

Jui-Feng Lin

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I. EDUCATION

Ph.D. in Industrial & Systems Engineering (GPA=3.7/4.0) **September 2009**
University at Buffalo - The State University of New York, USA

Concentration: Human Factors
Advisor: Colin G. Drury
Dissertation: *A unified model for self-paced movements*

The aim of this research was to propose a general model indicating a group of concepts to describe how the relationships of speed-accuracy tradeoffs (RSATs) in hand-control movements result from our motor system. Based on the feedback concepts of control theory, it was proposed that while performing hand-control movements, humans behave like an intermittent correction servo associated with four proposed motor properties. Five experiments were developed and conducted to answer four research questions related to the proposed general model and to validate a self-paced aiming movement model (SPAM) and a self-paced tracking movement model (SPTM) both developed according to the general model and programmed as two simulations for predicting the RSATs. Analyses of experimental results and statistical comparisons of both the experimental and the simulated RSATs answered the four research questions and validated the proposed SPAM and SPTM as well as the general model. This research provides a comprehensive understanding of our motor system.

M.S. in Industrial Engineering & Management (GPA=3.9/4.0) **July 2001**
Chaoyang University of Technology, Taichung, Taiwan

Concentration: Human Factors
Advisor: Hsieh-Ching Chen (陳協慶)
Thesis: *Development of a portable data logger for long-period monitoring of onsite work*

The goal of this research was to develop a data logger, utilizing engineering techniques of microprocessors, modern sensors (e.g., surface EMG measurement, multi-axis accelerometers, cardiometer) and signal conditioning, to record workers' posture, repetitive frequency, and magnitude of exertion during working hours. Several tests were conducted in a laboratory to test the developed logger's reliability and stability and to justify the equipped functions. Through this research, the logger could be applied in investigating a variety of CTD (cumulative trauma disorders) related jobs.

B.S. in Industrial Engineering & Management (GPA=3.6/4.0) **June 1999**
Chaoyang University of Technology, Taichung, Taiwan

The 4th in academic performance of 108 undergraduate students.

II. RESEARCH INTERESTS

Ergonomic Evaluation & Design:

- ◆ Wheelchair Controllability Evaluation
- ◆ Computer Mouse Evaluation
- ◆ Baby Carriage Design
- ◆ LED Evaluation

Human-Computer Interaction:

- ◆ Hand-Control Movement Modeling
- ◆ Interaction with Virtual Reality

Human-Computer Interaction:

- ◆ RFID Application
 - ◆ Service Engineering
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III. RESEARCH EXPERIENCE

Primary Research Investigator

January 2007 – August 2009

Industrial & Systems Engineering, University at Buffalo

Research Objective:

- ◆ Studied how the relationship of speed-accuracy tradeoffs (RSATs) in performing self-paced aiming and tracking movements result from the human motor system.

Involved Tasks:

- ◆ Proposed a general model indicating a group of concepts to explain how our motor system works in performing hand-control movements.
- ◆ Based on the general model, specified a self-paced aiming movement model and a self-paced tracking movement model that account for the rationale of Fitt's law and Drury's (1971) path control movement model, respectively.
- ◆ Developed and conducted five experiments with 16 participants.
- ◆ Developed the five computer programs for measuring the participant's motor properties and the RSATs in performing self-paced hand-control movements (by Visual Basic).
- ◆ Developed the two simulation models for predicting the participants' RSATs while performing the two hand-control movements (by Visual Basic).
- ◆ Analyzed the experimental data and prepared manuscripts discussing research results for publication.

Relevant Publications:

- ◆ **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. (2009). A general model that accounts for Fitts' law and Drury's model. Target Conference: *Proceedings of the 17th Congress of the International Ergonomics Association*, (accepted paper).
- ◆ **Lin, J-F.**, Drury, C., Paquet, V., & Karwan, M. A model of intermittent correction servo that accounts for Fitts' law. Target Journal: *Ergonomics*, (working paper).

- ♦ **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. An intermittent correction servo: a general model for self-paced aiming movements and self-paced tracking movements. Target Journal: *Ergonomics*, (working paper).
- ♦ **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. (2009). A general model for self-paced hand control movements. Target Conference: *Proceedings of the Human and Ergonomics Society 54th Annual Meeting*, (working paper).

Research Investigator**October 2006 - April 2007****Human Engineering Research Laboratories, VA Center of Excellence in Wheelchair & Associated Rehabilitation Engineering**

Research Objective:

- ♦ Applied the previously developed quantitative methodology for investigating wheelchair maneuvering control for persons with a spinal cord injury.

Involved Task:

- ♦ Developed the experimental protocol.

Relevant Publication:

- ♦ Drury, C., Koontz, A., Feathers, D., Kankipati, P., Paquet, V., **Lin, J-F.** (2008). Controllability of manual and power wheelchairs for spinal cord injury users. *Proceedings of the Human Factors and Ergonomics Society 52nd Annual Meeting*, 714-718.

