

PARENT ALERT SYSTEM (PAS) VIA SMS

A thesis submitted to the Faculty of Information Technology

In partial fulfilment of the requirement for the degree

Master of Science (Information Technology)

University Utara Malaysia

By

MOHAMED AHMED IMHMED

UNIVERSITI UTARA MALAYSIA (UUM)

©2009

PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a postgraduate degree from University Utara Malaysia, I agree that the University 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 purpose may be granted by my supervisor or, in their absence by the Dean of the Information Technology. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to University Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part, should be addressed to

Dean of Information Technology

University Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman.

ABSTRACT

The wireless technology is the most interesting technology in the ICT industry today. Alert system has widely used in many arias and types. The most one is using SMS to alert people or users and notify them about specific action. The poor of education is one of the crime reasons in Malaysia. Indeed, to protect the teenage and children to be engaged in such environment and crimes, this study aims to contribute in efforts to keep them away. The study aims to design a web-based attendance system to help the teachers and parents to control the students if they absent from the school. The Parent Alert System (PAS) prototype is introduced to be used by the teachers in high schools. Charging scheme for SMS is out of the study scope. The system covers two main functionalities: First function is to get the attendance information of the students and the second one is to send SMS to the parents if their son/daughter is absent to alert them. The General Methodology of Design Research is adopted to achieve the research objectives. The adapted methodology comprises five steps that are: awareness the problem, suggestion, development, evaluation and conclusion. Results of user evaluation on the PAS indicate that it has good usability in terms of Usefulness, Ease of Use and Outcome and Future Use. An independent samples t-test was conducted to compare the Usefulness, Outcome and Future Use and Ease of Use on two groups of participant who own mobile phone and others who do not own mobile phone. The t-test results indicate that there is no statistically significant different in the mean Usefulness, Outcome, or Future Use, and Ease of Use on the two groups.

ACKNOWLEDGEMENT

First and foremost, I would like to express my deep gratitude and most heartfelt thanks to the almighty “Allah” for his blessing, for lightning my heart with the torch of knowledge and for seeing me throughout my lifetime.

With utmost respect and pleasure, I would like to express my sincere thanks and appreciation to my academic supervisor PROF ABDUL NASIR ZULKIFLI, who continuously guided me throughout every step of my thesis work and generously shared his time and knowledge with me, I am greatly indebted to him for his encouragement and incessant help to achieve more than I expected of myself.

I am thankful for all the people around me who has contributed to the completion of my project. I am also indebted to all staffs of all at civil University Utara Malaysia (UUM).

I would like to express special great words of thanks to my family, who tirelessly encouraged and supported me in countless ways to pursue my masters degree .without their sacrifices, understanding endless care, I would not had the opportunity to study in Malaysia and I could never have reached where I am today.

Finally, would like to present my thesis to my father and all brothers. I owe my loving thanks to my mother .without their cheering great credit is sincerely due to my all friends in Malaysia.

Thank you UUM.

TABLE OF CONTENTS

PERMISSION TO USE.....	i
ABSTRACT.....	ii
ACKNOWLEDGEMENT.....	iii
TABLE OF CONTENTS	iv
LIST OF TABLES	1
LIST OF FIGURES	2
INTRODUCTION	3
1.1 Background	3
1.2 Problem Statement	6
1.3 Research Objectives	7
1.4 Scope and Limitation of the Study	7
1.5 Significance of the Study	7
LITERATURE REVIEW	9
2.1 Introduction	9
2.2 Mobile Application	9
2.2.1 WAP Concept and Definition	11
2.2.2 WAP architecture.....	13
2.2.3 Web Mobile Application	15
2.3 Students' Attendance System	23
2.4 Alert System	25
2.4.1 Automated Local Evaluation in Real Time (ALERT)	26
2.4.2 Personal Media Alert Systems	27
2.4.3 Medical alert system	27
2.5 SMS Alert System.....	28
2.5.1 Filtering Group Sending SMS	28
2.5.2 Monitoring and Filtering System for Mobile SMS	30
2.5.3 SMS Commerce Success	31
2.6 Usability Evaluation	31
RESEARCH METHODOLOGY	36
3.1 Introduction	36
3.2 The general Methodology of Research Design.....	36
3.3 Design Research Methodology	38
3.3.1 Awareness of Problem.....	39
3.3.2 Suggestion	39

