USER INTERFACE DESIGN OG HANDWRITING RECOGNITION FOR PRESCHOOL CHILDREN (HLN)

NUR SUKINAH BINTI AZIZ

UNIVERSITI UTARA MALAYSIA

2008

USER INTERFACE DESIGN OG HANDWRITING RECOGNITION FOR PRESCHOOL CHILDREN (HLN)

A thesis submitted to the Faculty of Information Technology
in partial fulfillment of the requirement for the degree
Master of Science (Information Technology)
University Utara Malaysia

By

NUR SUKINAH BINTI AZIZ

KOLEJ SASTERA DAN SAINS
(College of Arts and Sciences)
Universiti Utara Malaysia

PERAKUAN KERJA KERTAS PROJEK
(Certificate of Project Paper)

Saya, yang bertandatangan, memperakukan bahawa
(I, the undersigned, certify that)

NUR SUKINAH BINTI AZIZ

calon untuk Ijazah
(candidate for the degree of)   **MSc. (IT)**

telah mengemukakan kertas projek yang bertajuk
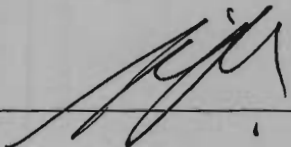*(has presented his/her project paper of the following title)*

**USER INTERFACE DESIGN OF HANDWRITING RECOGNITION
FOR PRE-SCHOOL CHILDREN**

seperti yang tercatat di muka surat tajuk dan kulit kertas projek
(as it appears on the title page and front cover of project paper)

bahawa kertas projek tersebut boleh diterima dari segi bentuk serta kandungan
dan meliputi bidang ilmu dengan memuaskan.
*(that the project paper acceptable in form and content, and that a satisfactory
knowledge of the field is covered by the project paper).*

Nama Penyelia Utama
(Name of Main Supervisor): **MR. MOHD. NIZAM BIN SAAD**

Tandatangan
(Signature)   : _____

Tarikh
(Date)   : _____

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the Universiti Library may make it freely available for inspection. I further agree that permission for copying of this thesis in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor, in her absence, by Dean of the College of Arts and Sciences. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain should not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Request for permission to copy or make use of material in this thesis, in whole or in part should be addressed to :

College of Arts and Sciences

Universiti Utara Malaysia

06010 Sintok

Kedah Darul Aman

ABSTRACT

This project will find about the requirement that involve developing the user interface of handwriting recognition for preschool children. The requirement will focus on the functional requirement and design requirement. Observation, survey, interview and questioner are used to get the entire requirements that are need. The relative advantage and disadvantage of each method are discussed. Prototype develops based on the gathering further requirement by surveying children outline. The handwriting recognition system will improve the preschool children learn how to write the alphabet using computer besides using the pen and paper

ACKNOWLEDGEMENTS

" All praise is due to Allah, Most Gracious, and Most Merciful "

First of all, I thank Allah for blessing me with good health to be able to complete this research paper. My expression of appreciation goes to several individuals, without whose cooperation, encouragement and suggestion, this study would not have been possible.

I heartily thank Mr. Mohd Nizam Bin Saad for serving as my advisor, as well as for her unwavering support, insight, guidance and encouragement throughout my study.

My special thanks to my beloved family, especially my husband (Muhamad Sukri bin Abd.Mutalib) and my parents (Haji Aziz bin Ismail and Rosni bt Abdullah) who sacrificed much and supported my efforts with love, understanding and constant encouragement without which it would not have been possible for me to earn this master's degree.

Lastly, I would like to dedicate my sincere gratitude and appreciation to friends around me for their assistance and support throughout the duration of my graduate studies.

TABLE OF CONTENTS

APPENDIX A : QUESTIONNAIRE
APPENDIX B : USER MANUAL

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

Acronym	Meaning
HLN	Handwriting- based Learning Number
OHR	Optical Handwriting Recognition
QUIS	Questionnaire for User Interface Satisfaction
swf	Shockwave Flash

CHAPTER 1

INTRODUCTION

This chapter contains an overview of the study, problem statement, objectives, scope and significance of study. This chapter ends by describing the report's structure.

1.1 Introduction

Learning to write is one of the most-essential skills children will ever learn. Typing on the keyboard is obviously a very useful skill but writing by hand more important especially for preschool children[1]. This is because writing can develop sensorimotor and it must develop in early aged. Sensorimootr skills tasks require an established or optimal strategy and a sequence of operation/movement. In the UK classroom, children spend between 30 % and 60 % of their school classroom time doing writing activities[2].A person can learn how to carry out a sensorimotor skills task by seeing how an expert or a video does the some task. However, there is certain learning tasks that are require a trainer to physically interact with a trainee. For example learning handwriting, medical procedures, painting/sculpting techniques and sport that need

1

The contents of the thesis is for internal user only

For future development and expansion of this research, the followings are suggested :

i.   Implement the visual and audio guided information to attract the preschool children to use it and enhance user learning by follow step by step write number.

ii. Enhance the system to online handwriting recognition.

