Smart home design for electronic devices monitoring based wireless gateway network using cisco packet tracer

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Abstract. In the era of technological development today, the technology has become the need for the life of today's society. One is needed to create a smart home in turning on and off electronic devices via smartphone. So far in turning off and turning the home electronic device is done by pressing the switch or remote button, so in control of electronic device control less effective. The home smart design is done by simulation concept by testing system, network configuration, and wireless home gateway computer network equipment required by a smart home network on cisco packet tracer using Internet Thing (IoT) control. In testing the IoT home network wireless network gateway system, multiple electronic devices can be controlled and monitored via smartphone based on predefined configuration conditions. With the Smart Home can potentially increase energy efficiency, decrease energy usage costs, control electronics and change the role of residents.

1. Introduction

In the era of technological development today, without realizing the technology has become a need that is often used for the life of today's society. Where almost all areas have been able to feel from the development of such technology, as in the field of computer network electronics. In this case, the need for home technology is increasingly required to make a smart home, where during this time in the control of electronic devices at home is done through the switch on or off switch.

Previously some smart home development has been done in monitoring or controlling electronic devices that are in the household but can only monitor or control on one electronic device only and the transmission media is done still using SMS gateway and Bluetooth [1-2], so cannot maximize in creating or building a smart home system is good in monitoring or controlling electronic devices that are in the household.

Smart Home is an application of a combination of technology and services devoted to the home environment with specific functions aimed at improving the safety, efficiency, and comfort of its inhabitants. In the smart home system usually consists of monitoring tools, control devices and automatic there are several devices that can be accessed using a computer or smartphone connected to the Internet network [4].
IoT is a structure in which objects, people are provided with an exclusive identity and the ability to move data through a network without requiring two-way inter-human to human source i.e. the destination or human interaction to the computer. IoT is a very promising development to optimize life based on intelligent sensors and smart appliances that work together over the internet [5].

The emergence of IoT is a major development in the world of the Internet that it is expected that billions of physical things or things will be equipped with various types of sensors connected to the internet through the network as well as technology support such as embedded sensors and actualization, Radio Frequency Identification (RFID), wireless sensor networks, real time and Web services, IoT is often also referred to as a physical Cyber system or network of networks with a large number of electronic devices or electronic objects and sensors connected to the internet [6-7].

Smartphones are handheld phones with computer-like capabilities, which are working phones using all software, operating systems that provide standard and fundamental relationships for application fans. Based on the development of smartphones today already has the presentation of advanced features and also has the ability to support the development of computer networking devices that make it a necessity in humans [8].

For that purpose, efforts are made to increase the needs of households to facilitate the use and control of all electronic devices by using remote or remote control, where devices that can be controlled using smart home technology such as lighting devices, access door, fan and various electronic devices others that can be activated or not activated using a smartphone through the home gateway computer network device as a transmission medium or liaison to some electronic devices that are in the household, other than that smart home has several benefits such as providing comfort, safety and security at the residence [9-10].

2. Methodology
In this study apply literature and experimental study methods, which in the literature study obtained from print media and Internet media in the form of journals, e-books and material books. While in experimental done using software and hardware that is designed its performance and done testing to make the application, whether it is as expected. In the configuration and testing of network systems by designing the concept of smart home IoT model which then test each subsystem model, in the end after subsystem testing, testing the overall system model to see the success level model of smart home systems designed on cisco package trackers. It uses the IoT home gateway as the media path that connects multiple wireless devices wirelessly and provides automatic addressing to devices connected to the home gateway, where all devices connect to the smartphone as an interface medium for controlling and monitoring electronic devices [11].

3. Configuring the Simulation Concepts In Cisco Packet Tracer
In building smart home network can be implemented through the simulation concept designed on cisco packet tracer. Some of the tools needed to build a smart home network are home gateways that function as transmission media paths and provide automatic addressing to multiple devices connected via wireless networks, smartphones that serve as interfaces in controlling and monitoring electronic devices, and some devices to be controlled based on conditions set on smartphone devices [12-14]. In figure 1 configure the smartphone device as an interface in monitoring and controlling electronic devices, then in figure 2 as the intermediate home gateway login on the smartphone device via the web browser, then in figure 3 as the interface list of IoT server electronic devices in the home menu located on the smartphone, then in figure 4 is a condition setting on electronic devices that are set in the menu conditions that are on the smartphone.
Figure 1. IoT server wireless settings.

