Joonbum Lee

Curriculum Vitae

Education

2011–2014	**Doctor of Philosophy**, *University of Wisconsin-Madison*, Madison, *WI*. Major: Industrial and Systems Engineering (Human Factors)
2009–2011	**Master of Science**, *University of Wisconsin-Madison*, Madison, *WI*. Major: Industrial and Systems Engineering (Human Factors)
2005–2007	**Master of Arts**, *Pusan National University*, Busan, *South Korea*. Major: Psychology (Engineering Psychology)
1999–2005	**Bachelor of Arts**, *Pusan National University*, Busan, *South Korea*. Major: Psychology (Psychology)

Dissertation

Title	*Integrating the Saliency Map with Distract-R to Predict and Evaluate Distraction Potential*
Supervisor	Professor John D. Lee

Masters Thesis

Title	*Road-crossing and Driving Behavior in the Elderly*
Supervisor	Professor Jaesik Lee

Awards

2012	1st place for the Intel Outstanding Student Paper award at 4th International Conference on Automotive User Interface and Interactive Vehicular Applications
2007	Best Research Achievement Award from Department of Psychology, Pusan National University

Research Interests

Topic	Driver Distraction, Visual Attention, Traffic Safety
Methodology	Predictive Modeling, Data Visualization

Experience

Research

2016–Present **Research Scientist**, Battelle, Seattle.
- Project 1: Motivations for Speeding (Sponsored by National Highway Traffic Safety Administration)
- Project 2: Principles and Guidance for Presenting Drivers with Dynamic Information on Active Traffic Management (Sponsored by National Cooperative Highway Research Program)
- Project 3: SHRP2 Implementation Assistance Program (IAP) Phase 2 (Sponsored by National Highway Traffic Safety Administration)

2014–2016 **Postdoctoral Associate**, AgeLab, MIT, Cambridge.
- Project 1: Advanced Human Factors Evaluator for Automotive Distraction (Sponsored by AHEAD Consortium)
- Project 2: Utilizing head-pose data to surrogate eye-tracking data for driver distraction research (Sponsored by Santos Family foundation)
- Project 3: Assessing road type and traffic volume using drivers' glance data (Sponsored by Jaguar Land Rover)

2009–2014 **Graduate Research Assistant**, Cognitive Systems Lab, University of Wisconsin-Madison, Madison.
- Worked for a project, "In-Vehicle Voice Control System" (Sponsored by National Highway Traffic Safety Administration)
- Worked for a project, "Connected Vehicle Design Research and Distraction Assessment" (Sponsored by National Highway Traffic Safety Administration)
- Worked for a project, "Making Driving Simulator More Useful for Behavioral Research" (Sponsored by Federal Highway Administration)
- Worked for a project, "Motivation for Speeding" (Sponsored by Battelle)

2004–2007 **Graduate Research Assistant**, Engineering Psychology Lab, Pusan National University, South Korea.
- Worked for a project, "Individual Differences in Information Processing" (Sponsored by Brain Korea 21)
- Worked for a project, "A Study on the Ship Collision Avoidance Behavior Using the Full Mission Ship Handling Simulator: Focused on Mariner's Situation Awareness)
- Worked for a project, "A Study on Specifying Critical Human Factors in Driving Skill Focusing on Drivers' Situation Awareness"
- Worked for a project, "A Study on Analysis and Enhancement of Mariners' Situation Awareness Based on Integrated Approaches of Psychological Experiments, Ship-Handling Simulation and Real Navigation"

Grant

March 2015-
February
2016 **Assessing road type and traffic volume using drivers' glance data: A feasibility assessment**, Jaguar Land Rover.
- Investigators: Coughlin, J. F., Reimer, B., Mehler, B., and **Lee, J.**
- Amount: 114,000 USD

2015 **Investigating the relationship of driver head-eye correspondence (Phase II Grant)**, Santos Family Foundation.
- Investigators: Coughlin, J. F., Reimer, B., Mehler, B., and **Lee, J.**
- Amount: 65,000 USD

2014 **Investigating the relationship of driver head-eye correspondence (Phase I Grant)**, Santos Family Foundation.
- Investigators: Coughlin, J. F., Reimer, B., Mehler, B., and **Lee, J.**
- Amount: 100,000 USD

Teaching

Spring 2014 **Teaching Certificate Program**, MIT, Cambridge.
- Completed the Kaufman Teaching Certificate Program (KTCP) at MIT

Spring 2011 **Teaching Assistant**, University of Wisconsin-Madison, Madison.
- Course: ISyE 349, Introduction to Human Factors
- Lead lab/discussion sessions

2004-2006 **Teaching Assistant**, Pusan National University, South Korea.
- Course: Human and Mechanical, Human Factors, Industrial and Organization Psyhology
- Managed teaching materials

Computer skills

Basic java, LATEX
Intermediate Matlab
Advanced R

Invited Presentations

2016 60th International Annual Meeting of Human Factors and Ergonomics Society, DC.
"Sensation Seeking and Drivers' Glance Behavior While Engaging in a Secondary Task"

