GRACE DOUGLAS

Email | +1 (608) 577-5262 | LinkedIn | Website

I am a human subjects researcher that builds human-like models to describe road user behavior in shared urban spaces. Specifically, my dissertation work explores cross-cultural representations of vulnerable road users in mixed-traffic driving environments, aiming to develop fair, safe, and shareable analytical representations of real-time negotiation between motorized and nonmotorized road users.

EDUCATION

New York University – NYU | Ph.D. Candidate Expected: May 2027

Transportation Systems, Civil & Urban Engineering, Advisor: Dr. Linda Ng Boyle, Vice Dean of Research Tandon SOE

Keywords: human factors, multimodal transportation, human-automation interaction, driver safety, statistical modeling, vehicle-pedestrian interaction, driver behavior modeling

University of Washington – UW | Master of Science March 2023

Industrial & Systems Engineering | GPA: 3.7

Relevant Coursework: Stochastic Processes in Engineering, Linear Optimization, Statistical Quality Engineering, Robust Design for Process Improvement, Human Performance Modeling, Engineering Simulation, Inferential Data Analysis

University of Wisconsin – UW - Madison | Bachelor of Science May 2021

Industrial & Systems Engineering, Statistics | GPA: 3.4

Relevant Coursework: Statistical Theory, Statistics in Engineering, Statistical Experimental Design, Industrial Data Analytics, Operations Research, Intro to Optimization, Intro to Human Factors and Design, Probabilistic Modeling

RESEARCH

Human Factors & Urban Ergonomics Lab (HumanFUEL) – NYU September 2023 - Present

Advised by Dr. Linda Ng Boyle | Vice Dean of Research, NYU Tandon SOE - C2SMART Institute

1. **Virtual Worlds for Real Agents: Validating VR Pedestrian Behavior** | *Dissertation Research*
   - Collaborative research with Cornell Tech establishing systematic validation framework for VR pedestrian behavior research using the Hoogendoorn behavioral hierarchy.
   - Comparing VR walking behavior to naturalistic pedestrian traces at matched physical locations to validate virtual environments for pedestrian-aware vehicle assistance systems.
   - Employing mixed-methods validation across strategic, tactical, and operational behavioral levels with comprehensive assessment of presence, cognitive workload, and motion sickness effects on ecological validity.
2. **Level of Detail in Pedestrian Detection Displays for Automated Driving** | *NSF Collaboration with UT Austin*
   - Investigating optimal information granularity in pedestrian detection displays for Level 3 automated vehicles through vehicle assistance systems research.
   - Using vehicle simulator with real-time eye tracking (Meta Aria Gen1 glasses) to objectively measure attention allocation between road monitoring and display interaction across five levels of information detail (LOD0-LOD4).
   - Examining how information detail affects driver trust calibration, situational awareness, and cognitive load during mixed-traffic scenarios to establish design guidelines for pedestrian detection interfaces.
3. **Pedestrian Exposure for Crash Prediction** | *National Highway Traffic Safety Administration (NHTSA)*
   - A standardized physical activity measure for environmental exposure improves intersection-level prediction of pedestrian exposure to vehicle collision.
   - A pedestrian-vehicle crash severity model provides a granular outcome to examine the relationship between environmental features and crash likelihood.
4. **The Next Mobile Office: How will we Work in Self-Driving Cars?** | *National Science Foundation (NSF)*
   - Investigating the impact of virtual meeting engagement on takeover performance in conditionally automated vehicles using a NADs miniSim vehicle simulator.
   - Participants actively engaged in a virtual meeting are randomly assigned Emergency or Planned treatments.

Human Factors and Statistical Modeling Lab – UW June 2021 – August 2023

Advised by Dr. Linda Ng Boyle | Professor, Chair, UW Industrial & Systems Engineering

1. **Cross-Cultural Mapping of Older Drivers** | *National Science Foundation (NSF)*
   - This study compared SHRP2 NDS database and Survey of Health, Aging and Retirement in Europe (SHARE) to identify common lifestyle, health, and personality characteristics to profile driving performance across cultural boundaries.
2. **Multimodal Environments & Multitasking Driving Behaviors** | *Federal Highway Administration (FHWA)*
   - Used the largest collected naturalistic driving database (SHRP2 NDS) to examine in-vehicle driving behavior.

- Applied Dynamic Bayesian networks to investigate dependencies between dynamic and static contextual predictors.

3. **Measuring Pedestrian Exposure Using Electronic Devices** | *National Highway Traffic Safety Administration (NHTSA)*
   - Examined pedestrian exposure and risk to collision in Seattle, WA by analyzing spatial-temporal data of pedestrian walking behavior.
   - Implemented zero-inflated count models to predict pedestrian risk dependent on environmental predictors.

Cognitive Systems Lab – UW-Madison May 2017 – August 2019

Advised by Dr. John Lee | Professor, UW-Madison Industrial & Systems Engineering

- Conducted an ethnographic study recording driver short-stop behavior as a communication tool in uncontrolled multimodal environments.
- Labeled vehicle-pedestrian interaction with ANVIL video coding software, modeled proxemics and kinesics cues in R.
- Utilized NADs miniSim software for naturalistic driving environments to validate short-stop vehicle deceleration profiles.