Primary Research Investigator**September 2006 - January 2007****Industrial & Systems Engineering, University at Buffalo**

Research Objective:

- ♦ Studied the relationships among mental workload, sleepiness and fatigue in performing monotonous driving tasks.

Involved Task:

- ♦ Performed a literature review in developing the research questions.

Research Assistant**January 2006 - August 2006****Research Institute for Safety & Security in Transportation, University at Buffalo**Project 1.

Research Objective:

- ♦ Investigated the effects of working shift, working periods and working breaks on airplane-engine-blade inspection tasks.

Involved Tasks:

- ♦ Modified and improved an airplane-engine-blade-inspection simulation so that the on-site experiment could be conducted and the data could be effectively analyzed (by Visual Basic).
- ♦ Conducted the on-site experiments in several maintenance hangars around the USA.
- ♦ Analyzed the experimental data and helped publish the research results.

Relevant Publication:

- ♦ Drury, C., Green, B. & **Lin, J-F.** (2007). Fatigue in aviation inspection: laboratory and validation studies. *Contemporary ergonomics; Proceedings of the Ergonomics Society's Annual Conference*, 41-46.

Project 2.

Research Objective:

- ♦ Empirically demonstrated that servers' behaviors (i.e., service time) were affected by queue length.

Involved Tasks:

- ♦ Helped collect the on-site data related to security flow in Buffalo Niagara International Airport. The data included the queue length of passenger in different security check procedures and the service time of carry-on security screening tasks.

Relevant Publication:

- ♦ Project contents were published in Marin, C., Drury, C., Batta, R., & Lin, L. (2007). Human factors contributes to queuing theory: Parkinson's law and security screening. *Proceedings of the Human Factors and Ergonomics Society 51st Annual Meeting*. 602 – 606.

Project 3.

Research Objective:

- ♦ Investigated whether different working postures affect experienced security operators' performance of X-ray baggage-screening task.

Involved Tasks:

- ♦ Helped conduct the on-site experiments in Buffalo Niagara International Airport with experienced security operators.

Relevant Publication:

- ♦ The contents were published in Drury, C., Hsiao, Y. L., Joseph, C., Joshi, S., Lapp, J., & Pennathur, P. R. (2008). Posture and performance: sitting vs. standing for security screening. *Ergonomics*, 290-307.

Primary Research Investigator**September 2005 - September 2006****Industrial & Systems Engineering, University at Buffalo**

Research Objective:

- ♦ Proposed a quantitative methodology for assessment of wheelchair controllability.

Involved Tasks:

- ♦ Designed and conducted the experiments with six wheelchair users.
- ♦ Analyzed the experimental data and published the research contents.

Relevant Publication:

- ♦ **Lin, J-F.**, Drury, C. & Paquet, V. (2006). A quantitative methodology for assessment of wheelchair controllability. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, 1204-1207.

Research Investigator**January 2005 - January 2006****Industrial & Systems Engineering, University at Buffalo**

Research Objective:

- ♦ Studied the extent to which exertion and discomfort can be perceived by external observers.

Involved Tasks:

- ♦ Helped perform the relevant literature review.
- ♦ Helped develop the research questions and the experimental protocol.
- ♦ Developed the computer program that allows the participants to rate the video clips of human subjects performing 20 Ovako working postures according to Corlett and Bishop's body part discomfort scales (BPD) and Borg's rated perceived effort (RPE) (by Visual Basic).

- ♦ Helped analyze the experimental data and publish the research results.

Relevant Publication:

- ♦ Drury, C., Atilas, M., Chaitanya, M., **Lin, J-F.**, Marin, C., Nasarwanji, M., Paluszak, D., Russell, C., Stone, R., & Sunm, M. (2006). Vicarious perception of postural discomfort and exertion. *Ergonomics*, 49, 1470-1485.

Research Assistant **February 1999 - February 2001; September 2001 – March 2002**
Physical Medicine & Rehabilitation, Chang Gung Memorial Hospital, Linko, Taiwan

Involved Tasks:

- ♦ Developed a cognitive system to estimate cognition & coordination of children with cerebral palsy and other brain damage (by C++ Builder).
- ♦ Developed a database for restoring and estimating the data collected from clinical diagnosis (by Microsoft Access).

Research Assistant **September 1999 – July 2001**
Industrial Engineering & Management, Chaoyang University of Technology, Taiwan

Research Objective:

- ♦ Developed and validated a portable data logger for monitoring onsite workers' physical information, including EMG signals, heart rates, and accelerometer signals.

