Paul D. S. Fink, Ph.D.

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Education and Training

Ph.D. in Spatial Information Science and Engineering
The University of Maine
Advised by Dr. Nicholas Giudice
2018 - 2023

M.Ed. in Student Development in Higher Education
The University of Maine
2015 - 2017

B.S. in Education focusing on Education Policy
The University of Vermont
2010 - 2014

Active Research Areas

Human-Computer Interaction: Non-visual access of graphical materials, human-in-the loop robotics, anthropomorphized intelligent systems, inclusive design, and blind and visually impaired navigation.

Accessible Autonomous Vehicles: Multimodal user interfaces, human-vehicle collaboration, gestural interaction, computer vision, and AR/XR augmentations. Helped lead a winning team in the Inclusive Design Challenge.

Haptic Interfaces: Smartphone-based touchscreen interaction, ultrasonic mid-air haptics, non-visual information access, accessible data science, and in-vehicle applications for mapping, route progress, and spatial navigation.

State and Federal Policy: Fully autonomous vehicles, inclusion, ethics, the Every Student Succeeds Act, and proficiency-based high school graduation requirements on higher education admissions processes.

Appointments

Virtual Environment and Multimodal Interaction Laboratory (VEMI): *Postdoctoral Research Associate*
Summer 2023 - Current

Toyota Research Institute (TRI): *Machine Assisted Cognition and Human-Centered Driving Research Intern*
Summer 2022

Virtual Environment and Multimodal Interaction Laboratory (VEMI): *Graduate Research Assistant*
Fall 2018 – Spring 2023

Maine Scholars Strategy Network (SSN): *Legislative Graduate Fellow*
Fall 2021 – Spring 2023

Day One Project, Federation of American Scientists: *Day One Technology Policy Fellow*
Spring 2021

Maine Education Policy Research Institute (MEPRI): *Contracted Researcher*
Spring 2016 – Spring 2017

United States Senate: *Constituent Advocacy and Educational Outreach Intern*
Spring 2015

Competitive Grants and Research Support (Involvement on ~$1.1 Million Awarded)

2023 (In Review)	U.S. Department of Transportation, "Center of Excellence on Transportation, Inclusive Technology, and Accessible Navigation" (Proposed $8.8 million). UMaine, Rutgers, and NYU. Contributing author to the grant submission and if awarded, would serve as Project Manager for the center under N.A. Giudice, PI.
2023 (In Review)	Centers for Disease Control Grants for Injury Control Research Centers (ICRC). "Prevention of Rural Injury in Maine (PRIME): An Injury Control Center to Serve the Northern New England Region" (Proposed $1 million). Contributing author to the grant submission and if awarded, would lead research related to wearable augmented reality interfaces for older adults.
2022	U.S. Department of Transportation Stage II Inclusive Design Challenge (IDC) winning prize for "The Autonomous Vehicle Assistant (AVA): A Complete Trip Solution for Future Mobility" ($300,000). Design and development of a mobile application to seamlessly assist passengers with visual impairment and older adults during pre-journey planning, travel to pick-up locations, and vehicle entry processes. Co-PI and contributing author to the award submission, N.A. Giudice, PI.
2020 - 2022	U.S. Department of Transportation Stage I Inclusive Design Challenge (IDC) semifinalist prize, "The Autonomous Vehicle Assistant (AVA): Ride-hailing and localization for the future of accessible mobility" ($300,000). Co-PI and contributing author to the award submission, N.A. Giudice, PI.

2019 - 2022 National Science Foundation (NSF) grant CHS-1910603, “Improving user trust of autonomous vehicles through human-vehicle collaboration” ($499,898). Development of human-vehicle collaboration profiles to improve user trust, usability, and accessibility of fully autonomous vehicles. Principal graduate research assistant and contributing author to the grant submission, N.A. Giudice, PI.