6.4   Summary

Overall the objective of this study has been achieved which is to produce a prototype and find the requirement for user interface design. Handwriting – based Learning Number (HLN) prototype was developed to enhance handwriting for preschool children to write number. The prototype was evaluated and the results confirms that the user satisfy the user interface design.

REFERENCES

[1] M. Mansour, M. Eid, A. E. Saddik, and R. Iglesias, "A Haptic Multimedia Handwriting Learning System," 2007.

[2] McHale.K and Cermak.S, "Fine motor activities in elementary school:Preliminary findings and provivional implications for children with fine motor problems," *American Journal of Occupational Therapy,* vol. 46, pp. 898-903, 1992.

[3] M. Mansour, M. Eid, and A. E. Saddik, "A Multimedia Handwriting Learning and Evaluation Tool," in *Proc. Intelligent Interactive Learning Object Repositories (I2LOR),* , Montreal, QC, Canada, November 2007

[4] C.Koutro, N.Kastis, G.Neofotistos, W. V. d. Velde, M.Ramalho, and M.Panayi, "Interactive Learning Environments for Children: User Interface Requirements for a Magic Mirror and Diary Composer Environment."

[5] N. Iwayama, K. Akiyama, H. Tanaka, H. Tamura, and K. Ishigaki, "Handwriting-based Learning Materials on a Tablet PC : A Prototype and its Practical Studies in an Elementary School," in *Proceedings of the 9th Int'l Workshop on Frontiers in Handwriting Recognition*, 2004.

[6] J. C. Read, S. MacFarlane, and C. Casey, "Measuring the Usability of Text Input Methods for Children," in *HCI2001*, 2001, pp. 559-572.

[7] J. C. Read, "CobWeb - A Handwriting Recognition Based Writing Environment for Children," *EARLI SIG Writing,* 2004.

[8] P. S. rao and J.Aditya, "Handwriting Recognition - "Offline" Approach."

[9]   L. Anthony, J. Yang, and K. R. Koedinger, "Adapting Handwriting Recognition for Applications in Algebra Learning," in *International Multimedia Conference Proceedings of the international workshop on Educational multimedia and multimedia education* Augsburg, Bavaria, Germany ACM New York, NY, USA 2007, pp. 47 - 56

[10]   C. C.Tappert and S.-H. Cha, "English Language Handwriting Recognition Interface," *Text Entry System,* 2007.

[11]   C. Y. Suen, J. Kim, K. Kim, Q. Xu, and L. Lam, "Handwriting Reognition - The Last Frontiers," 2000.

[12]   M. Liwicki and H. Bunke, "Enhancing Training Data for Handwriting Recognition of Whiteboard Notes with Samples from a different Database," in *Proceedings of the Eighth International Conference on Document Analysis and Recognition,* 2005, pp. 550 - 554

[13]   J. C. Read, S. MacFarlane, and P. Gregory, "Requirements for the design of a handwriting recognition based writing interface for children," in *Interaction Design And Children Proceedings of the 2004 conference on Interaction design and children: building a community* Maryland 2004, pp. 81 - 87

[14]   S. Srihari, J. Collins, R. Srihari, H. Srinivasan, S. Shetty, and J. Brutt-Griffler, "Automatic scoring of short handwritten essays in reading comprehension test," pp. 300-324, 2005.

[15]   R. Niels and L. Vuurpijl, "Automatic Trajectory Extraction And Validation of Scanned Handwritten Characters," 2006.

[16]   F. Wolf, T. Scheidat, and C. Vielhauer, "Analyzing Handwriting Biometrics in Metadata Context," vol. 4105/2006, 2006.

[17]   S. Tanner, *Deciding whether Optical Character Recognition is feasible*: King's Digital Consultancy Services, 6 December 2004.

[18]   R.Seiler, M.Schenkel, and F.Eggimann, "Off-Line Cursive Handwriting Recognition Compared with On-Line Recognition," pp. 505-509, 1996.

[19]   J. C. Read, S. MacFarlane, and C. Casey, "Designing a Handwriting Recognition Based Writing Environment for Children," in *8th International EARLI SIG Writing Conference*, Staffordshire,England, 2002.

[20]   J. C. Read, "On the application of text input metrics to handwritten text input," 2006.

[21]   X. Wang, J. Li, X. Ao, G. Wang, and G. Dai, "Multimodal Error Correction for Continuous Handwriting Recognition in Pen-Based User Interfaces," 2006.

[22]   R. A. Haraty and H. M. El-Zabadani, "Abjad Hawwaz: An Offline Arabic Handwriting Recognition System," *(202) International Journal of Computers and Applications - 2005* 2005.

[23]   S. N.Srihari, X. Yang, and G. R.Ball, "Offline Chinese handwriting recognition: an assesment of current technology," pp. 137-155, 2006.

[24]   E. Mazzone, "Requirements Gathering in Designing Technology for Children," in *IDC'07* Aalborg, Denmark: ACM, 2007.

