

Implementing Smart Home using Internet of Things

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Abstract- The smart home technology is going to be widely used which aimed to make people live easier and comfortable. The smart home devices and home automation will be the wave of the future. The aim of this paper is to provide secured home system to allow the users to control the house remotely. The system used different technology related to smart home based on IoT concepts. And, the system included security system, alert system, different types of sensors to control the water and power consumption, door and gate control system, audio system, Wi-Fi and IP phones. The technologies which used based on different type of sensors either communicate through the wireless or cabling which all connected to controller called Shaula Astrolabe 720 which consist with other sub-system such as amplifier, 720, PoE switch and ZigBee gate way. The controller is considered the heart of the system as manage the communication between the devices and application over the internet. In addition, the ZigBee wireless smart home technology that widely using for this kind of application. In addition, the paper has gone through the project management stages to get the positive results as per the planning phase.

Keywords: *Internet of Things (IoT), Power over Ethernet (PoE), Smart Home, Entrepreneurship, IoT sensors*

I. INTRODUCTION

The smart home technology started long time back and concept was used based on the smart home association, it is the integration of technology and services through the network. The proliferation of devices connected through the internet has increased along with big data transferred through the internet. Therefore, the number of devices will be connected at the end of 2021 around 22.5 billion device IoT (Andrew, 2016).

The smart home application is going to be widely used which aiming to make people live easier and relaxed for example imagine that people driving home in hot summer, it will be able to turn it on before reaching home using your smart phone rather turning the AC on after you reached home Therefore, there are no doubt that the smart home devices and home automation will be the wave of the future. (Rosslin John Robles, 2010).

The study reveals implementing smart home using internet of things.

II. PROBLEM DEFINITION

Smart home system requires security, flexibility of new appliances, remote home management insight, surveillance feature, energy saving and monetary benefits.

Sultanate of Oman known by the huge heat wave during summer, which can reach around 50c which may affects the furniture and decoration. Most of the people

staying in Muscat because of their work, however they are visiting the hometown during holidays and occasions. Therefore, cooling need to be maintain inside their villas to prevent the damages through IoT.

III. REVIEW OF LITERATURE

The Internet of Things (IoT) is used widely in public and private sectors and spend almost \$5 trillion (Andrew, 2016). The proliferation of devices connected through the internet has increased along with big data transferred. Therefore, the number of devices will be connected at the end of 2021 around 22.5 billion device IoT (Andrew, 2016).

The smart home is way of controlling every appliances and devices inside the house as well as remotely through the smart phones, which provide the safety, security and comfort for the smart people. There are many items can be controlled in smart homes concepts such as TV, AC, CCTV, Audio system , water management , lights ...etc. Therefore, the smart home equipped with different technology and applications using sensors to show the status of the house (Home, 2017).

IV. METHODOLOGY

The PPDIOO stand for Prepare, Plan, Design, Implement, Operate, and Optimize. It is a Cisco methodology that lifecycle approach to Network Design and Implementation. The PPDIOO consist of six phases to Complete the designing of network as shown in figure 1 (Sivasubramanian, 2012)

It can be applied for both new network intuitive and existing network system. In addition, it is easy to understand and use effectively. In addition, the model gives clear picture about the project in early stage.

The main advantages of using PPDIOO Cisco model:

Reducing the cost of the project while implementing new technologies to purchase new equipment, monitoring the system and maintaining the system. It improves the speeding access to application and services. It minimizes the downtime of the system because depend on proper plan, hence; minimize risk of impacting the whole system. It is common model used to build new network and cisco has its own IoT logical diagram.



Fig-1: PPDIOO Phases (Sivasubramanian, 2012)

Prepare: In this phase determine the organization requirements, developing the strategy of network and identifying the technology which going to support. Also, establish financial justification for the project by evaluating the business case for the proposed architecture.

Plan: During the planning phase, identifying the initial requirements based on the objectives and goals of the projects. Also, assessing the site and evaluating the existing network if available. In addition, the planning phase will help to manage tasks, determine responsibility, highlighted critical millstone and located the resources. Hence, the plan should align with goals, scope and located budget.

Design: the design considers very critical part of any project and need to meet the business needs. Also, the completing the project will depend on getting the design correct. In addition, the design should meet incorporates specification to support scalability, security, reliability and performance.

Implement: The network either built or improving the existing network shouldn't disturb. And during this phase carry out configuration and installation of any new devices. Therefore, if any modification for the design or existing network need to be communicated to user.

Operate: This consider the final product phase as final test of the design carried out. Also, this phase involves the maintenance of the network and day to day operation. Also, required to monitor the network in order to eliminate the faulty and get the maximum benefits of the system which will help the optimize phase.

Optimize: This is proactive which involves management of the network that's the network monitoring will be critical to identify and resolve the issues before affect the entire network.

V. PROJECT PLAN

Work Breakdown Structure (WBS): It present the comprehensive project plan which consider the using of PPDIOO model for our project requirements. The WBS implemented by using MS-project showing the main elements with target date to be completed.

Communication Plan: Communication consider very critical elements in any projects in order to get the final

products. There are different parties involved in this project as mentioned in the stockholder's section, which they need to communicate to each other effectively to get the project completed within given time and budget.

Acceptance plan: The acceptance plan will be the final stage of the project during the handover process.