Involved Tasks:

- ♦ Developed the data logger, including testing the sensors, designing the circuit (by Protel, Altium Products), and programming the microchips (by MPLab, Microchip Technology).
- ♦ Developed the data analysis program that could display the collected data of EMG signals, heart rates and accelerometer signals stored in a flash card (by LabVIEW).
- ♦ Conducted the experiment for validating the data logger.
- ♦ Helped publish the research results.

Relevant Publications:

- ♦ Chen, H-C., Sheng, C-F., Chen, Z-Y., Liu, Y-P. & **Lin, J-F.** (2004). Development of work-field monitoring technology to investigate repetitive strain injuries in upper limbs. *Proceedings of the 11th Annual Meeting & Conference of Ergonomics Society of Taiwan, Chang Hua, Taiwan.*
- ♦ **Lin, J-F.**, Chen, H-C. & Lin, W-H. (2002). Development of a portable data logger for long-period monitoring of onsite work. *Proceedings of the 9th Annual Meeting & Conference of Ergonomics Society of Taiwan, Tsing Hua, Taiwan.*

IV. OTHER PROFESSIONAL EXPERIENCE

Website Maintainer **September 2008 – August 2009**

Industrial & Systems Engineering, University at Buffalo

- ◆ Maintained and improved the department of ISE's website (<http://www.ise.buffalo.edu/>) utilizing Contribute and Dreamweaver.

ABET Assistant **September 2007 – August 2009**

Industrial & Systems Engineering, University at Buffalo

- ◆ Cooperated with department's faculty and TAs to collect and organize the materials of Accreditation Board for Engineering and Technology (ABET).
- ◆ As a tour guide, introduced department's programs in an undergraduate course, called "Discover Industrial Engineering".
- ◆ Developed a simulation that demonstrated the airport X-ray baggage-screening task for the 12 high school seniors who enrolled in BEAM (Buffalo-area Engineering Awareness for Minorities, UB's cooperative educational enrichment) program using Visual Basic.

Teaching Assistant **January 2007 - May 2007**

Industrial & Systems Engineering, University at Buffalo

- ◆ As a TA of a graduate course, called 'Human-Computer Interaction'.

Programmer **September 2006 – August 2009**

University at Buffalo

Program 1:

- ◆ Developed a three-stage computer program that allowed a Ph.D. student whose concentration is Human Factors to study the effect of human trust on autonomous software agent reliance, including Stage 1: agent development & measurement using standard trust tools, Stage 2: paired comparison of agents for psycho metric scaling and Stage 3: application & management of designed agents in reading comprehension tasks (by Visual Basic).

Program 2:

- ◆ Developed a computer program that allowed an Economics Ph.D. student to extract USA manufacturers' relevant information from three yearly databases (by Visual Basic & VBA).
- ◆ Developed a database that stored the extracted data and provided the student her desired sorting functions (by Microsoft Access).

Program 3:

- ◆ Developed a computer program that allowed ergonomists to conduct on-site experiment for studying the similarity of words related to COMFORT, DISCOMFORT, and FATIGUE with flight attendants and flight passengers (by Visual Basic).

Teaching Assistant **September 1999 – July 2001**

Industrial Engineering & Management, Chaoyang University of Technology, Taiwan

- ◆ As a TA of two undergraduate classes, Human Factors and Human Factors Practice.
- ◆ Assisted and graded the students' programming homework of a graduate class, Numerical Methods.

V. PUBLICATIONS

Working Papers:

1. **Lin, J-F.**, Drury, C., Paquet, V., & Karwan, M. (2009). Intermittent correction servo that accounts for Fitts' law. Target Journal: *Ergonomics*, working paper.
2. **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. (2009). Intermittent correction servo: a general model for self-paced aiming and tracking movements. Target Journal: *Journal of Experimental Psychology: Human Perception and Performance*, working paper.
3. **Lin, J-F.**, Drury, C. & Paquet, V. & Karwan, M. (2010). A general model for self-paced hand control movements. Target Conference: *Proceedings of the Human Factors and Ergonomics Society 54th Annual Meeting*.

Accepted Paper:

1. **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. (2009). A general model that accounts for Fitts' law and Drury's model. *Proceedings of the 17th Congress of the International Ergonomics Association*.

Peer Reviewed Journal Paper:

1. Drury, C., Atilas, M., Chaitanya, M., **Lin, J-F.**, Marin, C., Nasarwanji, M., Paluszak, D., Russell, C., Stone, R., & Sunm, M. (2006). Vicarious perception of postural discomfort and exertion. *Ergonomics*, 49, 1470-1485, (SCI, SSCI).

