

Gaojian Huang

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RESEARCH INTERESTS

Human factors, human-automation interaction, (semi)autonomous driving, successful aging, multimodal displays, human behavior modeling, adaptive automation, universal design

EDUCATION

Purdue University, West Lafayette, IN

Ph.D. in Industrial Engineering | School of Industrial Engineering 2017 – 2021 (expected)

- *Dissertation title:* Aging and Automation: Non-chronological Age Factors and Takeover Request Modality Predict Transition to Manual Control Performance during Semi-autonomous Driving
 - *Advisor:* Dr. Brandon Pitts
 - *Dissertation committee:* Drs. Paul Parsons, Robert Proctor, and Shirley Rietdyk

Purdue University, West Lafayette, IN

M.S. in Psychology | College of Health and Human Sciences 2018 – 2020

- *Advisor:* Dr. Robert Proctor
- *Concentration:* Cognitive Psychology

Indiana University, Bloomington, IN

M.S. in Safety Management | School of Public Health 2014 – 2016

- *Advisor:* Dr. Todd Smith
 - *Concentration:* Organizational Ergonomics & Workplace Safety
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GRANTS/EXTERNAL FELLOWSHIPS

- **Link Foundation Fellowship in Modeling, Simulation, & Training.** *Using Advanced Driving Simulation and Vibrotactile Cues to Train Older Drivers to Interact with Next-Generation Autonomous Vehicles (Awarded: \$30,000).* 2020 – 2021.
Project objective: To use vibrotactile cuing and advanced driving simulation to train drivers (especially older drivers) on how to interpret information from in-vehicle interfaces and complete takeover tasks in semi-autonomous vehicles.
 - **HFES Augmented Cognition Technical Group Student Grant Award.** *Physiological Responses Predict Mind Wandering during Semi-Autonomous Driving: Implications for Takeover Performance (Sole PI; \$500).* 2020.
 - **HFES Aging Technical Group Student Research Scholarship.** *The Influence of Non-chronological Age Factors on Mental States and Takeover Performance in Next-Generation Autonomous Driving (Sole PI; \$500).* 2019 – 2020
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AWARDS AND HONORS

- HFES Student Member with Honors Award, Chicago, IL (2020) 2020
- Dr. Theodore J. and Isabel M. Williams Fellowship in Industrial Engineering, West Lafayette, IN (2020) 2020
- Purdue Graduate School Incentive Grant Award, West Lafayette, IN 2020
- HFES Honor Student of Purdue Award, West Lafayette, IN 2020
- Purdue Graduate Student Government Professional Grant, West Lafayette, IN 2019
- Graduate Student Mentor of the Summer, Purdue University, West Lafayette, IN 2019
- Outstanding Speaker Award, 1st Annual Conference on Next-Generation Transport Systems, IN 2019
- Stanley Roscoe Best Student Paper Competition Finalist, 20th International Symposium on Aviation Psychology, Dayton, OH 2019
- Travel Grant, School of Industrial Engineering, Purdue University, West Lafayette, IN 2019
- Outstanding Undergraduate Graduation Thesis (Design), Tianjin, China 2014
- Honor Student Award, Tianjin, China 2014
- People Scholarship, Tianjin, China 2010 – 2013
- Freshman Scholarship, Tianjin, China 2011

PUBLICATIONS AND PRESENTATIONS

Journal Articles

1. **Huang, G.**, Luster, M., Karagol, I., Park, J. W., & Pitts, B. J. (2020). Self-Perception of Driving Abilities in Older Age: A Systematic Review. *Transportation Research Part F: Traffic Psychology and Behaviour*, 74, 307–321.
2. Smith, T. D., DeJoy, D. M., Dyal, M. A., & **Huang, G.** (2019). Impact of work pressure, work stress and work–family conflict on firefighter burnout. *Archives of Environmental & Occupational Health*, 74(4), 215-222.
3. **Huang, G.**, & Pitts, B. J. (Under Review). The Effects of Age, Physical Exercise, and Alert Modality on Performance in the Transition Phase of the Semi-autonomous Vehicle Takeover Process. *Applied Ergonomics*.
4. Sridhar, H., **Huang, G.**, Thorpe, A., Oishi, M., & Pitts, B. J. (Under Review). Characterizing the Effect of Mind-wandering on Partially Autonomous Braking Dynamics. *IEEE Transactions on Human-Machine Systems*.
5. Werner, L., **Huang, G.**, & Pitts, B. J. (Under Review). Older Adult User and Non-User Perceptions of Speech Recognition Technology: A Focus Group Study. *International Journal of Human-Computer Interaction*.

