A Security Framework for IOT based Smart Home Automation System

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Abstract- The Internet of Things (IoT) is a new platform for our technology. Though of IOT, we can control our daily life work such as home application, control, and easy communication systems, improve our digital services, etc. The Internet of Things (IoT) is joining our daily contents information wisely to the internet to make communication between objects and people and among themselves. In this paper, we show improved home automation with the help of IoT. For calculating response time of IoT, we need fog computing platform. Fog computing is also known as fogging or edge computing which is built by Cisco and it is extended the version of cloud computing through a network.

In our proposed system, we use the motion sensor, SBC-PT which is a network access component and daily life component in a home. We can monitor and control that equipment by the approach of IOT based system. The home automation system uses the portable devices as a user interface. They can connect with home automation network through an internet approach. The user will move straightly with the system via control interface whereas home apparatus is remotely controlled through sensor and server.

Keywords: IOT, home automation, smart home, response time, control system.

GJCST-E Classification: I.2.1

ASECURITYFRAMEWORKFORIOTBASEDSMARTHOMEAUTOMATIONSYSTEM

Strictly as per the compliance and regulations of:

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I. Introduction

Home automation also known as an intellectual home system. Numerous people often and often shift from one place to another for their business purpose, personal work, traveling, etc. [1]. So that kind of people leaves their home without checking their household component. That's why they need to exhort and control their things. In this situation, we needed smart home automation. Intellectual home system makes with a network, monitoring instrument and home ingredients [2].

In modern time we use this system for controlling our home automatically. This system raises the alleviation of our home equipment. Equipment that we use in our system is light, door, fan, window, motion detector, webcam, lawn sprinkler, etc. [3]. If the system built in the home, we will control the home things virtually. For controlling the system, we need not to present physically at home.

To implement a smart home system, we need to control centrally. To save the information centrally, we employ fog computing in exchange for cloud computing. Fog computing minimizes the bandwidth and low latency, because cloud computing is not stable for numerous IOT use [4]. Though this computing system, we can easily connect between sensors and IoT device.

In this paper, we proposed an approach to improve home automation system. At first, we discuss IOT, then our proposed system through Cisco and why we use home automation. Finally, we discuss the goals of our works.

a) *Benefits of Home Automation System*
- Monitoring and ruling all home devices from one space.
- Progressed home security.
- Improved energy efficiency.
- Save time.
- Save money and utilizes suitability.
- Remote control of home objects.
- Ease to use components of a home.
- Prick detection, CO and smoke detectors.
- Governing house peoples activities.
- After all increasing peace of mind.

II. IoT Based Home Automation

IoT means a world-wide network of interconnected things that are incomparable. An advanced network of IoT is being created, when a public wants to associate with different objects. IoTs terminology is applied for the enhancement of intelligent houses to increase the surviving formats of life [5]. It proposed leading connectivity among services, apparatus, and systems. It uniquely identifies not only attached computing system but also internally handle existing internet architecture [6]. It gives us strong-level facility at the communication and knowledge.

There are three main natures in IoT ecosystems: consumers, governments, and businesses purposes [7]. IoT platforms act as the bridge between the devices, sensors and the data networks. IoT safety and privacy have become the major worry among consumers and businesses [8].

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a) Some Advantages of IoT

- Sensor-guided decision analytics.
- Method optimization.
- Momentary control and feedback of difficult autonomous process.
- Real-time calculation of a system.
- Lessened errors in gathering data.
- Reduced cost.
- Raised situational conscious.
- Originate workable systems.
- Saving time.
- Control and automation of any system.
- Cost-reducing and power expense.
- Easy to communicate with our daily life things.

The fact is that the IoT permits for virtually bondless advantages and connections to accept the position. Most of us can't even imagine and understand the impact of today's issues. Security is a major challenge that is again and again brought up. We have the missions of security and data sharing. IoT is a hot-button matter withal today, so one can barely think how the speech and anxiety will step by step increasing when people are discussing billions of devices being appended [9].

