IOT Based Secured Smart Home Automation System Using Raspberry Pie

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Abstract- **This documentation presents a home automation system implemented using the Raspberry pi. This paper is a proof of project for a home that can be controlled remotely through the use of device. A controlled home like this can make life more convenient and also safer. The device monitoring aspect of this project demonstrates the ability of being able to know what is going on with different systems at home which can be used for control and safety. For example, the state of some sensors for intruder detection and the state of different devices like fans or lights at home. It is also demonstrated using a few motors, how one can control different systems at home using the Internet. So, a virtual "switch" available in the cloud UI can be toggled to turn on/off a fan at home. This project has a large scope and can be accommodate with many other systems like smart electronic appliances at home. This documentation describes the project implementing the basic framework to achieve such a connected home. It gives a combination of use of hardware and software in the current implementation of the project, future improvements and scope. This project also adds a CCTV camera at the door for intruder detection.**

Keywords- **IOT based Home automation system, a ZigBee based Home automation system, Android based Home automation system, Embedded web server for home appliances. etc**.

I.INTRODUCTION

A home is where every individual relax and maximize comfort as well as improve the quality of life. For such purpose the work load of house for an individual must be made easier. As well as there is a need of security for house of every individual, wherever they go they must have an assurance of security of their home. A personal computer or smart phone has embedded system which performs one or a few predefined tasks, usually with very specific requirements.

Such systems can be bought in use of automating a home and making it secure by installing various devices which will let the owner control them via the personnel computer or a Smartphone. Since the system is dedicated to specific tasks, design engineers can optimize it, reducing the size and cost of the product. Embedded systems are often mass-produced, benefiting from economies of scale. IoTs (Internet of Things) technology can also be applied to create a new concept and wide development space for smart homes to provide intelligence, comfort and to improve the quality of life. Operating system and ports such as a USB port both Home automation and Smart Homes can be described as Introduction of technology within the home environment to provide convenience, comfort, security and energy efficiency to its occupants.

It involves introducing a degree of automatic control to certain electrical and electronic systems in a building, including lighting, temperature control, closed circuit television cameras etc. Adding intelligence to home environment can provide increased quality of life for the elderly and disabled people who might otherwise require care givers or institutional care. Today, Smart Phones are more than just Phones, they are now the main Human Interaction Devices and users thus want to control/accomplish most of their tasks from their Smart Phones rather than conventional ways. A custom-made Raspberry Pi will be fitted at each power points or switch boards. It will act as the control for all electrical appliances (lighting, fans, cameras etc.).

There will be no work for the user regarding his/her appliance. One has to initialize the required settings at the time of setting up of the system. However, in our project we are modifying the working of personal assistance with security in which we will provide the user control and surveillance to the closed circuit television cameras that will be installed in the house. The systems adaptation to the repeating commands and making use of it for accurate and precise functioning will be implemented. The devices will be connected to the internet via LAN or Wi-Fi (Depends upon the choice of the user).

The user just has to login in to the specified webpage during the time of initialization and in case there is a need to change the automation settings. The web-page will be coded in such a way that it provides complete

control to the user over the automation process such as timing and conditions for the automation process. The idea behind Home automation is to make all the houses more comfortable, secure as well as improve the quality life of every individual staying there. This system is available 24x7 which will help the user as well as the devices used are easily available in market which reduces cost and makes the system available at a cheaper cost.

II. LITERATURE REVIEW

The Secured Home Automation System contains all the things that are present in the home which can be controlled through the use of phone and also the security measures through CCTV will be provided which can be viewed on the phone screen.

1. Iot Based Home Automation System-The internet has been connecting people and making life simpler by providing all kinds of information with the click of a button. The next big wave in this domain is the internet of things which will enable physical objects used in day to day life to connect to the internet and exchange data. In this paper a home automation system based on internet of things is developed. This allows the user to automate all the devices and appliances of home and integrate them to provide seamless control over every aspect of their home. The designed system not only monitors the sensor data, but also actuates a process according to the requirement, for example switching on the light when it gets dark and it allows the user to control the household devices from anywhere [1].

2. A ZigBee based Home automation system-In recent years; the home environment has seen a rapid introduction of network enabled digital technology. This technology offers new and exciting opportunities to increase the connectivity of devices within the home for the purpose of home automation. Moreover, with the rapid expansion of the Internet, there is the added potential for the remote control and monitoring of such network enabled devices. However, the adoption of home automation systems has been slow.

This paper identifies the reasons for this slow adoption and evaluates the potential of ZigBee for addressing these problems through the design and implementation of a flexible home automation architecture. A ZigBee based home automation system and Wi-Fi network are integrated through a common home gateway. The home gateway provides network interoperability, a simple and flexible user interface, and remote access to the system. A dedicated virtual home is implemented to cater for the system's security and safety needs. To demonstrate the feasibility and effectiveness of the proposed system, four devices, a light switch, radiator valve, safety sensor and ZigBee remote control have

been developed and evaluated with the home automation system. [2]

3. Android based Home automation system
In recent years, the number of network enabled digital devices at homes has been increasing fast. With the rapid expansion of the Internet, the owners have been requesting remote control and monitoring of these in-home appliances. This leads to networking these appliances to form a kind of home automation system. In this paper, an Android based home automation system that allows multiple users to control the appliances by an Android application or through a Web site is presented.