Academic Products

Journal Articles:

1. **Fink, P. D. S.**, Doore, S. A., Lin, X., Maring, M., Zhao, P., Nygaard, A., Beals, G., Corey, R. R., Perry, R. J., Freund, K., Dimitrov, V., & Giudice, N. A. (2023). The Autonomous Vehicle Assistant (AVA): Emerging technology design supporting blind and visually impaired travelers in autonomous transportation. *International Journal of Human-Computer Studies*, *179*. https://doi.org/10.1016/j.ijhcs.2023.103125

2. **Fink, P. D. S.**, Alsamsam, M., Brown, J. R., Kindler, H. D., & Giudice, N. A. (2023). Give us something to chauffeur it: Exploring user needs in traditional and fully autonomous ridesharing for people who are blind or visually impaired. *Transportation Research Part F: Traffic Psychology and Behaviour*, *98*, 91–103. https://doi.org/10.1016/j.trf.2023.09.004

3. **Fink, P. D. S.**, Holz, J. A., & Giudice, N. A. (2021). Fully Autonomous Vehicles for People with Visual Impairment: Policy, Accessibility, and Future Directions. *ACM Transactions on Accessible Computing (TACCESS)*, *14*(3), 15:1-15:17. https://doi.org/10.1145/3471934

   *** TACCESS is the highest ranked journal for Accessible Computing on Google Scholar ***

4. Palani, H. P., **Fink, P. D. S.**, & Giudice, N. A. (2021). Comparing Map Learning between Touchscreen-Based Visual and Haptic Displays: A Behavioral Evaluation with Blind and Sighted Users. *Multimodal Technologies and Interaction*, *6*(1), 1. https://doi.org/10.3390/mti6010001

5. Palani, H. P., **Fink, P. D. S.**, & Giudice, N. A. (2020). Design guidelines for schematizing and rendering haptically perceivable graphical elements on touchscreen devices. *International Journal of Human–Computer Interaction*. https://doi.org/10.1080/10447318.2020.1752464

Fully Refereed Conference Papers:

1. **Fink, P. D. S.,** Dimitrov, V., Yasuda, H., Chen, T. L., Corey, R. R., Giudice, N. A., Sumner, E. S. (2023). Autonomous is Not Enough: Designing Multisensory Mid-Air Gestures for Vehicle Interactions Among People with Visual Impairments. *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI ‘23).* https://doi.org/10.1145/3544548.3580762. (Acceptance rate 28.39%).

   *** CHI is the highest ranked outlet for Human Computer Interaction on Google Scholar ***

2. **Fink, P. D. S.,** Allaban, A. A., Atekha, O., Perry, R. J., Sumner, E. S., Corey, R. R., Dimitrov, V., & Giudice, N. A. (2023). Expanded Situational Awareness Without Vision: A Novel Haptic Interface for Use in Fully Autonomous Vehicles. *Proceedings of the 2023 ACM/IEEE International Conference on Human-Robot Interaction (HRI '23*). https://doi.org/10.1145/3568162.3576975. (Acceptance rate 25.2%).

   *** HRI is the highest ranked outlet for Human Robot Interaction on Google Scholar ***

3. Alsamsam, M., **Fink, P. D. S.**, Brown, J. B., Dimitrov, V., & Giudice, N. A., (2023) Does it Press? Investigating the Efficacy of an Ultrasonic Haptic Button Interface for Non-Visual Driving Applications. *In: Gesa Praetorius, Charlott Sellberg and Riccardo Patriarca (eds) Human Factors in Transportation. AHFE (2023) International Conference*. AHFE Open Access, vol 95. AHFE International, USA. http://doi.org/10.54941/ahfe1003819

4. Loranger, J., Brown J. B., Kindler, H., **Fink, P. D. S.**, Dimitrov, V., & Giudice, N. A., (2023) The Design of Mid-Air Ultrasonic Haptic Interfaces Based on the Perception of Lines. *In: Isabel L. Nunes (eds) Human Factors and Systems Interaction. AHFE (2023) International Conference*. AHFE Open Access, vol 84. AHFE International, USA. http://doi.org/10.54941/ahfe1003586

Extended Abstracts:

1. **Fink, P. D. S.**, & Giudice, N. A. (2021). Vibrotactile Maps for Promoting Spatial Understanding in Autonomous Vehicles. *Cognitive Processing, 22***,** 41-42. https://doi.org/10.1007/s10339-021-01058-x

