healthier standard of living. On the other hand automation systems installed in commercial buildings don't only increase comfort, but also allow centralized control of heating, ventilation, air condition and lighting, having ubiquitous access. Hence, they contribute to an overall cost reduction and also to reduction and also to energy saving while we are not able to access them physically.

Problem Defination

There is a great energy crisis in current situation of our country. Moreover, people have become negligent in proper utilization of the available energy. People often forget to turn off the light sources and other home appliance while staying out from home. Even in those situations, application of home automation makes it possible to control them from a distant place in easy way with our smart phone.

People are constantly running from place to place, working to accomplish everything on our never-ending "to-do" list. Because of the home automation system, we never have to worry about opening the door, switching off the appliances and so on. In short, we can save precious time and experience more daily productivity.

Objective Of Project

The objective of this project is to complement a low cost, reliable and scalable home automation system that can be used to remotely switch on or off any household appliance, using a microcontroller to achieve hardware simplicity, low cost short messaging service for feedback and voice dial from any phone to toggle the switch state.

2. Literature Review

Vaishnavi S. Gunge, Pratibha S. Yalagi "Smart Home Automation: A Literature Review"International Journal of Computer Applications,National Seminar on Recent Trends in Data Mining (RTDM 2016)

[1] Home automation is becoming popular due to its numerous benefits. 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).

[2] The work deals with discussion about different intelligent home automation systems and technologies from a various features standpoint. The work focuses on concept of home automation where the monitoring and control operations are facilitating through smart devices installed in residential buildings.

[3] Heterogeneous home automation systems and technologies considered in review with central controller based (Arduino), web based, email based, Bluetooth-based, mobile- based, SMS based, ZigBee based, Dual Tone Multi Frequency-based, cloud-based and the Internet with performance[IJCATM: www.ijcaonline.org].

3. System Analysis

Existing System

• The existing system for controlling home appliances is either a manual or remote control process.

• Manually, home appliances like Light, fan, etc are controlled by human beings.

• Lot of energy wastage.

• Time consumption.

• Lot of wastage in electricity.

• It is outdated now.

• Makes use of arduino and GSM.

Disadvantages Of Existing System

• The existing infra-red (IR) or Blue-tooth remote controls present in the market are in general appliance specific and the same cannot be used interchangeably.

• Electrical appliances connected through Bluetooth making use of Blue-tooth enabled smart phones cannot be managed from a distant location.

• Thus functions such as being able to turn on an air-conditioner while returning home cannot be done with such systems.

• The difficulty faced by current home security/surveillance systems in providing information pertaining to the situation to users while being away from home is tried to overcome in this project.

Proposed System

• The proposed system is an IOT Based technology used for operating home appliances using android phone.

• Smart Home -Improves the standard of living at home.

• Control Fan through the mobile application.

• Using vibration sensor and fire sensor.

• Uses GSM and Arduino.

4. System Design and Implementation

Modules Description

System analysis uses various types of information systems to support many processors needed to carry out their business function. Each of these information systems has a particular purpose, and each have a life of its own. This "life of its own "concept is called the System Development Life Cycle.

Software Requirements

Front End   :   HTML
Database   :   MYSQL
IDE   :   Android eclipse, Aurdino
Coding Language   :   java

Hardware Requirements

Micro Controller   :   Arduino
Regulated Power Supply   :   230AC-5V
Display   :   LCD Display
Phone   :   Android smart phone
Sensors :   Vibration, fire
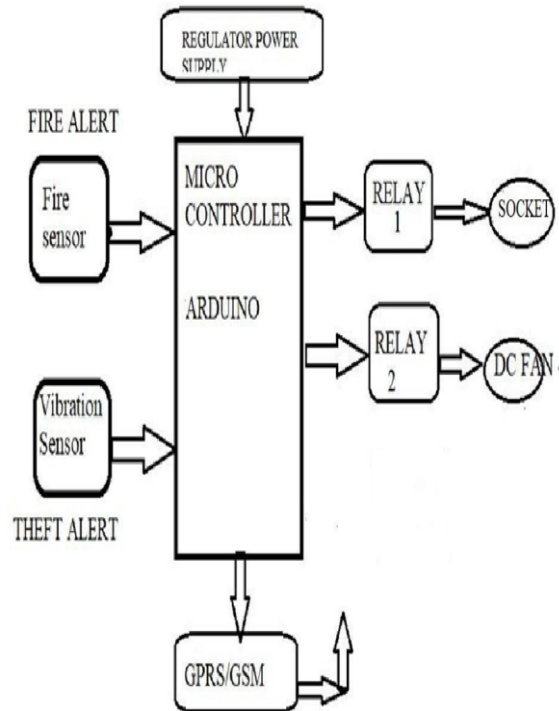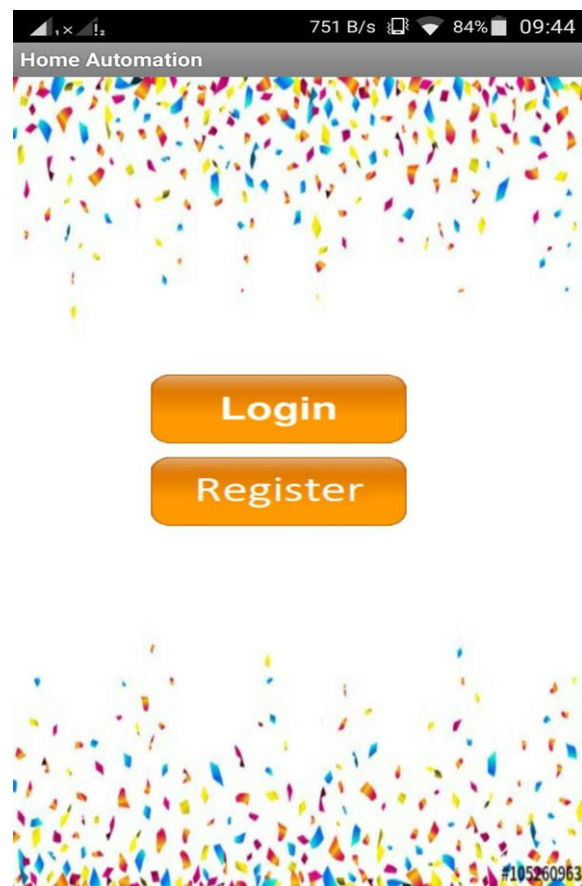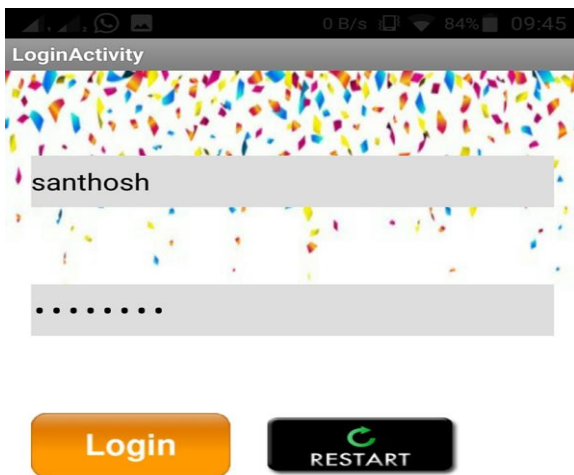