Resource plan: The resource plan determines the devices and technology which going to be used to achieve the project objectives. The equipment mainly hardware as most of it has built in technology plug and play.

Risk management plan: The risk management plan considers very vital piece of the project as the project manager needs to consider the factors might impact the completion of the project and evaluate its impact in order to put control to mitigate it.

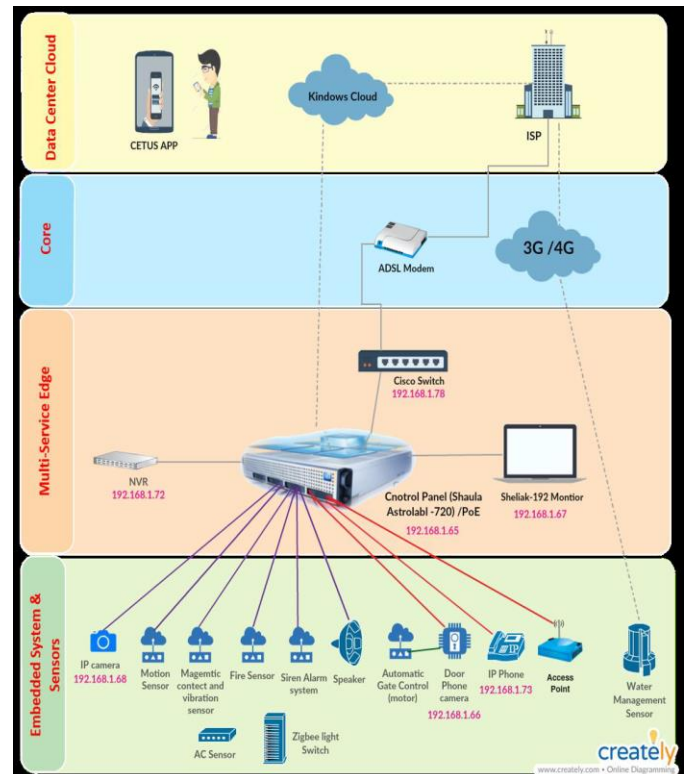


Fig-2: Block Diagram Design

IMPLEMENTING OF SMART HOME USING INTERNET OF THINGS

This is smart home diagram (fig. 2) which uses to connect different devices through the internet for remote access and control. The IoT model including four layers as following:

The Data center also called management hosting application and used to host the application that most critical to provide the services and managing end to end IoT. Hence, security service in data center/cloud network consider very critical to ensure the IoT/M2M (Machine to machine) system is protected from deferent type of cyber-attack. The internet service required to establish the communication with devices inside the house. Therefore, this will be achieved by establishing connection from ISP. In addition, the data center cloud will host the cloud application server, which called

CETUS. Moreover, to gain access the application will need to have authentication (user name and password).

Cloud being used is the ASTROLABE Cloud Service (ASTRO Cloud) which is a propriety cloud service of ASTROLABE tech. CETUS is an app offered by ASTROLABE tech that can connect to their cloud service and devices.

CETUS is the only app that can be used with the ASTROLABE Cloud service and ASTROLABE devices. CETUS is designed to work with the ASTROLABE DEVICES and even if the cloud can be connected to via other app it will not be able to interpret the communication and display user understandable responses.

Core: it is also called management service layer as the data flow through the connection with ISP. In the core will place the ISP router, which will provide the internet service, which will connect it with the PoE switch through CAT 5 /a line.

Multi-service -edge: consider as gateway and network layer tow. In this layer, will place control panel which consist from Astrolabe -720, PoE switch, Audi, and power supply. All the security sensors, motion sensors, gate controller, fire sensors, speakers ...etc. connected to Astrolabe 720. And, the CCTV, NVR, phone door camera, IP phone, access point and monitor will be connected to the PoE switch. The controller will be connected with internet service through ISP. Both the switch and Astrolabe 720 reconnected internally to communicate to each other. In addition, will have one Cisco 6 port switch to distribute the internet to the villas.

Embedded system and sensors: this is sensors and devices connectivity, which consider layer one. in this will place end user devices such as CCTV, different types of sensors, alarm system, security system, access point for Wi-Fi, door phone...etc. this end user devices will be connected to control panel which consist from Astrolabe -720, PoE switch, Audi, ZigBee gateway and power supply

VI. CONCLUSION

The objectives of this project which was aimed to minimize the security issues such as theft criminal acts, control the consumption of water and power, reduce the number of employees required to maintain the compound, maintain the quality and enhance the people life inside the houses especially for older and disabled people.

Generally, the house is the most part of people life as they are spending the greatest part of their life inside it. Hence, the main aim of smart homes improving people live by using the available technology.

Currently no houses or government building in the area is implemented smart home or building concepts and this would be marketing for the smart home system and good for future business trade

THERE ARE MANY BENEFITS ATTAINED BY IMPLEMENTING SMART HOME:

- Maximizing Home Security: Secured system from non-authorized personal.

- Accessibility: Smart home have many feature accessibility technologies, enhance older people life as can do things
- Energy Efficiency: Control the consumable of water and power
- Remote control of home functions
- Improved Appliance functionality: The life of the furniture, decoration and appliance.
- Home management Insights, Convenience, Comfort zone
- Monetary savings

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