[25]   J. J.Jensen and M. B.Skov, "A Review of research methods in children's technology design," 2005.

[26]   D. Hopkins, "Designing User Interface to Simulation Games."

[27]   J. C. Read, "A study of the usability of handwriting recognition for text entry by children," *Interacting with Computers,* vol. 19, pp. 57-69, 2007.

[28]   D. Xu, J. C. Read, E. Mazzone, and M. Brown, "Designing and testing a tangible interface prototype," in *Interaction Design And ChildrenProceedings of the 6th international conference on Interaction design and children table of contents* Aalborg, Denmark 2007 pp. 25 - 28

[29]   S. W. Beng, "Designing For and With Children."

[30]   E. Strommen and K. Alexander, "Emotional Interfaces for Interactive Aardvarks: Designing affect into social interfaces for children," in *Proceedings of ACM CHI'99 (May 1-3, 1999, Pittsburgh, PA) Conference on Human Factors in Computing Systems*, 1999.

[31]   D.Grammenos, A.Paramythis, and C.Stephanidis, "Designing the User Interface of an Interactive Software Environment for Children."

[32]   A. LCC, "Interface Design Guidelines for User of All Ages," 2001.

[33]   J. Halloran, E. Hornecker, G. Fitzpatrick, M. Weal, D. Millard, D. Michaelides, D. Cruickshank, D. D. Roure, and "The Literacy Fieldtrip : Using UbiComp to Support Children's Creative Writing," in *Interaction Design And Children Proceedings of the 2006 conference on Interaction design and children* Tampere, Finland 2006, pp. 17 - 24

[34]   J. S. Rhodes, "Improving the User Interface," 1999.

[35]   L. J.Najjar, "Principles of Educational Multimedia User Interface Design," 2002.

[36]   L. Jansen, B. v. Dijk, and J. Retra, "Musical Multimodal Child Computer Interaction," 2006.

[37]   J. C. Read, S. MacFarlane, and M. Horton, "The Usability of Handwriting Recognition for Writing in the Primary Classroom."

[38]   J. C. Read, S. MacFarlane, and C. Casey, "'Good enough for what?' Acceptance of Handwriting Recognition Errors by Child Users," 2003.

[39]   J. C. Read, S. MacFarlane, and C. Casey, "Oops! Silly me! Errors in a Handwriting Recognitionbased Text entry Interface for Children," 2002.

[40]   J. C. Read and M. Horton, "Demonstrating CobWeb - An Innovative Writing Environment for Children."

[41]   J. C. Read, S. MacFarlane, and C. Casey, "What's Going On?Discovering what Children Understand about Handwriting Recognition Interfaces," in *Proceedings of Interaction Design and Children (IDC'03)*, Preston, England 2003, pp. 135 - 140

[42]   J. C. Read, S. MacFarlane, and C. Casey, "Endurability, Engagement and Expectations: Measuring Children's Fun."

[43]   J. C. Read and S. MacFarlane, "Using the Fun Toolkit and Other Survey Methods to Gather Opinions in Child Computer Interaction," in *Interaction Design And Children Proceedings of the 2006 conference on Interaction design and children* Tampere, Finland 2006, pp. 81 - 88

[44]   J. C. Read and K. Fine, "Using Survey Methods for Design and Evaluation in Child Computer Interaction."

[45]   J. P.Chin, V. A.Diehl, and K. L.Norman, "Development of an Instrument Measuring User Satisfaction of the Human-Computer Interface," in *Conference on Human Factors in Computing Systems Proceedings of the SIGCHI conference on Human factors in computing systems* Washington, D.C., United States 1988, pp. 213 - 218

[46]   M. Abdullah, "E-Brochure : User's Satisfaction and It's Influence to Communities (A Case Study At RIC Balik Pulau, Penang)," Universiti Utara Malaysia, 2004.

[47]   W. W. Chin and M. K. O. Lee, "A Proposed Model and Measurement Instrument for The Formation of IS Satisfction : The Case of End User Computing Satisfaction," 2000, pp. 553-563.

[48]   A. Hawor, "User's Satisfaction of Using Mobile Reservation Technology (Case Study : Mobile Ticketing Reservation System)," Universiti Utara Malaysia, 2004.

[49]   B. Boehm, "Making RAD Work for Your Project," 1999.

[50]   D. F. Sittig, G. J. Kuperman, and J. Fiskio, "Evaluating Physician Satisfaction Regarding User Interactions with an Electronic Medical Record System."

[51]   J. M. Hilbe, "A review of SPSS, Part 3: version 13.0.(Product/Service Evaluation)," The American Statistician, 01-MAY-05.

[52]   J. R. A. Santos, "Cronbach's Alpha: A Tool for Assessing the Reliability of Scales," *Journal of Extension,* vol. Volume 37 Number 2, April 1999.

[53]   B. Harper, L. Slaughter, K. Norman, and "Questionnaire administration via the WWW: A validation & reliability study for a user satisfaction questionnaire," 1997.