Home automation is made of one or spare computers to manage basic home activities and form deliberately and sometimes remotely [10]. An automated home is also called an intellectual home. For connecting home objects through the internet, we need a platform that is known as Internet of Things (IoT) [11]. We use IoT because it provides our surrounding objects to append Internet easily. IoT devices that are peer to the Internet will more than triple in 2020.

b) Future of IoT

- In the next five years almost 6 trillion IoT's objects connected to the Internet.
- Businesses will be the bearer of IoT solutions cause of IoT's behavior and those are cheaper operating costs, raising productivity and prolong to current markets or spread new manufacture oblation.
- The complicated infrastructure of the Internet of Things exuded into individual ecosystem.
- The profuse extensive staving to the benefits and drawbacks of fake cellular and internet networks.
- The major role of analytics processes, along edge analytics, cloud analytics, fog analytics will perform in building the most of IoT sending.
- The skate privacy challenges submitted by the IoT and that defeated.
- Upcoming IoT's infrastructures are connectivity, security, data storage, system integration, device hardware, and application development.
- In-complex analysis the IOT ecosystem will alternative and in several industries.

III. Background and Related Work

The smart house was concepts, not real form. Though home materials were not suspect as smart in the early twentieth century (1901-1920). The first engine-power vacuum cleaner invented in 1901, and the electricity-power vacuum invented in 1907. The ECHO 4 was the fundamental smart machine, but it was not vending in the market in the year of 1966-1967. In the year of 1990s, this home automation department reached some new experiment and processing. Smart house become exoteric in the early century 2000s, and various terms began to arise [12]. Suddenly in this century, smart homes ripen affordable choice for people [13]. Now we can control home by a remote server or any wireless component such as a laptop, Wi-Fi, mobile phone, tabs, sensing from any sensor [14].

To implement the automation system of functionality and comfortably, we designed a standalone, liberal, melodious and cheap cost home monitoring and controlling system using sensor service. This work is implemented to retire the troubles of existing methods. It bears much resilience, consolation potentiality and security.

This paper proposes a smart home automation system that services the segregation of objects that connected through the motion sensor, fog computing, server and switch connection among things. This system uses a laptop to monitor the home components. The main object of this paper is to operate household components by sensing the motion sensor. When the sensor detects motion, then those components are automatically turned ON/OFF. We can also turn ON/OFF that objects through server if we want. This system is useful from other systems, because when the motion sensor is sensing objects in that time, they are instinctively changed their state. After a lag time sensing, components go back to their previous state. This process happens back and forth.

IV. Proposed System Framework

a) System Description

Signal Board Computers (SBC-PT) is one kind of network access component. In that component, we will connect motion sensor and others household objects like as door, fan, light, window, etc. Sensors are necessary to gain real-time data from things. These sensors rapidly create a huge volume of data. The main thing is to make a home automation system based on the Internet of Things idea composed of a main controlling instrument and all objects connected to the sensors. In SBC board we will describe the system configuration for detecting the motion sensor. While a man enters in the automated room, a motion creates in this stage, so the sensor is alarmed for obtaining products activation. When it finds out any motion, then automatically all the objects turned ON/OFF. Whereas

the sensor will rotate ON it shows high input after finishing its delay (1000ms) time it naturally closed OFF. This process happened continuously until motion object present in the existing home.
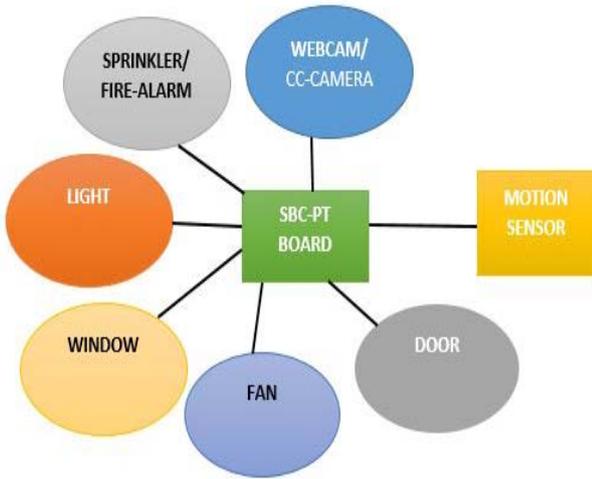

Fig. 1: Proposed System Framework.