Peer Reviewed Proceeding Papers:

1. **Lin, J-F.**, Drury C. (2010). Modeling Fitts' law (Accepted). *The 9th Pan-Pacific Conference on Ergonomics. The Ambassador Hotel, Kaohsiung, Taiwan*.
2. **Lin, J-F.** (2010). 彈道式移動時間模型與彈道式移動變異模型的驗證. *The 17th Annual Meeting of the Ergonomics Society of Taiwan, Tatung University, Taipei, Taiwan*.
3. **Lin, J-F.**, Drury C. (2010). An application of the intermittent illumination model for measuring individual's corrective reaction time. *The 3rd International Conference on Applied Human Factors and Ergonomics. Miami, Florida, USA*.
4. **Lin, J-F.**, Drury, C., Karwan, M. & Paquet, V. (2009). A general model that accounts for Fitts' law and Drury's model. *Proceedings of the 17th Congress of the International Ergonomics Association*.
5. Drury, C., Koontz, A., Feathers, D., Kankipati, P., Paquet, V., **Lin, J-F.** (2008). Controllability of manual and power wheelchairs for spinal cord injury users. *Proceedings of the Human Factors and Ergonomics Society 52nd Annual Meeting*, 714-718.
6. Drury, C., Green, B. & **Lin, J-F.** (2007). Fatigue in aviation inspection: laboratory and validation studies. *Contemporary ergonomics; Proceedings of the Ergonomics Society's Annual Conference*, 41-46.
7. **Lin, J-F.**, Drury, C. & Paquet, V. (2006). A quantitative methodology for assessment of wheelchair controllability. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, 1204-1207.
8. Chen, H-C., Sheng, C-F., Chen, Z-Y., Liu, Y-P. & **Lin, J-F.** (2004). Development of work-field monitoring technology to investigate repetitive strain injuries in upper limbs. *Proceedings of the 11th Annual Meeting & Conference of Ergonomics Society of Taiwan, Chang Hua, Taiwan*.
9. **Lin, J-F.**, Chen, H-C. & Lin, W-H. (2002). Development of a portable data logger for long-period monitoring of onsite work. *Proceedings of the 9th Annual Meeting & Conference of Ergonomics Society of Taiwan, Tsing Hua, Taiwan*.

M.S. Thesis:

1. **Lin, J-F.** (2001). Development of a portable data logger for long-period monitoring of onsite work. *Thesis for the Degree of Master, Department of Industrial Engineering & Management, Chaoyang*

University of Technology, Taiwan.

Technical Reports:

2. Chen, H.-C., Lee, C-L. & **Lin, J-F.** (2000). Development of a portable data logger for long-period monitoring of onsite work. *Research Project Report to National Science Council (NSC89-2213-E-324-041)*, Taiwan.
3. Chen, H.-C., **Lin, J-F.** & Lin, W.-H. (2000). Study of how handle thickness affect maximal flexion force and optimal span of fingers. *Research Project Report to National Science Council (NSC89-2213-E-324-013)*, Taiwan.

VI. HONORS, AWARDS AND SCHOLARSHIPS

Awards:

1. Selected to participate in the second stage of the IEA KU Smith Student Award.

Honors:

1. Mr. Ojha's HCI (Human-Computer Interaction) Research Found, June 2008 – September 2008.
2. Mark Diamond Research Found, Graduate Student Association, University at Buffalo, June 2007 – October 2008.
3. Conference Grants, Graduate Student Association, University at Buffalo, June 2006.

Scholarships:

1. Graduate Assistantship, Department of Industrial & Systems Engineering, University at Buffalo, September 2007 – Present.
2. Teaching Assistantship, Department of Industrial & Systems Engineering, University at Buffalo, January 2007 – May 2007.
3. Research Assistantship, Research Institute for Safety & Security in Transportation, University at Buffalo, January 2006 – August 2006.
4. Research Assistantship, Department of IE&M, Chaoyang University of Technology, September 1999 – June 2001.
5. Teaching Assistantship, Department of IE&M, Chaoyang University of Technology, September 1999 – June 2001.

VII. COURSES QUALIFIED TO TEACH

Undergraduate:

- ◆ Introduction to Human Factors & Practice
- ◆ Statistics
- ◆ Engineering Graphics & Practice
- ◆ Database Management Systems
- ◆ Computer Languages
- ◆ Probability
- ◆ Introduction to Computer & Practice
- ◆ System Simulation

Graduate:

- ◆ Man-Machine System Application (Human-Computer Interaction)
- ◆ Human Factors Research Methodology & Practice
- ◆ Organizational Ergonomics (Marco-ergonomics, Socio-technical Systems)
- ◆ Application of Human Factors in Product Design
- ◆ Application of Human Factors in Health Care & Patient Safety
- ◆ Psychological Foundations in Human Factors (Work Physiology)
- ◆ System Simulation
- ◆ Multivariate Statistics
- ◆ Design & Analysis of Experiment
- ◆ Numerical Methods

VIII. PROFESSIONAL AFFILIATION

- ◆ Human Factors and Ergonomics Society (2003-Present)
- ◆ Ergonomics Society of Taiwan (2009-Present)