Working Papers

1. **Huang, G.**, & Pitts, B. J. “Semi-Autonomous Vehicle Takeover: The Effects of Takeover Request Modality and Lead Time on Performance”
2. **Huang, G.**, Kansara, D., Liu, Y., & Pitts, B. J. “Is location all that matters? An Evaluation of In-Vehicle Vibrotactile Interfaces”

Conference Papers

1. **Huang, G.**, & Pitts, B. (2020). Age-Related Differences in Takeover Request Modality Preferences and Attention Allocation During Semi-autonomous Driving. In *International Conference on Human-Computer Interaction* (pp. 135-146). Springer, Cham.
2. **Huang, G.**, & Pitts, B. (2020). The Effects of Engagement in Physical Exercise on Semi-autonomous Takeover Request Perception between Younger and Older Adults. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. Chicago, IL.
3. **Huang, G.**, Petersen, C., & Pitts, B. (2020). The Impact of Mental States on Semi-autonomous Driving Takeover Performance: A Systematic Review. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*. Chicago, IL.
4. **Huang, G.**, Steel, C., Zhang, X., & Pitts, B. (2019). Multimodal Cue Combinations: A Possible Approach to Designing In-Vehicle Takeover Requests for Semi-Autonomous Driving. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 63, No. 1, pp. 1739-1743). Sage CA: Los Angeles, CA: SAGE Publications.
5. **Huang, G.**, Liang, N., Wu, C., & Pitts, B. (2019). The Impact of Mind Wandering on Signal Detection, Semi-autonomous Driving Performance, and Physiological Responses. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 63, No. 1, pp. 2051-2055). Sage CA: Los Angeles, CA: SAGE Publications.
6. Werner, L., **Huang, G.**, & Pitts, B. J. (2019). Automated Speech Recognition Systems and Older Adults: A Literature Survey and Synthesis. In *Proceedings of the Human Factors and Ergonomics Society Annual Meeting* (Vol. 63, No. 1, pp. 42-46). Sage CA: Los Angeles, CA: SAGE Publications.
7. **Huang, G.**, & Pitts, B. (2019). Automated Speech Recognition Technology to Support in Flight Weather-related Communication for GA Pilots. In *20th International Symposium on Aviation Psychology*. (pp. 468-473).

Invited Talks, Presentations, & Posters

1. **Huang, G. (presenter)**, & Pitts, B. J. (2020). Age-Related Differences in Takeover Request Modality Preferences and Attention Allocation During Semi-autonomous Driving. Oral presentation given at the *22nd International (Virtual) Conference on Human-Computer Interaction*. Copenhagen, Denmark. July.
2. **Huang, G. (co-presenter)**, Liang, N., & Pitts, B. J. (2020). Physiological Monitoring During Autonomous Driving. Oral presentation given at the *106th Purdue Road School Transportation Conference and Expo*. West Lafayette, IN. March.
3. **Huang, G. (presenter)**, Steel, C., Zhang, X., & Pitts, B. J. (2019). Multimodal Cue Combinations: A Possible Approach to Designing In-Vehicle Takeover Requests for Semi-Autonomous Driving. Oral presentation given at the *63rd International Annual Meeting of the Human Factors and Ergonomics Society*. Seattle, WA. October.