Figure 2. Home gateway smartphone login.
4. Smart Home Simulation Concept Results In Cisco Packet Tracer

Based on the configuration of the smartphone simulation concept that has been set up in the IoT home gateway network on the Cisco packet tracer, some electronic devices can be controlled and monitored according to system testing, configuration and condition settings on electronic devices specified in in the smartphone system, making it easier in designing and implementing in building the smart home network. In figure 5, we can explain the process of controlling electronic devices through a smartphone-controlled home gateway. In-camera webcam device connected to the device motion detector, where webcam camera will light up when the device motion detector captures a move. So do some conditions on lawn sprinkler devices, when lawn sprinkler 1 is turned on and off by smartphone,
then lawn sprinkler 2 and lawn sprinkler 3 will react. And on the window, fan, garage door, and door devices are also controlled by the smartphone through the home gateway transmission media.

**Figure 5.** Concept results of smart home simulation.

5. **Conclusion**

In building a smartphone network we can simulate it using a Cisco package tracker and learn or know how to configure the network and connect multiple electronic devices to connect to each other over the wireless network, in addition, to set up some electronic devices based on their condition. set on smartphones With this simulation, design and implementation planning can be done in building smart home network using IoT home gate and there is a possibility that this simulation can be applied in real world based on current technology development, thus making it a necessity for community life which potency can improve energy efficiency, reducing energy use costs, controlling electronic devices and changing the role of occupants.

**References**

[1] A. ElShafee and K. A. Hamed 2012 *Design and Implementation of a WiFi Based Home Automation System*, World Academy of Science, Engineering and Technology, pp. 2177-2180.

[2] R.Pivare, M.Tazil 2011 *Bluetooth Based Home Automation System Using Cell Phone*. IEEE 15th International Symposium on Consumer Electronics Singapore, pp.192-195.

[3] Sun, C. (2012) Application of RFID Technology for Logistics on Internet of Things.

[4] Kosmatos, E.A., Tselikas, N.D. and Boucouvalas, A.C 2011 *Integrating RFID}s and Smart Objects into a Unified Internet of Things Architecture*. Advances in Internet of Things: Scientific Research, 1, 5-12.

[5] Moeinifar, D., Shamsi, H. and Nafar, F 2012 Design and Implementation of a Low-Power Active RFID for Container Tracking @ 2.4 GHz Frequency: Scientific Research.

[6] Want, R 2006 *An Introduction to RFID Technology*. IEEE Pervasive Computing, 5, 25-33.

[7] R. Piyare, 2013 Internet of Things, *Ubiquitous Home Control and Monitoring System using Android based Smart Phone*, International Journal of Internet of Things, 2, no. 1, pp. 5-11.

[8] A. Rajabzadeh, A. R. Manashty, and Z. F. Jahromi 2010 *A Mobile Application for Smart House Remote Control System*, World Academy of Science, Engineering and Technology, 62, pp.80-86.

[9] R. Shahriyar, E. Hoque, S. Sohan, I. Naim, M. M. Akbar, and M. K. Khan 2008 *Remote controlling of home appliances using mobile telephony*, International Journal of Smart Home, 2, pp. 37-54.
[10] Aggarwal, R. and Lal Das, M 2012 *RFID Security in the Context of Internet of Things*. First International Conference on Security of Internet of Things, Kerala, pp.51-56.

[11] B. Park, 2012. *Mobile IP-Based Architecture for Smart Homes*, International Journal of Smart Home, 6, pp.29-36.

[12] Gigli, M. and Koo, S 2011 *Internet of Things, Services and Applications Categorization*. Advances in Internet of Things, 1, 27-31.

[13] R. T. Fielding and R. N. Taylor, 2002 *Principled design of the modern web architecture*, Software Engineering, Proceedings of the 2000 International Conference, pp. 407-416.

[14] U. Sharma and S. R. N. Reddy 2012 *Design of Home/Office Automation Using Wireless Sensor Network*, International Journal of Computer Applications, 43, pp. 53-60.