3.3.3	Development.....	44
3.3.4	Evaluation	47
3.3.5	Conclusion	48
DATA ANALYSIS.....		49
4.1	Usability Evaluation.....	49
4.2	Instrument for User Evaluation	49
4.3	Validity And Reliability	51
4.4	Summary.....	55
DISCUSSION, FUTURE WORKS AND CONCLUSION		56
5.1	Discussion	56
5.2	Future Works	57
5.3	Conclusion	58
REFERENCES.....		59
APPENDIX A: QUESTIONNAIRE.....		66

LIST OF TABLES

3.1 Likert Scale Classification	48
4.1 Demographic Data summary	50
4.2 Cronbach Alpha Values for All Dimensions	52
4.3 Independent Sample Test.....	53
4.4 Descriptive Statistics for All Items	54

LIST OF FIGURES

2.1 WAP Protocol Stack	14
2.2 Nikebasketball Mobile Application Adapted	18
2.3 Weather Channel Application Adapted	19
2.4 Stephen King Mobile Adapted	20
2.5 MSNBC.com Mobile Application	22
2.6 Traffic Information System Architecture	23
2.7 ALERT Remote Sensor	26
2.8 Media Acquisition And Processing	27
2.9 SMS Spam Filtering System	29
2.10 Using CAPTCHA Method in SMS Terminal	29
2.11 The Network Topology Graph of SMS	30
2.12 SMS Commerce Application Framework	31
3.1 The General Methodology of Design Research.....	38
3.2 PAS; s Mobile Architecture	40
3.3 PAS UML Use Case Diagram	41
3.4 Check Attendance Sequence Diagram.....	42
3.5 Send SMS Sequence Diagram.....	43
3.6 Login Sequence Diagram.....	44
3.7 Login Webpage.....	45
3.8 Attendance Review Webpage.....	46
3.9 Printing Window of PAS.....	47

CHAPTER 1

INTRODUCTION

1.1 Background

The wireless technology is the most interesting technology in the ICT industry today, where there is much innovation and research. As technology developed through time, advances in telecommunication and computer hardware knowledge have led to the emergence of mobile computing (Chipangura, Terzoli, Muyingi, & Rao, 2006). Mobile computing provides instant deployment of service over a large geographical area and offers every user many services. Information Communication Technologies (ICTs) play a significant role in enhancing developing countries (Pade, Mallinson, & Sewry, 2006). As a convenient and low-cost mobile communication technology, Short Messaging Service (SMS) is experiencing very rapid growth. Pade, et al. (2006) reported that 700 million mobile phone users worldwide sent 20 to 30 billion SMS messages every month in 2001. At the same time, SMS applications have emerged to provide mobile users consumer oriented services (Xu, Teo, & Wang, 2003). It also can facilitate communication and the transformation of information from business to business, business to customers, employers to employees in more added value services (Karim, Darus, & Hussin, 2006).

Epstein and Sheldon (2002) have suggested that schools interested in improving or maintaining good attendance can benefit from taking a comprehensive approach which includes students,

The contents of
the thesis is for
internal user
only

REFERENCES

- ALERT systems Organization (2007). About ALERT: ALERT Saves Lives Retrieved September 1, 2009, from <http://www.alertsystems.org/alert.html>
- American Lung Association (2003). Adolescent Smoking Statistics Retrieved June 7, 2009, from <http://www.lungusa.org/site/pp.asp?c=dvLUK9O0E&b=39868>
- Amor (2002). Internet future Strategies: How pervasive computing services will change the world. USA: Prentice Hall.
- Antovski, L. a. G., M (2003). M-Payments. Information Technology Interfaces, 2003. ITI 2003. Proceedings of the 25th International Conference, 95 – 100.
- Best, J. W., & Kahn, J. V. (2000). *Research in education* (8th ed.). USA: Allyn and Bacon.
- Bhola, H. S. (1990). *Evaluating Literacy for development projects, programs and campaigns*. Paper presented at the Evaluation planning, design and implementation, and utilization of evaluation results, Hamburg, Germany.
- Biemer, M., & Hampe, J. F. (2005). *A Mobile Medical Monitoring System: Concept, Design and Deployment*. Paper presented at the ICMB 2005. International Conference on Mobile Business.
- Carlsson, C., Carlsson, J., & Walden, P. (2005). *Mobile Services For The Hospitality Industry*. Paper presented at the Thirteenth European Conference on Information Systems, Regensburg, Germany.
- Cervera, A. (2002). Analysis of J2ME for Developing Mobile Payment Systems.
- Chan, S. S., Fang, X., Brzezinski, J., Zhou, Y., Xu, S., & Lam, J. (2002). Usability for Mobile Commerce Across Multiple Form Factors. 3(3), 187-199.
- Chang, Y. C., Chen, J. L., & Tseng, W. M. (2005). *A mobile commerce framework based on Web services architecture*. Paper presented at the International Conference on Information Technology: Coding and Computing, 2005. ITCC 2005.
- Chen, Y.-F., Gibbon, D., Liu, Z., Shahraray, B., & Wei, B. (2006). *Personal Media Alert Systems: Personalization and Dissemination of Broadcast Content With a P2p Micropayment Scheme*. Paper presented at the Multimedia and Expo, 2006 IEEE International Conference.