2016 Liberty Mutual Research Institute for Safety, Hopkinton, MA.
"Multiple Approaches for a Deeper Understanding of Driver Distraction"

2015 Harvard Schepens Eye Research Institute, Boston, MA.
"Investigating Drivers' Head and Glance Correspondence"

2015 8th International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design, Snowbird, UT.
"Predicting Secondary Task Involvement and Differences in Task Modality Using Field Highway Driving Data"

2015 Transportation Research Board 94th Annual Meeting, Washington D.C.
"Analyses of Glance Patterns of Older and Younger Drivers During a Visual-Manual HMI Interaction"

2014 AHEAD Consortium, MI
"Glance Pattern Analysis"

2014 AHEAD Consortium, MA
"Integrating the Saliency Map with Distract-R to Assess Driver Distraction of Vehicle Displays"

2014 Human Factors and Ergonomics Society New England Chapter, MA
"Integrating the Saliency Map with Distract-R to Assess Driver Distraction"

2013	57th International Annual Meeting of Human Factors and Ergonomics Society, CA "A Saliency-based Search Model: Application of the Saliency Map for Driver-vehicle Interfaces"
2011	Transportation Research Board 90th Annual Meeting, Washington D.C. "Matching Simulator Characteristics to Highway Design Problems"
2011	Transportation Research Board 90th Annual Meeting, Washington D.C. "Computational Model of Drivers' Visual Attention for Assessing Simulator Fidelity"
2007	Annual Symposium of Korean Psychological Association, South Korea "Analysis of Age Difference in Road Crossing Behavior Using Signal Detection Theory"
2006	Annual Symposium of the Korean Data Analysis Society, South Korea "The Effects of Stimuli Types and Task Difficulty on Driver?s Memory Search in Dynamic Driving Situation"
2006	Conferences of Korean Psychological and Social Issues, South Korea "Effect of Item Size In-Vehicle Navigation System on Driver's Visual Search and Driving Performances"

Publications

Peer Reviewed Journal Articles

Submitted **Lee, J**., Munoz, M., Fridman, L., Victor, T., Reimer, B., and Mehler, B. Investigating drivers' head and glance correspondence, *PeerJ Computer Science.*

2017 **Lee, J**., Roberts, S. C., Reimer, B., and Mehler, B. Does order matter? Investigating the effect of sequence on in-vehicle glance duration with on-road driving data, *PLoS ONE, 12*(2): e0171730. doi:10.1371/journal.pone.0171730

2016 Munoz, M., Reimer, B., **Lee, J**., Mehler, B., and Fridman L. Distinguishing patterns in drivers' visual attention allocation using hidden Markov models, *Transportation Research Part F: Traffic Psychology and Behaviour, 43*, 90-103.

2016 **Lee, J**., Mehler, B., Reimer, B., Ebe, K., and Coughlin, J. F. Relationship between older drivers' cognitive abilities as assessed on the MoCA and glance patterns during visual-manual radio-tuning while driving, *The Journals of Gerontology, Series B: Psychological Sciences, gbw131.*

2016 Fridman, L., **Lee, J**., Reimer, B., and Mehler, B. A framework for robust driver gaze classification, *SAE Technical Paper 2016-01-1426, doi: 10.4271/2016-01-1426.*

2016 Fridman, L., **Lee, J**., Reimer, B., and Victor, T. "Owl" and "Lizard": Patterns of head pose and eye pose in driver gaze classification, *IET Computer Vision, 10*(4), 308-314.

2016 Fridman, L., Langhans, P., **Lee, J**., and Reimer, B. Driver gaze estimation without using eye movement, *IEEE Intelligent Systems, 31*(3), 49-56.

2011 Lee, J. D., McGehee, D. V., Brown, J. L., Richard, C. M., Ahmad, O., Ward, N. J., Hallmark, S., and **Lee, J**. Matching simulator characteristics to highway design problems, *Transportation Research Board, 2248/2011*, 53-60.

2008 **Lee, J**., Kim, B., Lee, S., and Lee, J. The effect of age on judgment in driving: A simulation study, *Journal of the Korean Society of Safety, 23(1)*, 46-50.

2007 **Lee, J**., and Lee, J. Analysis of age difference in road crossing behavior using signal detection theory, *Korean Journal of Industrial and Organizational Psychology, 20(3)*, 253-265.

2006 **Lee, J**., and Lee, J. The effects of stimuli types and task difficulty on driver's memory search in dynamic driving situation, *Journal of the Korean Data Analysis Society, 8(1)*, 391-406.

2006 **Lee, J**., and Lee, J. The effect of mariner's situation awareness training on navigation performances, *Korean Journal of Experimental Psychology, 18(3)*, 221-237.

2006 **Lee, J**., Oh, J., and Lee, J. The effect of repeated mariner training using a ship-handling simulator system on ship control, *Journal of Korean Navigation and Port Research, 30(6)*, 427-432.

