# Analysis and Design of Intelligent Electric Stringing Machines


## 謝政諺、陳昭雄

E-mail: 9707074@mail.dyu.edu.tw



**ABSTRACT**

This thesis investigates in the analysis and design of an intelligent electronic stringing machine. With considering the human-factors engineering, we design a floor stand and stringing mechanical structure to obtain a high-precision force control and automatically adjust elevation and tilt of string machine. Moreover, we also design electrical circuits including a touch screen, a force sensor, motor drivers and position measurement of floor stand. Based on the PIC microcontroller of Microchip cooperation, we develop control and interface software to integrate interface circuit, force and position sensing circuit and motor drivers. The main features of this intelligent stringing machine are that not only can the high precision force control be achieved but also the elevation and tilt can be adjusted to satisfy the ergonomic requirements. Experiments performed on a practical string machine demonstrate the effectiveness of the proposed methods.



Keywords : Embedded microcontroller ; Touch screen ; Stringing machine ; Motor controller


**Table of Contents**



**REFERENCES**


[1] P. Z. Grabowski, M.P. Kazmierkowski, B.K. Bose, and F. Blaabjerg, ”A Simple Direct-Torque Neuro-Fuzzy Control of PWM-Inverter-Fed Induction Motor Drive,” IEEE Trans. on Industrial Electronics, vol.47, no. 4, pp. 863-870, 2000.

[2] C.L.I. Boldea and F. Blaabjerg, “Direct Torque Control of Sensorless Induction Motor Drives: A Sliding-Mode Approach ” IEEE Trans. on Industry Applications, vol. 40, no. 2, pp. 582-590, 2004.

[3] F. Freudenstein, and L.S. Woo, ”Kinematic Structure of Mechanisms, ”in Basic Questions of Design Theory North, 1974.

[4] H. Y. Cheng, “Creative Design of Double Shoes Mechanisms, ”Vol.45, pp.378-383, 2002.

[5] Y. Fukuda, and K. Kato, ‘VLSI ESD Phenomenon and Protection ’, in Proc. 10th EOS/ESD Symposium, pp. 228-234, 1988.

[6] R. E. Locher, “ Introduction to Power Supplies, ” Application Note 556, National Semiconductor, AN-556, November 1988.

[7] I. D. Jitaru, “ High Efficiency DC-DC Converyer, ” Power Conversion. Proceedings, pp.109 -116. June 1994.

[8] D. Howe, “An Integrated Design Approach for Brushless DC Drive Systems ”, Permanent Magnet Machines and Drives, IEE Colloquium on pp. 211-215, 1993.

[9] L. E. Davis. “ Microprocessor Control of DC Motor Drives “ , IEEE Industry Appl. Conference Record Vol. 2, pp.1782 - 1786, 1992.

[10] S. Hamada, “ Two-switch Forward Soft-Switching PWM DC-DC Power Converter “ , Electronic Letters, Volume:36, pp. 2055-2056, 7 Dec.2000.

[11] PIC18F8722 Datasheet, Microchip technology, 2004.

[12] L6206 Datasheet, SGS-THOMSON Microelectronics , 1997.

[13] LM2596 Datasheet, National Semicondurtor, May 2002 [14] 曾紹瑋，碩士論文，"電子式球拍拉線機之嵌入式微控制器研發"，大葉大學，2007年6月 [15] 井澤實著，杜光宗編譯，“ 精密定位技術及其設計技術“ 建宏出版社，1992。

[16] 曾百由，“ 微處理器原理與應用 C語言與PIC18微控制器 ”五南圖書公司，2006。