The system has three hardware components: a local device to transfer signals to home appliances, a Web server to store customer records and support services to the other components, and a mobile smart device running Android application. Distributed cloud platforms and services of Google are used to support messaging between the components. The prototype implementation of the proposed system is evaluated based on the criteria considered after the requirement analysis for an adequate home automation system [3].

4. Embedded Web Server for Home Appliances
Main aim of this paper is to describe how to connect a micro- controller to LAN or Internet and use it as a web server. This paper offers a new approach to control home appliances from a remote terminal, with an option from a local server, using the Internet. This system is accomplished by personal computers, interface cards, microcontroller, along with window-type software and microcontroller control software. The system is designed to control home appliances' on/off, to regulate their output power, and to set their usage timing. The microcontroller which is used in this project is the Philips P89C51RD2BN microcontroller [4].

III. METHODOLOGY

This System is the Implementation of the Home Automation System using Raspberry Pi which provides security to our home associated technologies. The proposed system hinges on our novel integration using cameras and motion detectors. The Raspberry Pi here is used to control and operate the camera, electronics appliances such as lights, fan, television, etc. It also stores the information described on the security purpose in which the Intruders are detected at the door by the camera. When any of the motion is detected at the door, the camera automatically initiates and the recording captured is send to the house owner using Raspberry Pi and the owner is informed about the possible intrusion. The Raspberry Pi has two main components: the Web application which executes on the mobile device's browser and the server side that is

run and operate on the Raspberry Pi hardware tool component. Any household security at a major level is always pricey which a middle-class person cannot afford. Hence this paper helps in providing security at a very low cost so that security won't be a matter to any average class person. Our project provides a great benefit to the people that can afford a low-cost product which will provide home automation operation to any devices carrying a bowser. The project proposed works on internet (Master) and the Raspberry Pi (Hardware tool).

A Raspberry Pi which is custom made will be set at each switch board. It acts as the controller to every electrical appliance such as light, fan, television, air conditioner, etc. The User should initialize the required setting at the time of setting up the system. There after the system will be self-sustained. The Raspberry Pi (custom made) have relays fixed on it which is used to control the lights and the fans and other electrical appliances. The board will be connected to the internet hub and the hub will be connected to internet by Wi-Fi or LAN. The internet is said to be the master as the entire control process is based on online side program (ASP or PHP modules). Login is to be done by the user to initialize the system or in order to make any changes in the automation system. The coding is done simple and gives overall control to the user on the timing and conditions for automation process.

Raspberry bi can be connected to various sensors. Camera is connected to the motion sensor it captures the image of the intrusion made at the door. There is also light that at the camera which helps in capturing a clear image at night in the dark. Raspberry Pi is also connected to the Temperature sensor which draws the curtain at the signal processing of the sensor. The Raspberry Pi is connected with internet through Wi-Fi or LAN and by which the user can access it through any suitable interface.
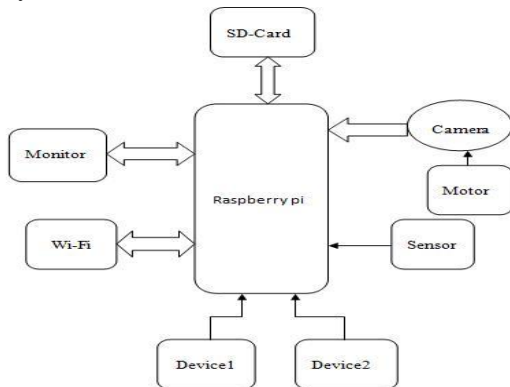

Fig.1 The Raspberry Pi is connected with internet through Wi-Fi or LAN

IV. RASPBERRY PI ARCHITECTURE

The Raspberry Pi is a series of credit card sized single board computers that can perform the actions of a fully capable computer. It is an open source hardware technology combined with a programming language and an Integrated Development Environment (IDE). The Raspberry Pi has four distinct power modes,

1. **The run mode-** The central processing unit (CPU) and all functionality of the ARM11 core will be available at this mode and will be powered up
2. **The standby mode-** The main course clocks are shut down i.e. the parts of the CPU that process instructions are no longer running in this mode. But the power circuits on the core will still active. The core can be quickly woken up by a process generating a special call to the CPU called an interrupt.
3. **The shutdown mode-** The board will be in a complete shutdown with no power
4. **The dormant mode-** The core will be powered down and all the caches are left powered ON.

V. CONCLUSION

Developed a comprehensive solution that provides a user friendly home automation and security application for homes. We accomplished this through the integration of cheap, off-the-shelf, widely available devices. This work provides users with an easy to use in mobile and pc for which they can remotely access and control their home appliances and security. In future we intend to provide a wireless relay connection and wireless sensors which can be movable and can be operated and which can be used in company and instates for Security to the whole building with one single system. This provides a full security support for homes. The inclusion of artificial intelligence is also intended in future scope which will help in more precise actions of the system.

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