4. **Huang, G. (presenter)**, Liang, N., Wu, C., & Pitts, B. J. (2019). The Impact of Mind Wandering on Signal Detection, Semi-autonomous Driving Performance, and Physiological Responses. Oral presentation given at the *63rd International Annual Meeting of the Human Factors and Ergonomics Society*. Seattle, WA. October.
5. **Huang, G. (presenter)** (2019). Smart Home Technologies for Older Adults. Invited lecture in IE 590: Human Factors of Gerontechnology. West Lafayette, IN. October.
6. Park, J., **Huang, G.**, & Pitts, B. J. (2019). Self-Perception of Manual Driving Abilities in Older Age: A Systematic Review. Poster presented at *the Annual Fall Undergraduate Research Expo*. West Lafayette, IN. November.
7. Gonzales, A., **Huang, G.**, Pitts, B. J. (2019). Augmented Reality in Semi-Autonomous Driving: The Effect of Warning Signal Format and Perceived Urgency on Takeover Performance. Poster presented at *Purdue Summer Undergraduate Research Fellowship Research Symposium*. West Lafayette, IN. August.
8. Richards, M., **Huang, G.**, Karagol, I., Pitts, B. J. (2019). Perception versus Reality: How do Older Drivers Self-perceive their Own Driving Abilities?. Poster presented at *Purdue Summer Research Opportunity Program's (SROP) Research Poster Symposium and Reception*. West Lafayette, IN. July.
9. **Huang, G. (presenter)**, & Pitts, B. J. (2019). Predicting Mind Wandering during Semi-autonomous Driving and Exploring Potential Mitigation Strategies. Oral presentation given at the *1st Annual Conference on Next-Generation Transport Systems (NGTS-2019)*. West Lafayette, IN. May.
10. **Huang, G. (presenter)**, & Pitts, B. (2019). Automated Speech Recognition Technology to Support in Flight Weather-related Communication for GA Pilots. Oral presentation given at the *20th International Symposium on Aviation Psychology*. Dayton, OH. May.
11. **Huang, G. (presenter)**, Liang, N. (presenter), & Pitts, B. J. (2019). Assisted-Driving & Autonomous Vehicle Systems: Human Factors Considerations in Next-Generation Transportation. Poster presented at the *105th Purdue Road School Transportation Conference and Expo*. West Lafayette, IN. March.
12. **Huang, G. (presenter)**, & Pitts, B. J. (2018). Assessing the Capability of Automated Speech Recognition Weather Information Interfaces in GA Flight. Poster presented at the *2018 The Partnership to Enhance General Aviation Safety, Accessibility and Sustainability (PEGASAS) Annual Meeting*. West Lafayette, IN. May.
13. Smith, T.D. & **Huang, G. (co-presenter)** (2017). Bolstering occupational safety and health outcomes through effective multi-level leadership. Oral Presentation given at the *2017 National Safety Council Congress & Expo*. Indianapolis, IN. September.

• **Patent**

Xi, Z., Zhang, J., Yang, J., **Huang, G.** (2012). Tapered jet foam sol generating device for controlling coal dust at transferring point of conveyor belt

RESEARCH/WORK EXPERIENCE

Next-generation Human-systems and Cognitive Engineering (NHanCE) Lab

West Lafayette, IN

Graduate Student Research Fellow

2017 – Present

- Project: CRII: CHS: Bridging the Age-Related Performance Gap: Multimodal Interfaces to Support Older Adults in Transitioning to Manual Control in Autonomous Systems (Project Lead; funded by the National Science Foundation, Award #: 1755746; Dates: 2018 - 2021)
 - Quantifying the effects of non-chronological aging factors – physical activity, on semi-autonomous takeover performance
 - Evaluating multimodal interface design to support takeover performance in semi-autonomous vehicles
 - Assessing advanced driving simulation training effects on information interpretation and takeover performance
- Project: Supporting the Detection of System Malfunction and Cybersecurity Threats through Vibrotactile Interfaces (Project Lead; funded by the ZF Automotive Company; Dates: 2019 – 2020)
 - Measuring how well drivers respond to tactile alerts at different in-vehicle locations
 - Conducting a systematic literature review on tactile cueing in driving
- Project: Mind wandering during Semi-Autonomous Driving: Implications for Takeover Performance and Mental States Prediction (Project Lead; partially funded by the HFES Augmented Cognition Technical Group and Aging Technical Group; Dates: 2018 – 2020)

- Quantified the impacts of mind wandering on semi-autonomous takeover performance and physiological responses
- Developed models to predict mind wandering and performance while driving using physiological sensors
- Project: Exploring the Feasibility of Automated Speech Recognition Technology to Support in Flight Weather-Related Communication for GA Pilots (Project Lead; funded by the Federal Aviation Administration; Dates: 2017 – 2018)
 - Analyzed the performance of commercial speech recognition systems in the General Aviation cockpit
 - Conducted qualitative assessment to understand the perception of users regarding speech recognition systems

Human Performance Lab (HPL)

West Lafayette, IN

Graduate Student Research Fellow

Aug 2018 – Present

- Attending weekly research seminar and discussions on research related to cognitive psychology
- Leading presentation of human factors articles related to autonomous driving and multimodal displays

Department of Applied Health Science

Bloomington, IN

Graduate Research Assistant

Aug 2015 – May 2016

- Project: Investigating Federal Emergency Management Agency (FEMA) fire prevention and safety research and development
 - Evaluated the contribution of safety training and practice on firefighter safety behavior outcomes
 - Conducted regression analysis to discover predictors of burnout within the fire service
 - Measured the correlation between burnout and workplace performance

Shanghai Yuanke Enterprise Management Consulting Co. Ltd.

