**Introduction**

Generally, when the electrical equipment is plugged in but it is not in use, there still has the flow of electricity. That means we will lose the electrical energy about five to ten percent of regularly usage, so that wastes money for no reason. Moreover, that may also because of many accident such as the conflagration from electrical short circuit. Therefore, many people who always forget to unplug the electrical device have to remind themselves every time they go out. On the other hand, if they go out with forgetting to unplug, they must go home to pull the plug out to avoid the dangerous situations, so it is a waste of so much time. In order to solve these problems, smart home technology will be required. With the advance of technology, many research projects about smart home have been developed in order to facilitate human and improve their quality of living. A home, which is smart, is the technology used to make all electronic around the home act "smart" or "intelligent" or more automated that is to say smart home has highly advanced automatic systems for lighting, temperature control, security and many other functions. [1]

A smart device is an ordinary appliance with a sophisticated computer installed to give it more functionality that can monitor so many aspects of daily routines. A smart home is useful for everyone and can also be used to enhance the everyday life at home. Accordingly, smart home consists of three parts, which are network, controlling devices and home automation. [2,3] The network is used for connecting the automation to the controlling devices and it can be wire and wireless. The controlling devices are used for managing the systems. And the home automation are device which control the physical environment. However, we will discuss all these three parts in detail in the following section.

**SMART HOME TECHNOLOGY**

**Smart home network**

Smart home network technology can be classified into two main types, which are wiring system and wireless system. [4] In wiring system, the equipment will be connected into the main power supply directly, so the data will be sent to the devices to activate or deactivate them. There are many types of wires that people may want to install in-wall. Many home automations are connected through wiring system such as new wire (twisted pair, optical fiber), Powerline, Busline, etc. An example of outstanding technology is X10, which is open standard for home automation. X10 transmits binary data using the Amplitude Modulation (AM) technique.And X10 controllers send signals over existing AC wiring to receiver modules. Other technologies are HomePlug, Consumer Electronics Bus (CEBus), European Installation Bus, etc.

In the wireless system, there must have two main elements that are sender and receiver. Many new appliances use wireless technology to communicate with other devices. The example of wireless communication system are microwaves, Infrared (IR), radio frequency (RF), Wi-Fi, Bluetooth, IEEE 802.11, and so on. Furthermore, some of smart home network standard can work using both wiring system and wireless system. An example of wireless communication system for smart home is Z-wave, which is a reliable and affordable wireless home automation solution. Z-wave is a wireless RFbased method for instant remote control of appliances.

**Smart home controller**

Smart home controlling devices are used for managing the systems by sending data or signal to control the actuators. The examples of the controllers are not only the remote control, but they can also be smartphones, tablets (iPad, Galaxy tab), web browsers and Short Message Service (SMS). Moreover, some of systems may have computer which works as center of the environment perception or the evaluation unit. [5]

**home automation**

**1) In Kitchen**

The most heard about smart technologies are that of the kitchen. An example appliances which are smart are refrigerators, microwaves, coffee makers, and dishwashers. The Internet Refrigerator applies the technology of smart home to make many works much easier. There is Internet enabled and allows for users to communicate with it via the Internet, so it is able to download recipes and then display them on its LCD screen. Moreover, the refrigerator also takes an automatic inventory of items inside of it and it can alert the users to what is there. What’s more, microwaves are also smart. Microwaves can communicate with smart refrigerators and suggest recipes based on the food items available in the refrigerator. The microwave can even be set to start at certain times while users are away from home. [2,6]

**2) In living room**

Stepping away from the kitchen, one part of the home which has smart home technology adoption is living room. Smart devices like televisions and stereos will utilize this technology to improve the entertainment experiences. The smart TV will have many functions like desktop Personal computer so this leads to interactive TV and more interactive content will become available. [2,6]

Furthermore, lighting control systems can be used to control household electric lights by using of motion detectors to automatically extinguish the lights in a room after people have left and turn on the lights if people enter a room.

**3) In Bedroom**

The room has smart climate control which the users can set the scene in bedroom with single-touch heating and can choose a unique night-time temperature and lighting profile for each bedroom. The bed is also equipped with sensor that can monitor movement of a person in bed for detecting health condition regarding sleeping in typical routine of a person. [7]

Moreover, the smart devices can be used in many aspects, for instance,

* Welfare - Health monitoring, Personal trainer, remote diagnosis
* Entertainment - Television, video, games, Smart Home Theatre, Multi-Room Audio, HD Video Distribution
* Environment - Remote control of lighting and heating and air conditioning. Energy usage and cost.
* Security - Smart Security, simulated occupancy, property monitoring and protection, detection of fire, gas leaks and water leaks, teleassistance.
* Communication - Video phone, home calendar, reminders and communication inside and outside the house
* Green - Reduce Electricity and heating fuel consumption. [8]

**SMART HOME CHALLENGES**

1. **Challenges one:**

Security Smart home also comes with some security concerns. For instance, hackers can access the network system. They have the ability to control all smart devices especially the security appliances. [11]

1. **Challenges two: Adaption to New Environment**

Owning a smart home means having to learn how to use your home that requires you to adapt to many innovations around you such as security systems and many sensors that always detect your movement. Accordingly, it will take reading manuals and learning about how-to of your home. [12]

1. **High Cost of Intelligence**

Although smart homes have many properties that makes human’s lives convenient, these smart properties are in a higher price tag. The cost of an intelligent home is high because some of the technology is relatively new. However, mostly of home automations are just a few advances that are standard in a new home, the cost of other aspects can be expensive as well. [12]

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