5. Results and Analysis
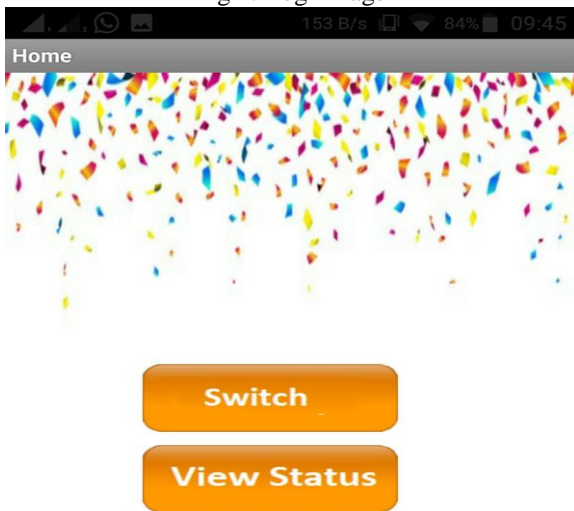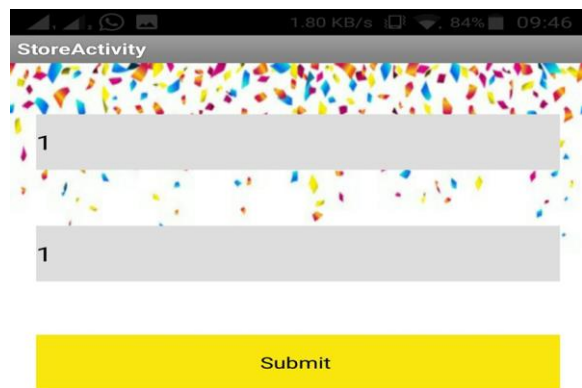

Fig 1: HOME PAGE

Fig 2: Login Page

Fig 3: Menu Page

Fig 4: Giving Signals to Arduino

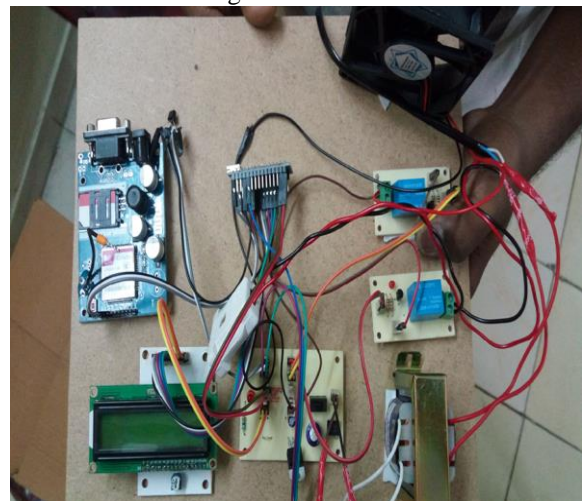| Testcase	Description	Input	Excpected ouput	Actual output	Result
1	To Validate user	tejaswi tejaswi	valid	valid	passed
2	To validate User	tejaswi tejawi	Invalid	Invalid	Failed
3	To validate User	tejaswi teja	Invalid	Invalid	Failed
4	To validate User	tejaswi tejaaa	Invalid	Invalid	Failed

Fig 5: Validation

Fig 6: Project complete Kit

6. Conclusion

By using this application we can control home appliance. This have been implemented using multiple ways such as The Internet, electrical switch, and Graphical User Interface (GUI). By using phones and tablets we can reduce the cost. The system is suitable for remotely controlling the appliances. Here, we have introduced the event of a home management and security system exploitation using Arduino and Internet of Things technology. The system is suitable for real-time home safety monitoring and controlling the home appliances.

The various future applications may be used by controlling various household devices of house with internet, Industrial automation and management through internet, machine-driven fireplace exit systems and improvement of security problems in extremely restricted areas.

7. References

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