- Childhelp.org (2006). National Child Abuse Statistics Retrieved June 8, 2009, from <http://www.childhelp.org/resources/learning-center/statistics>
- Chipangura, B., Terzoli, A., Muyingi, H., & Rao, G. S. V. R. K. (2006). *Design, Development and Deployment of a Mobile E-Commerce Application for Rural South Africa*. Paper presented at the The 8th International Conference on Advanced Communication Technology, 2006. ICACT 2006. .
- Coakes, S. J. (2005). *SPSS version 12 for Windows Analysis Without Anguish*. Sydney: John Wiley & Sons Australia.
- Colafigli, C., Inverard, P., & Martriccian, R. (2001). *InfoParco: An Experience in Designing an Information System Accessible through WEB and WAP Interfaces*. Paper presented at the Hawaii International Conference on System Science, Los Alamitos.
- Computer Science and Telecommunications Board [CSTB] (1998). Design and Evaluation: A Review of the State-of-the-Art Retrieved September 1, 2009, from <http://www.dlib.org/dlib/july98/nrc/07nrc.html>
- Davis, F. D. (1989). Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology. *International Journal of Human-Computer Interaction*, 7(1), 57-78.
- Dickinger, A., Heinzmann, P., & Murphy, J. (2005). *Mobile environmental applications*. Paper presented at the 38th Annual Hawaii International Conference on System Sciences, HICSS'05, Hawaii.
- EI-AIfy, E. M. (2005). A General Look at Building Applications for Mobile Devices. *Distributed Systems Online, IEEE*, 9(9).
- Elliott, G., & Phillips, N. (2003). *Mobile Commerce and Wireless Computing Systems*: Addison Wesley.
- Elliott, G., & Phillips, N. (2004). *Mobile Commerce And Wireless Computing Systems*: Pearson Education Limited: Pearson Education
- Epstein, J. L., & Sheldon, S. B. (2002). Present and Accounted for: Improving Student Attendance through Family and Community Involvement. *Journal of Educational Research*, 3-7.
- Gay, M. L. W. J. G. K., & Rieger, R. H. (1999, November 1999). Project Soup: Comparing Evaluations of Digital Collections Efforts. *D-Lib Magazine*, 5.