When sensor finds out any motion then automatically all the objects turned ON/OFF. Whereas the sensor will rotate ON it shows high input after finishing its delay (1000ms) time it naturally closed OFF. This process happened continuously until motion object present in the existing home.

b) Proposed System Functions

The proposed home automation system has the abilities to observe the following objects in users home and monitor the following activities:

- Light ON/OFF
- Fan ON/OFF
- Door ON/OFF
- Window ON/OFF
- Webcam/CC-Camera ON/OFF
- Fire-Alarm/Sprinkler ON/OFF.

The goal of the proposed work is not to formless costly objects such as high-end own computers. This scheme allows approved hose masters to control and monitor associated instruments at home. The smart home must complete essential condition, processed data and consoling equipment to create a better home automation system.

V. Analysis of Proposed Framework

a) Software Design

For implementing the proposed system in virtually here, we will use Cisco Packet Tracer. It is very helpful to design IoT components. Here we use Server-PT, Switch-2960, Laptop-PT, SBC-PT, Motion Sensor and other IoT components. Steps that we will do in the simulation are:

- First, we connect server, laptop, and several IoT objects through Copper Straight cable.
- Setup server IP address for accessing the components.
- For controlling devices through laptop also need to configure laptop's IP address.
- Then we configure all IoT components uniquely.
- For Signing up to the web browser, we set a username and password. This password is used for login into the server access.
- When we go to the web page for login to the remote server, then put server IP address into the URL box, and next ask to input username and password. If we input correct information, then login to the server.
- Next turn on the Registration server.
- Connect all components to the Registration Server.
- For SBC-PT connection we use IoT Custom Cable.
- Finally, we will join our proposed system with the server simulation.
- For connecting to the Registration Server, we go to the IoT accessories configuration then turn on the Remote Server option and put Registration Server's IP address, username, and password. Do that process for all IoT components.
- If we want to control home automation things through remote laptop, then put IP address, username, and password for turn ON/OFF the objects.
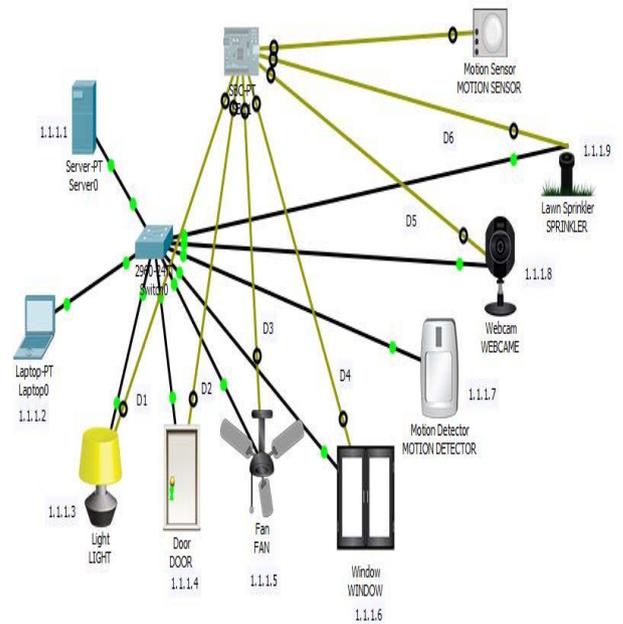

Fig. 2: Software Implementation of Proposed System.

b) Security Issues

When motion detected, it will process its work. But its sometimes create a problem because when any unwanted people such as thief, abductor, robber enter the room then its hamper our actual action. So that we need to, trace out home living people. For that, we

invent a way to discover original living people [15]. In this purpose to identify wanted people, we will use Eye Retina Scan. It is feasible because no two people have the similar retinal pattern. Exceptionally it has low negative effect rates for detecting [16].

