

Health monitoring and emergency report system

于耀忠、林仁勇

E-mail: 345341@mail.dyu.edu.tw

ABSTRACT

This thesis studies a portable health monitoring and emergency report system. The proposed system consists of two parts which are bio-signal monitoring functions and communication functions. The bio-signal monitoring functions includes ECG (Electrocardiogram, ECG) and SPO2 (Oxygen saturation) measurement devices which are combined with ZigBee transceiver. The communication part includes mobile devices (netbooks), ZigBee modules and satellite positioning system (Global Positioning System, GPS) devices, which are connected via different network protocols. The purpose of the proposed system is to set up a machine-to-machine (Machine to Machine, M2M) environment, where if the patient who needs to be cared has abnormal status, the doctor and the relatives can immediately know the location of the patient and receive the bio-signal data. Therefore, the doctor can realize the situation of the patient and prepares the possible treatment before the patient arrives at the hospital. In this study, we have finished designing the prototype of the proposed portable health monitoring and emergency report system. The prototype give a demonstration of the possibilities to send the abnormal alarms to the persons who register in a server and transmit the biomedical information and GPS coordinates to whom care the patient.

Keywords : M2M、WSN、BSN、GPS、ZIGBEE、ECG

Table of Contents

目錄	封面	內頁	簽名頁	中文摘要	iii	ABSTRACT	iv	致謝	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 研究動機及目的	3	1.3 論文各章提要	4	第二章 相關文獻與探討	5	2.1 生醫資訊	6	2.1.1 ECG介紹	7	2.1.2 SPO2介紹	9	2.2 相關技術介紹	9	2.2.1 GPS	10	2.2.2 WSN介紹	12	2.2.3 Zigbee介紹	12	2.2.4 Bluetooth介紹	13	2.3 相關探討	13	第三章 系統架構	14	3.1 系統架構簡介	14	3.1.1 系統之設計	15	3.1.2 運作流程	16	3.2 系統軟硬體環境	18	第四章 結果與分析	25	4.1.1 健康監測系統	25	4.1.2 緊急通報系統	28	4.2 整體架構分析	30	第五章 結論與未來研究方向	33	5.1 結論	33	5.2 未來研究方向	35	參考文獻	37	圖目錄	圖2.1 心電圖示意圖	8	圖3.1 系統架構簡圖	15	圖3.2 使用者架構	16	圖3.3 系統流程	17	圖3.4 系統架構示意	18	圖3.5 ZigbeX Mote	20	圖3.6 ZigbeX Mote (子版)	20	圖3.7 ZigbeX Mote (母版)	21	圖3.8 BIO生醫感測模組	21	圖3.9 BIO Module架構圖	22	圖3.10 SpO2感測器模組	22	圖3.11 ECG模組感測貼片	23	圖3.12 SpO2模組感測器 (手指)	23	圖3.13 i-gotU gt-200E GPS軌跡記錄器	24	圖3.14 HOLUX m-241 GPS軌跡記錄器	24	圖4.1 ECG及SPO2的顯示	25	圖4.2 ECG封包分析	26	圖4.3 MAP的顯示 (等級13)	27	圖4.4 MAP的顯示 (等級15)	27	圖4.5 MAP的顯示 (等級17)	28	圖4.6 通報系統	29	圖4.7 通報訊息圖	29	圖4.8 整體設備圖	32	圖4.9 整體效能圖	32	圖5.1 透過IPv6的新型無線網路架構	33	圖5.2 自行焊接的ECG電路板	36	表目錄	表1.1 06~10年無線通訊技術醫療設備市場預估	4	表2.1 心電圖之參數名稱及意義說明	8	表2.2 GGA - GPS Fixed Data	11	表3.1 硬體設備	19
----	----	----	-----	------	-----	----------	----	----	---	----	----	-----	------	-----	---	--------	---	----------	---	-------------	---	------------	---	-------------	---	----------	---	-------------	---	--------------	---	------------	---	-----------	----	-------------	----	----------------	----	-------------------	----	----------	----	----------	----	------------	----	-------------	----	------------	----	-------------	----	-----------	----	--------------	----	--------------	----	------------	----	---------------	----	--------	----	------------	----	------	----	-----	-------------	---	-------------	----	------------	----	-----------	----	-------------	----	------------------	----	-----------------------	----	-----------------------	----	----------------	----	--------------------	----	-----------------	----	-----------------	----	----------------------	----	-------------------------------	----	----------------------------	----	------------------	----	--------------	----	--------------------	----	--------------------	----	--------------------	----	-----------	----	------------	----	------------	----	------------	----	----------------------	----	------------------	----	-----	---------------------------	---	--------------------	---	---------------------------	----	-----------	----

REFERENCES

- 參考文獻 [1]台灣國際醫療網站 (Taiwan Task Force for Medical Travel) <http://medicaltravel.org.tw> [2]陳堂麒 “發展醫療電子產業 台灣廠商應尋求異業聯盟” 《生技與醫療器材報導月刊11月號》117期, 2008 [3]Invacre, Frost and Sullian, Espicom, PJB Publications, Jewson Enterprises, Infiniti estimates “無線通訊技術之於醫電應用概況” in工研院 IEK(2008/02). [4]台灣區電機電子工業同業公會 <http://www.teema.org.tw/publish/moreinfo.asp?autono=3322> [5]Invacare, Frost and Sullivan Epicom, PJB Publications, Jewson Enterprises, Infiniti estimates ;工研院 IEK(2008/02). [6]劉惠娟 “迎接起飛的醫療電子市場商機” 《生技與醫療器材報導月刊12月號》118期, 2008 [7]Anan Wongjan, Amphawan Julsereewong, and Prasit Julsereewong, Members, IAENG “Continuous Measurements of ECG and SPO2 for Cardiology Information System” in IIIMECS 2009. [8]gang Wang; Dongming Peng; Wei Wang; Sharif, H.; Hsiao-hwa Chen; Khoyneshad, A. “Resource-aware secure ECG healthcare monitoring through body sensor networks” in Wireless Communications, IEEE, 2010, Page(s): 12-19. [9]Jiunn-Der Lee. Oxygenation indices and their clinical implication. J Respir Care ROC 1998, 9(1), Page(s): 46-50. [10]維基百科 <http://zh.wikipedia.org/zh-tw/Wikipedia> [11]SiRF-Siemens-XT5x-v2 “XT55 GPS Command Specification”. [12]H. A. Rahim, R. B. Ahmad, A. S. M. Zain, U. U. Sheikh “Implementation and Analysis of Integration GSM/GPRS modem in a

TMS320VC6713 Digital Signal Processor for Vehicle Location " , ICCCE, 11-13 May 2010, Page(s): 1-5 [13]I. F. Akyildiz, W. Su, Y.Sankarasubramaniam, E. Cayirci, "Wireless Sensor Networks: A Survey," in Elsevier Computer Networks, 15 March 2002, Page(s): 393-422 [14]Lingjiao Wang, Hua Guo, Bin Duan and, Chuan Liu " Route Optimum Mechanisms for Local Communication on PMIPv6 " in IEEE 2010 2nd International Asia Conference on Informatics in Control, Automation and Robotics , Page(s): 80-83 [15]Juan Jose Martinez Castillo " The Survival Of Communications In Ad Hoc AndM2M Networks: The Fundamentals Design Of Architecture And Radio Technologies Used For Low-Power Communication NOMOHI Devices " in ITSim 2010, Page(s): 666 - 671.