- Goldman, J., Salus, M., Wolcott, D., & Kenedy, K. Y. (2003). *Child Abuse and Neglect User Manual Series. A Coordination Response to Child Abuse and Neglect*: The Foundation for Practice.
- He, P., Wen, X., & Zheng, W. (2008). *A Novel Method for Filtering Group Sending Short Message Spam*. Paper presented at the the 2008 International Conference on Convergence and Hybrid Information Technology.
- Holzberg, C. S. (2000). E-mail Unplugged: Explore Your Wireless Access Options *Staying In Touch* 8(7), 22-25.
- International Engineering Consortium (2007). Web ProForums Retrieved August 13, 2009, from <http://www.iec.org/online/tutorials/wap/index.html>
- ISO (1991). International Organization for Standardization (ISO) 9126 Retrieved July 15, 2009, from <http://www.angelfire.com/nt2/softwarequality/ISO9126.pdf>
- John, B. E., & Kieras, D. E. (1996). Using GOMS for user interface design and evaluation: which technique? *ACM Transactions on Computer-Human Interaction (TOCHI)*, 3(4), 287-319.
- Jones, M. L. W., Rieger, R. H., Treadwell, P., & Gay, G. K. (2000). *Live from the stacks: user feedback on mobile computers and wireless tools for library patrons*. Paper presented at the Fifth ACM conference on Digital libraries, San Antonio, Texas, United States
- Junior, W. M. d. A., & Verdier, C. (2005). Public Health Alert System for Health Networks: Application to Cardiology. *Computers in Cardiology, 2005*, 151 - 154.
- Kaikkonen, A., & Tormanen, P. (2000). *User Experience in Mobile Banking*. Paper presented at the Proceedings of HCI2000, BCS.
- Kalkbrenner, G., & Nebojsa, F. (2001). Campus Mobil: Mobile Services for Campus and Student needs Retrieved August 15, 2009, from <http://ls12.cs.uni-dortmund.de/~kalkbren/campusmobil.pdf>
- Kalliola, M. (2005). Mobile Payments. *Towards the Next Wave of Mobile Communication*, 51.
- Karim, N. S. A., Darus, S. H., & Hussin, R. (2006). Mobile Phone Applications in Academic Library Services: A Students' Feedback Survey. *Campus-Wide Information Systems*, 23(1), 35-51

- Kasinath, G., & Armstrong, L. (2005). *Content Specific Access Control for Rapid Application Development: Research from School of Computer and Information Sciences*: Edith Cowan University.
- Kim, J., Baratto, R. A., & Nieh, J. (2006). *pTHINC: A ThinClient Architecture for Mobile Wireless Web*. Paper presented at the 15th international conference on World Wide Web WWW.
- Kustin, S. (2002). The Proliferation of Wireless Internet Access Devices and its Effect on Consumer Behavior Patterns
- Lannelli, V. (2007, July 15, 2007). Child Abuse Statistics Retrieved June 5, 2009, from http://pediatrics.about.com/od/childabuse/a/05_abuse_stats.htm
- Lewis, J. R. (1995). IBM Computer Usability Satisfaction Questionnaires: Psychometric Evaluation and Instructions for Use. *International Journal of Human-Computer Interaction*, 7(1), 57-78.
- Merisavo, M., Kajalo, S., Karjaluoto, H., Virtanen, V., Salmenkivi, S., Raulas, M., et al. (2007). An empirical study of the drivers of consumer acceptance of mobile advertising. *Journal of Interactive Advertising*, 7(2), 18.
- Ministry of Transport and Communications Finland (2006a). Mobile Services Market in Finland Retrieved August 29, 2009, from http://www.mintc.fi/oliver/up1964-julkaisuja%2022_2006.pdf
- Ministry of Transport and Communications Finland (2006b). Understanding Mobile Marketing-Teaching: Technology and Research Retrieved August 29, 2009, from <http://www.mmaglobal.com/uploads/MMAMobileMarketing102.pdf>
- Missingham, R. (1999). *Perspectives on DL'99*. Paper presented at the Fourth ACM Conference on Digital Libraries.
- Mobile Marketing Association [MMA] (2007). Mobile Marketing Sweepstakes & Promotions Guide Retrieved August, 30, 2009, from <http://mmaglobal.com/modules/article/view.article.php/articleid=967>
- Moksin, M. I., & Yasin, N. M. (2009). *The Implementation of Wireless Student Attendance System in an Examination Procedure*. Paper presented at the Proceedings of the 2009 International Association of Computer Science and Information Technology - Spring Conference.
- Muller, N. J. (2002). *Desktop encyclopedia of telecommunications*: McGraw-Hill.