Shanghai, China

Assistant Safety Consultant (Intern)

Feb 2014 – May 2014

- Assisted senior safety consultants to deliver and evaluate safety training
- Classified safety regulations, laws, and policies from multiple areas (e.g., construction safety) to build document system
- Operated workplace safety inspection and data collection

Bureau of Safety Supervision, Government of Tianjin Binhai District

Tianjin, China

Summer Research Intern

Jun 2012 – Aug 2012

- Helped safety specialists perform safety inspection at approximate five hundred small manufacturing enterprises
- Collected questionnaires from small manufacturing enterprises

TEACHING EXPERIENCE

- **Lecturer**, Indiana University, Bloomington, IN 2016 – 2017
 - Course: SPH – H180 Stress Prevention & Management
 - Developed course materials (e.g., syllabus), lectures, and in-class activities
 - Lectured to 80 undergraduate students for Fall 2016 semester
 - Course: SPH – S151 Legal Aspect of Safety (Spring 2017)
 - Developed course materials (e.g., syllabus), lectures, and in-class activities
 - Lectured to 30 undergraduate students for Spring 2017 semester
- **Graduate Teaching Assistant**, Indiana University, Bloomington, IN 2015 – 2016
 - Course: SPH – H180 Stress Prevention & Management (Supervisor: Bobbie Saccone, Ph.D.)
 - Course: SPH – F255 Human Sexuality (Supervisor: Vickie VanDeventer, M.S., MPH)
 - Course: SPH – F341 Effects of Divorce on Children (Supervisor: Courtney Olcott, Ph.D.)
- **Teaching Certificate/Training**
 - Preparing Future Faculty (course), Purdue University, West Lafayette, IN 2020
 - Certificate of Foundations in College Teaching, Purdue University, West Lafayette, IN 2019
 - Pedagogy in Health Behavior (course), Indiana University, Bloomington, IN 2016

LEADERSHIP/MENTORSHIP EXPERIENCE

- **Co-President**, Human Factors & Ergonomics Society (HFES) Purdue Chapter 2019 – 2020
- **Lab Manager**, MhanCE Research Lab, West Lafayette, IN 2017 – Present
- **Research Mentor**, MhanCE Research Lab, West Lafayette, IN 2017 – Present
 - Lauren Werner, Purdue Industrial Engineering Master's student

- Christine Petersen, Purdue Psychological Science Senior Undergraduate student
- Ryan Dubbink, Purdue Industrial Engineering Undergraduate student
- Jun Woo Park, Purdue Psychological Science Senior Undergraduate student
- Alec Gonzales, Purdue Summer Undergraduate Research Fellowship Program student

PROFESSIONAL/UNIVERSITY/COMMUNITY SERVICE

Professional/University Service

- **Journal Reviewer** 2020 – Present
 - *Gerontechnology*
- **Reviewer**, HFES Augmented Cognition Technical Group Student Grant Award (2020-2021) 2020
- **Committee Chair**, 1st Annual HFES Student Chapter Conference 2020
- **Organizing Committee Member**, Student Career and Professional Development Day Panels at the 64th HFES Annual Meeting 2020
- **Session Chair**, Purdue Summer Undergraduate Research Fellowship Research e-Symposium 2020
- **Volunteer**, HFES Fellows Task Force 2020
- **Co-chair**, the Human Factors and Ergonomics Society (HFES) Annual Meeting 2019
 - *Perception and Performance Technical Group (PPTG)*
 - *Human Performance Modeling Technical Group (HPMTG)*
- **Student Volunteer**, the HFES Annual Meeting 2019
- **Judge**, Purdue Summer Undergraduate Research Fellowship Research Symposium 2019

Community Service

- **Tech Team Volunteer**, Center on Aging and the Life Course (CALC), Purdue University 2019 – Present
 - *Solving electronic equipment problems at senior living facilities*
- **Volunteer**, Purdue Space Day 2019
 - *STEM Educational outreach program for K-12 students*
- **Volunteer**, Chicago Marathon 2019
- **Volunteer**, the 8th Annual Purdue Boilermaker Half-Marathon & 5k 2019

PROFESSIONAL AFFILIATIONS

- Human Factors and Ergonomics Society (HFES) 2017 – Present
 - Aging Technical Group
 - Augmented Cognition Technical Group
 - Cognitive Engineering and Decision Making Technical Group
 - Perception and Performance Technical Group
 - Safety Technical Group
 - Surface Transportation Technical Group
 - Institute of Electrical and Electronics Engineers (IEEE) 2020 – Present
 - International Society of Gerontechnology 2020 – Present
 - National Safety Council (NSC) Member 2019 – Present
 - American Society of Safety Professionals (ASSP) Member 2014 – 2017
-