Design and Implementation of Control for Photovoltaic Energy System Using Micro-Controller

林春日、黃登淵

E-mail: 9314934@mail.dyu.edu.tw

ABSTRACT

The capabilities of the micro-controller have been greatly enhanced due to the constant improvement of semiconductor technology in the last decade. The micro-controller becomes very popular in the control field because of its superior reliability and lower cost. Due to its versatile functionalities, the PIC micro-controller is employed to monitor and control an isolated solar system. First, we use the PIC micro-controller to acquire the real-time signal of our solar system, and, in turn, use the acquired information to monitor the status of the solar system at any instant. Furthermore, if we find any abnormal status in this solar system, the PC can concurrently issue a control signal to it. To achieve this goal as mentioned above, the PC-side is designed to communicate with the solar system through the embedded micro-controller. We adopt the following two major steps to implement this system. First, we establish the communication between PIC and PC via ADAM RF module through RS232/RS485 protocols. Second, a visual IDE (Integrated Development Environment) is employed to develop the corresponding software in the PC-side. Functionally, this system can issue a warning message when the operation of the solar system is abnormal. As a result, it reveals that the architecture developed in this research can be extensively used to the supervisory control apparatus in many industrial applications.

Keywords : Micro controller ; Real time monitor ; programming designand control ; Solar cell ; Visual

Table of Contents

REFERENCES

參考文獻 1. J., Tang, M.R., Varley, M.S, Peak, “ Hardware implementations of multi-layer feedforward neural networks and error backpropagation using 8-bit PIC microcontrollers, ” IEE Colloquium on Neural and Fuzzy Systems: Design, Hardware and Applications, May 9, 1997. 2. J.C., Lima, A., Medeiros, V.M., Canalli, F., Antunes, F.S., Dos Reis, “ A PIC controller for grid connected PV system, ” IEEE International Congress on Power Electronics, Oct. 15-19, 2000, pp. 307 -311 3. J.C., Lima, J.M., Corleta, A., Medeiros, V.M., Canalli, Antunes, F., Libano, F.B., Dos Reis, F.S., “ A PIC controller for grid connected PV system using a FPGA based inverter, ” Proceedings of the 2000 IEEE

International Symposium on Industrial Electronics, Volume 1, Dec. 4-8, 2000, pp. 169 -173. 4. S., Mekhilef, N.A., Rahim, R.A., Rahman, T.W., Jau,“ PIC based photovoltaic maximum power point tracking control system,” Asia-Pacific Conference on Circuits and Systems, Volume 1, Oct. 28-31, 2002, pp. 251-255. 5. 施慶隆，”PIC16F87X微控制器原理實習與專題應用”，全華科技圖書，2003。 6. 趙春堂，”PIC 單晶片學習密笈-以PIC16F877為例”，全威圖書，2002。 7. Microchip Technology Inc.，”PIC16F87X Data Sheet 28/40 pin 8 bit CMOS FLASH Microcontrollers”, 2001. 8. Tamagawa-Seiki CO. LTD.，”DC Servo Motors,” Catalogue No. T12-1384N19, 2002. 9. Toshiba, TA7257P, Data sheet, 2001. 10. 吳財福、張建軒、陳裕愷，”太陽能供電與照明系統綜論”，全華科技圖書，2000。 11. 吳大偉、陳金龍、王孟輝、尤榮錄，”工業電子學”，高立圖書，1995