

Smart Home Control Systems

李育德、林仁勇

E-mail: 364816@mail.dyu.edu.tw

ABSTRACT

In this thesis, we implement a smart home control system by using Arduinos, XBees, an Ethernet shield, a relay, a photoresistor and an infrared remote controller. We use the ZigBee as the transmission protocol between the sensors and control modules. A gateway with the TCP/IP protocol stack is response to communicate with a remote server via the Internet. The experiment shows that the proposed system works well. Since the Arduino project is an open source project, it is an easy and quick approach to implement the smart home prototype system.

Keywords : Arduino、Xbee、WSN、Smart Home

Table of Contents

封面內頁 簽名頁 中文摘要 iii ABSTRACT iv 誌謝 v 目錄 vi 圖目錄 viii 表目錄 x 第一章 緒論 1 1.1 研究背景 1 1.2 研究動機和目的 2 1.3 論文各章提要 5 第二章 WSN相關文獻與探討 6 2.1 智慧家庭 6 2.2 相關技術介紹 8 2.2.1 WSN介紹 9 2.2.2 ZigBee介紹 10 2.2.3 照度感測器介紹 10 2.2.4 紅外線遙控介紹 11 2.2.5 繼電器介紹 13 2.2.6 溫濕度感測模組 13 2.2.7 Arduino介紹 14 2.2.8 Xbee介紹 14 第三章 系統架構 15 3.1 系統分析 15 3.2 系統架構 16 3.2.1 運作流程 17 3.3 硬體設備 19 第四章 結果與分析 28 4.1 資料封包格式 28 4.2 實驗結果 29 4.3 整體架構分析 41 4.4 成本分析 42 第五章 結論與未來發展 42 5.1 結論 43 5.2 未來研究方向 44 參考文獻 46 附錄 50

REFERENCES

- [1]F. Akyildiz, W. Su, Y.Sankarasubramaniam, and E. Cayirci, " Wireless Sensor Networks: A Survey, " Communications Magazine, Vol. 40, pp. 102-114, Aug., 2002.
- [2]智慧生活智慧家庭生活系統 <http://www.fbblife.com/25152361/article/content.aspx?ArticleID=1179>.
- [3]C. Yaoming, S. Wei, H. Hongwei, and X. Youzhi, " A Smart Gateway for Health Care System Using Wireless Sensor Network, " Fourth International Conference on Sensor Technologies and Applications, pp. 545-550, Jul. 18-25, 2010.
- [4]無線網路技術-IrDA <http://www.msservermag.com.tw/technicwords/020509.aspx>.
- [5]ZigBee Alliance, <http://www.zigbee.org/>.
- [6]Bluetooth <http://www.bluetooth.com/Pages/Bluetooth-Home.aspx>.
- [7]Wi-Fi-維基百科, <http://zh.wikipedia.org/wiki/Wi-Fi>.
- [8]WiMAX-維基百科, <http://zh.wikipedia.org/wiki/WiMAX>.
- [9]G. Xiang, and L. Zhao, " Research and Design of Smart Home System Based On ZigBee Technology, " International Conference on Artificial Intelligence and Computational Intelligence (AICI), pp. 290-293, Oct. 23-24, 2010.
- [10]E. Fife, and F. Pereira, " Digital Home Health and mHealth: Prospects and Challenges for Adoption in the U.S, " FITCE Congress, pp. 1-11, Aug. 31-Sept. 3, 2011.
- [11]台灣區電機電子工業同業公會 <http://www.teema.org.tw/epaper/20090916/disquisition.html>.
- [12]K. Yoshiharu, " Splish:A Visual Programming Environment for Arduino to Accelerate Physical Computing Experiences, " Eighth International Conference on Creating Connecting and Collaborating through Computing (C5), pp. 3-10, Jan. 25-28, 2010.
- [13]C. Chi Hung, and Y. Chien Tung, " Research and Application of Things for Smart Home - Taking Control of the Rolling Shutter Windows, " Thesis of the Engineering and Naval Architecture, National Taiwan Ocean University Institutional Repository, 2011.
- [14]L. Yan dong, and S. Shun-feng, " Architecture of Smart Home Systems with integration of Environment and Equipment, " Thesis of the Department of Electrical Engineering, National Taiwan University of Science and Technology, 2009.
- [15]K. Chih Chien, and C. Chiung-Hsing, " Design and Implementation of Smart Home Based on Android and ZigBee, " Thesis of the Electronic Communication Engineering, National Kaohsiung Marine University, 2012.
- [16]G. Chong, L. Zhihao, and Y. Yifeng, " The Research and Implement of Smart Home System Based on Internet of Things, " International Conference on Electronics Communications and Control (ICECC), pp. 2944 - 2947, Sept. 9-11, 2011.
- [17]G. Virone, A. Wood, L. Selavo, Q. Cao, L. Fang, T. Doan, Z. He, R. Stoleru, S. Lin, and J. A. Stankovic, " An Advanced Wireless Sensor

Network for Health Monitoring, " Transdisciplinary Conference on Distributed Diagnosis and Home Healthcare (D2H2), Arlington, VA, Apr. 2-4, 2006.

[18]S. Jardosh, P. Ranjan, and D. Rawal, " Prioritized IEEE 802.15.4 for wireless sensor networks, " 2010 6th Cpnference on Wirless Advanced (WiAD), pp. 1-7, Jun. 27-29, 2010.

[19]H. Dae Man, and L. Jae Hyun, " Smart Home Energy Management System using IEEE 802.15.4 and ZigBee, " IEEE Transactions on Consumer Electronics, Vol. 56, pp. 1403-1410, Aug., 2010.

[20]光敏電阻-維基百科 <http://zh.wikipedia.org/wiki/%E5%85%89%E7%94%B5%E9%98%BB>.

[21]光電二極管-維基百科 <http://zh.wikipedia.org/wiki/%E5%85%89%E9%9B%BB%E4%BA%8C%E6%A5%B5%E9%AB%94>.

[22]紅外線遙控器 <http://coopermaa2nd.blogspot.com/2010/01/nec-ir-protocol.html>.

[23]LED-R-5T55-廣華電子商城 <http://shop.cpu.com.tw/product/38569/info/>.

[24]LED-R-3T-廣華電子商城 <http://shop.cpu.com.tw/product/8196/info/>.

[25]繼電器介紹 http://coopermaa2nd.blogspot.com/2011/03/blog-post_26.html.

[26]DHT11溫溼度感測模組 <http://www.micropik.com/PDF/dht11.pdf>.

[27]SHT11溫溼度感測模組 http://twarm.com/commerce/product_info.php?products_id=3096.

[28]Arduino-HomePage, <http://www.arduino.cc/>.

[29]Digi International Inc

<http://www.digi.com/products/wireless-wired-embedded-solutions/ZigBee-rf-modules/point-multipoint-rfmodules/xbee-series1-module#overview>.