PUBLICATIONS AND PRESENTATIONS

Domeyer, J., Dinparastdjadid, A., Lee, J. D., Douglas, G., Alsaid, A., & Price, M. (2019). *Proxemics and Kinesics in Automated Vehicle–Pedestrian Communication: Representing Ethnographic Observations*. Transportation Research Record, 2673(10), 70–81. [link]

Douglas, G., Boyle, L. N., Kim, H., Moudon, A., Mooney, S., Saelens, B., & Ebel, B. (2022). *A Framework to Assess Pedestrian Exposure Using Personal Device Data*. Proceedings of the Human Factors and Ergonomics Society Annual Meeting, 66(1), 320–324. [link]

Douglas, G., Boyle, L. N., Saelens, B., Mooney, S., Moudon, A. V., Ebel, B. E., & Kim, H. (2024). *A framework for assessing pedestrian exposure using GPS and accelerometer data* (Report No. DOT HS 813 583). National Highway Traffic Safety Administration. [link]

Douglas, G., Li, J., Khaloei, M., Liu, J., Guo, H., Zou, T., Boyle, L.N., MacKenzie, D. (202X, *pre-print*). *Investigating How Multimodal Environments Affect Multitasking Driving Behaviors* (Report No. DOT HS xxx xxx). Federal Highway Administration. [link]

Li, J., Douglas, G., MacKenzie, D., & Boyle, L. (2024). *Examining drivers' secondary task engagement at intersections using naturalistic driving data.* Available at SSRN 5027098. [link]

Douglas, G. A., & Boyle, L. N. (2025). *Virtual worlds for real agents: Validating virtual pedestrian behavior for vehicle assistance systems.* Adjunct Proceedings of the 17th International Conference on Automotive User Interfaces and Interactive Vehicular Applications, 73–77. [link]

Douglas, G., Boyle, L. N., Mooney, S., Sealens, B., Moudon, A., & Ebel, B. (2025). *Pedestrian Exposure Measures for Different Scales of Analysis*. Paper presented at the 104th Annual Meeting of the Transportation Research Board, Washington, D.C.

LEADERSHIP & INVOLVEMENT

New York University, Establishing HumanFUEL | Brooklyn, NY January 2024 – Present

Founding research lab member

- Order, install, and calibrate new lab equipment: 2 vehicle simulators, 2 free-motion simulators, eye-tracking equipment, motion capture systems, LANs for real-time synchronization.
- Design lab space for human-subjects experiments, develop lab name and logo, and create lab space use documentation (data storage on secure servers, procedures for single- and multiplayer experimentation, version control etiquette for collaborations).
- Coordinate with building managers, administration, technology manufacturers and equipment suppliers.
- Interview potential undergraduate and graduate candidates for research lab positions.

University of Washington, HFES Student Chapter | Seattle, WA November 2021 – August 2023

Communications Director

- Maintain UW HFES Chapter website.
- Communicate with industry professionals to connect university students with future professional opportunities.
- Develop outreach surveys and Q&A sessions to encourage student body membership.

University of Wisconsin – Madison, Women's Varsity Soccer | Madison, WI August 2016 - 2021

NCAA Division 1 Student-Athlete | Team Captain

- 4-year Varsity Letter winner; Athletic Scholarship Recipient.
- Won Big Ten Conference Title (2019) and contributed to team appearances in NCAA Sweet 16 (2018, 2019).
- One of two Wisconsin student athletes chosen for the Big Ten COVID-19 'Return to Play' Taskforce.

CERTIFICATIONS

Internal Review Board (IRB): CITI Program for Human Subjects Research

TECHNICAL SKILLS

Object-oriented: Python, C#
Statistics/computation: R, MATLAB
ML/AI: Scikit-Learn, Tensorflow
Video labeling: ANVIL, Datavyu
3D modeling: Unity/3D, Unreal Engine, Blender, MotionBuilder, MOTIVE, ISAT (miniSim)
Data management: SQL
Simulation/Optimization: SUMO, Flow, GAMS, AMPL
Visualization/mapping: Vega-Lite, QGIS
Hardware: HMD (Oculus), MoCap (Optitrack, Sony Mocopi), vehicle simulator (miniSim Quarter Cab), Eye/head-tracking (Pupil Labs)
Additional: Git, LaTeX

INDUSTRY

Seagate Technology | Minneapolis, MN June 2020 – August 2021

Wafer Manufacturing and Systems Processing Engineering Intern

- Aided in successfully implementing a new tool set for operator use in the largest disk drive manufacturing facility.
- Used system software APF/AMA to analyze current usage of non-production wafers (memory storage disk inside of a disk drive).
- Optimized the use of non-production 'wafers' to satisfy capacity demands of newly implemented machines.

ICR, Inc. | Washington, D.C. May 2019 - July 2019

Data Science Intern

- Preprocessed real-time data streams in Python.
- Formulated bash scripts in Ubuntu systems for lengthy programs.
- Researched and modeled algorithms for neural networks used by DOD agencies to identify anomalous events.