2005 Gong, D., **Lee, J**., and Lee, J. A driving study on driver's subjective speed estimation as a function of the vehicle noise types and intensity, *Korean Journal of Psychological and Social Issues, 11(2)*, 31-46.

Peer Reviewed Conference Proceedings

2017 **Lee, J**., Sawyer, B. D., Mehler, B., Angell, L., Seppelt, B. D., Fridman, L., and Reimer, B. Linking the detection response tasks and the AttenD buffer through assessing Human-Machine Interface workload, *Transportation Research Board 96th Annual Meeting*

2016 Reimer, B., Pettinato, A., Seppelt, B., Fridman, L., **Lee, J**., Park, J., Iagnemma, K., and Mehler, B. Behavioral impact of drivers' roles in automated driving, *International Conference on Automative User Interfaces and Interactive Vehicular Applications.*

2016 Seaman, S., **Lee, J**., Angell, L., Mehler, B., Seppelt, B., and Reimer, B. Exploring generalizability of field experiment radio tasks with naturalistic driving data: A comparison with SHRP2 NEST, *International Conference on Automative User Interfaces and Interactive Vehicular Applications.*

2016 Domeyer, J., Seaman, S., Angell, L., **Lee, J**., Reimer, B., and Donmez, B. SHRP2 NEST Database: Exploring conditions of secondary task engagement in naturalistic trip data, *International Conference on Automative User Interfaces and Interactive Vehicular Applications.*

2016 **Lee, J**., Mehler, B., Reimer, B., and Coughlin J. F. Sensation seeking and drivers' glance behavior while engaging in a secondary task, *Human Factors and Ergonomics Society 60th Annual Meeting.*

2016 Lee, J. Y., **Lee, J**., and Lee, J. D. A visual search model for in-vehicle interfaces, *Human Factors and Ergonomics Society 60th Annual Meeting.*

2016 Sawyer, B. D., **Lee, J**., Dobres, J., Mehler, B., Coughlin, J. F., and Reimer, B. Effects of a Voice Interface on Mirror Check Decrements in Older and Younger Multitasking Drivers, *Human Factors and Ergonomics Society 60th Annual Meeting.*

2015 Munoz, M., **Lee, J**., Reimer, B., Mehler, B., and Victor, T. Analysis of drivers' head and eye movement correspondence: Predicting drivers' glance location using head rotation data, *8th International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design*, 203-209.
[Honda Outstanding Student Paper Award 1st Place]

2015 Sinelnikova, A., **Lee, J**., Reimer, B., Mehler, B., and Coughlin, J. F. Predicting secondary task involvement and differences in task modality using field highway driving data, *8th International Driving Symposium on Human Factors in Driver Assessment, Training and Vehicle Design*, 393-399.
[Honda Outstanding Student Paper Award 2nd Place]

2015 **Lee, J**., Reimer, B., Mehler, B., Angell, L., Seppelt, B. D., and Coughlin J. F. Analyses of glance patterns of older and younger drivers during a visual-manual HMI interaction, *In Proceedings of Transportation Research Board 94th Annual Meeting*, No. 15-4781.

2013 **Lee, J**., Lee, J. D., and Salvucci, D. D. A saliency-based search model: Application of the saliency map for driver-vehicle interfaces, *In Proceedings of Human Factors and Ergonomics Society 57th Annual Meeting, 57(1)*, 1933-1937.

2012 **Lee, J**., Lee, J. D., and Salvucci, D. D. Evaluating the distraction potential of connected vehicles, *In Proceedings of the International Conference on Automotive User Interfaces and Interactive Vehicular Applications*, 33-40.
[Intel Outstanding Student Paper Award 1st Place]

2011 **Lee, J**., Seppelt, B. D., and Lee, J. D. Computational model of drivers' visual attention for assessing simulator fidelity, *In Proceedings of Transportation Research Board 90th Annual Meeting*, No. 11-3962.

Technical Report

2015 Mehler, B., Reimer, B., McAnulty, H., Dobres, J., **Lee, J**., and Coughlin, J. F. Assessing the Demands of Voice Based In-Vehicle Interfaces - Phase II Experiment 2 - 2014 Mercedes CLA (2014t), *MIT AgeLab Technical Report 2015-8 (November 10, 2015). Massachusetts Institute of Technology, Cambridge, MA.*

Professional Service

Service

Driving Assessment 2017 - Scientific Review Committee

Driving Assessment 2015 - Scientific Review Committee

Human Factors and Ergonomics Society-Perception and Performance Technical Group 2015 - Student Paper Awards Review Committee

Human Factors and Ergonomics Society-Cognitive Engineering and Decision Making Technical Group 2015 - Student Paper Awards Review Committee

Peer reviewer

Human Factors: The Journal of the Human Factors and Ergonomics Society

Transportation Research Part F: Traffic Psychology and Behaviour

Advances in Mechanical Engineering

ACM CHI (Human-Computer Interactions)

Transportation Research Board

Journal of Transportation Safety and Security

Automotive User Interfaces and Interactive Vehicular Applications

IEEE Transactions on Intelligent Transportation Systems