- Nasco, S. A., & BrunerII, G. C. (2007). Perceptions and Recall of Advertising Content Presented on Mobile Handheld Devices. *Journal of Interactive Advertising*, 7(2).
- Nielsen, J. (1994). *Usability Engineering*. San Diego: Morgan Kaufmann Publishers.
- Nielsen, J. (2006). Quantitative Studies: How Many Users to Test? Retrieved September 20, 2009, from http://www.useit.com/alertbox/quantitative_testing.html
- Norman, D. A. (1998). *The invisible computer*: MIT Press Cambridge, MA, USA.
- Nylander, S. (2004). *Different Approaches to Achieving Device Independent Services – an Overview*: Swedish Institute of Computer Science.
- Open Mobile Alliance (OMA) (2004). Open Mobile Alliance Overview Retrieved August 13, 2009, from http://www.openmobilealliance.org/docs/OMAShortPaper_May2004v.1.pdf
- Pade, C. I., Mallinson, B., & Sewry, D. (2006). *An exploration of the categories associated with ICT project sustainability in rural areas of developing countries: a case study of the Dwesa Project*. Paper presented at the 2006 annual research conference of the South African institute of computer scientists and information technologists on IT research in developing countries, Somerset West, South Africa.
- Pallant, J. (2007). *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using SPSS* (3rd ed.). Wellington, New Zealand: Allen and Unwin.
- Parikh, T. S. (2005). Using Mobile Phones for Secure, Distributed Document Processing in the Developing World. *IEEE Pervasive Computing*, 4(2), 74-81.
- Plaisant, C., Marchionini, G., Bruns, T., Komlodi, A., & Campbell, L. (1997). Bringing treasures to the surface: iterative design for the Library of Congress National Digital Library Program. *Proceedings of the SIGCHI conference on Human factors in computing systems*, 518-525.
- Ramsay, M., & Nielsen, J. (2000). *WAP Usability Report* London: Nielsen Norman Group.
- RichTech.ca (2008). Open Admin for Schools Retrieved August, 17, 2009, from <http://richtech.ca/openadmin/docs/userdoc/node4.html>
- Sheldon, S. B. (2007). Improving Student Attendance with School, Family, and Community Partnerships. *Journal of Educational Research*, 100(5), 267-275.
- Shneiderman, B. (1980). *Software psychology: Human factors in computer and information systems*: Winthrop Publishers.

- Sidhu, A. S. (2005). The Rise of Crime in Malaysia: an Academic and Statistical Analysis *Journal of the Kuala Lumpur Royal Malaysia Police College*, from <http://mpk.rmp.gov.my/jurnal/2005/riseofcrime.pdf>
- Smith, J., Husson, T., & Mulligan, M. (2005). Mobile Marketing: Exploiting Marketing Opportunities in Emergent Mobile Media. *European Marketing & Advertising*, 4, 1-20.
- Standards (2006, January 6, 2006). Standards for Using the Student Attendance System Retrieved August 18, 2009, from <http://wveis.k12.wv.us/wveis2004/documents/StandardsforUsingAttendanceSystem.pdf>
- Sultan, F., & Rohm, A. (2005). The Coming Era of 'Brand in the Hand' Marketing. *MIT Sloan Management Review*, 47(1), 83-90.
- Vaishnavi, V. K., & Kuechler, W. J. (2004). Design Research in information system Retrieved July 15, 2009, from <http://www.isworld.org/Researchdesign/drisISworld.htm>
- Virtanen, V., Bragge, J., & Tuunanen, T. (2005, June 1-3, 2005). *Barriers for Mobile Marketing and How to Overcome Them*. Paper presented at the 4th Mobility Roundtable, Hong Kong.
- WapForum (2002a). What is WAP Retrieved July 20, 2009, from <http://www.wapforum.org/faqs/index.htm>
- Wapforum (2002b). Wireless Application Protocol (WAP 2.0): Technical White Paper Retrieved September 23, 2009, from www.wapforum.org/what/WAPWhite_Paper1.pdf
- Wikipedia (2007, September 28, 2009). Usability Retrieved September 20, 2009, from <http://en.wikipedia.org/wiki/Usability>
- Winkler, T., & Buckner, K. (2006). Receptiveness of gamers to embedded brand messages in advergaming: Attitudes towards product placement. *Journal of Interactive Advertising*, 7(1), 37-46.
- Witmer, D. (2009). What Is Happening to Our Children? Alarming Statistics Retrieved June 7, 2009, from <http://parentingteens.about.com/cs/familylife/a/statistics.htm>
- Wu, N., Wu, M., & Chen, S. (2008). *Real-time Monitoring and Filtering System for Mobile SMS*. Paper presented at the International Conference on Convergence and Hybrid Information Technology.

Xu, H., Teo, H. H., & Wang, H. (2003, January 6-9, 2003). *Foundations of SMS commerce success: lessons from SMS messaging and co-opetition*. Paper presented at the 36th Annual Hawaii International Conference on System Sciences