It recognizes the objects very quickly. While any staying people enter the room, the home automation system first configure with unique patterns of a person's retina blood vessel. It releases a stealthy beam of low-energy infrared light into a person's eye. So when retina scan matched successfully to the sensor and gave positive output, then the motion sensor start its process to serve to the user requirements. This method provides a high-security system for our home automation actions. Here a flow chart for our proposed design:
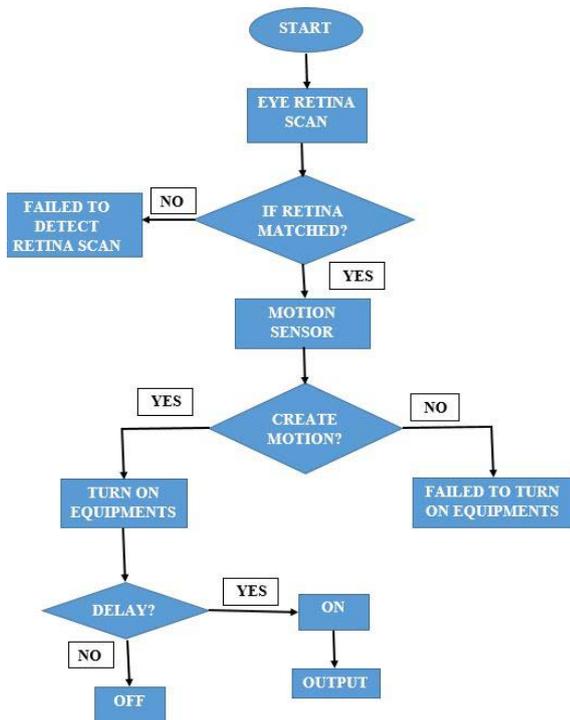

Fig. 3: Flow Chart of System Design.

c) *Future Work*

In the 21st century, the communication among social and computer is splitting aged obstacle and starting a new kingdom [17]. Nowadays mobile phone or computer is an important part of our modern life. Mobile phone or computer is not only a material for communication but also tries to give us better control for automated home [18]. There are some existing home automation systems which are built with real instruments of our house. This equipment is monitored through switches. The engine is switched ON/OFF manually when it is necessary. The existing method is not highly protected and misuse of electricity. The proposed system is better and more secure than the existing system. And the system is also imagined networking in our mobile phone to all the things through smart

technology [19]. In the proposed system, all the house appliances could be monitored by the owner from a remote area with the favor of user's mobile phone or computer through a network.

VI. Result

In this paper, the implemented system's that is connect all the devices with the sensors and the automated home is controlled by the controller. But there is some lacking in the other existing system. The main lacking is in the security portion. The security is a little bit weak in that observed process. In our home automation system, there are huge benefits than the other systems. Our system controls all the instruments of our house through mobile phones or computers. And the control system is simpler than the others. The system we build there is no lacking in security because we improved the security system of our proposed system. Our system is much secure than the others because here we use identical eye retina scan pattern for professed sensor's response which will detect the owner of that home.

VII. Conclusion

The home automation system is one of the most important sectors of the Internet of Things (IoT). In this paper, the home automation using the Internet of Things (IoT) proved that it has been worked favorably by joining simple equipment to it, and the appliances were practically monitored remotely through the internet. As one of the request state in the Internet of Things, the smart house appeals the most effort from the market. The process is preferable for real-time home security controlled and maintaining from fire accidents with quick solution. The system gives us better-secured home and controlled theft issues in our house. The proposed system consult the sensor data like temperature, motion, gas, light sensors, and activates a scheme following the necessity [20]. This process will explore different situation to control the home anytime anywhere. In this process, the sensors can be performed to save data that can examine the process. The modern home system utilizes that the users controlled the central control for all of their materials. In our system, we build a new technology to create an excellent automated home system which is more useful and more secure in our regular advanced life. And the smart house process is monitored with our mobile phones and computers, and it is to handle our busy lifestyle.

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