Op-eds, Policy Briefs, and Assessment Reports:

1. **Fink, P. D. S.**, & Giudice, N. A. (2022) Disability rights advocates improved remote voting for all. *Bangor Daily News.* Op-Ed. https://www.bangordailynews.com/2022/11/15/opinion/opinion-contributor/disability-rights-advocates-improved-remote-voting-for-all/

2. **Fink, P. D. S.** (2022). Self-driving vehicles are our future. UMaine is showing how. *Bangor Daily News*. Op-Ed. https://bangordailynews.com/2022/01/25/opinion/opinion-contributor/self-driving-vehicles-are-our-future-umaine-is-showing-how-joam40zk0w/

3. **Fink, P. D. S.**, & Giudice, N. A. (2021). Federal Accessibility Standards for Fully Autonomous Vehicles. Policy Brief. *Day One Project, Federation of American Scientists, IT & Technology Policy. https://www.dayoneproject.org/post/federal-accessibility-standards-for-fully-autonomous-vehicles*

4. **Fink, P. D. S.** (2018). Pathway One - Serving our State: Catalyzing Maine's Revitalization *Strategic Plan Assessment: The Blue Sky Plan.* https://umaine.edu/bluesky/blue-sky-outcomes/

5. **Fink, P. D. S.** (2018). Pathway Four - Transforming Lives: Strengthening the UMaine Undergraduate and Graduate Student Experience. *Strategic Plan Assessment: The Blue Sky Plan.* https://umaine.edu/bluesky/blue-sky-outcomes/

6. Stump, E., Fairman, J., Doykos, B., **Fink, P.** (2017). *Proficiency-based high school diploma systems in Maine: Implications for college and career access.* A report of the Maine Education Policy Institute (MEPRI). Published jointly by the University of Southern Maine (Gorham) and the University of Maine (Orono).

Patents and Inventions

Fink, P. D. S., Sumner, E. S., Dimitrov, V. (2023) MULTISENSORY GESTURAL-AUDIO INTERFACE TO PROMOTE SITUATIONAL AWARENESS FOR IMPROVED AUTONOMOUS VEHICLE CONTROL**.** 422/IP-A-6264. Filed January 3rd, 2023. Patent Pending.

Conferences, Presentations, and Invited Talks

2023 (Apr. 26) Autonomous is Not Enough: Designing Multisensory Mid-Air Gestures for Vehicle Interactions Among People with Visual Impairments. Talk given at *ACM CHI Conference on Human Factors in Computing Systems (CHI ’23)*, Hamburg, Germany.

2023 (Mar. 14) Expanded Situational Awareness Without Vision: A Novel Haptic Interface for Use in Fully Autonomous Vehicles. Talk given at *ACM/IEEE International Conference on Human-Robot Interaction (HRI ’23)*, Stockholm, Sweden.

2022 (Mar. 24) AI Personas for Blind and Sighted User Trust Across the Complete Trip of Driving. Co-presenter: Giudice, N.A. Talk given at *2nd International Conference on Embodied Intelligence,* Cambridge, UK (virtual).

2022 (Jan. 24) AVA: A Fully Accessible Ride-hailing, Mobility, and Navigation Tool for Fully Autonomous Vehicles Co-presenters: Giudice, N.A., Corey, R. R., & Allen, A. Talk given at *Inclusive Design Challenge Showcase*, Washington D.C. (virtual).

2021 (Nov. 9) The Future of FAVs for BVI People: Accessibility, Safety, and Policy Considerations. Co-presenter: Giudice, N.A. Talk given at *Workshop on Autonomous Vehicles,* Braille Institute, Santa Barbara, CA (virtual).

2021 (Oct. 20) Fully Autonomous Vehicles for People with Visual Impairment: Policy, Accessibility, and Future Directions. Co-presenters: Holz, J. A., & Giudice, N. A. Talk given at *The 23rd International ACM SIGACCESS Conference on Computers and Accessibility (ASSETS 2021)* (virtual).

2021 (Sep. 16) Vibrotactile Maps for Promoting Spatial Understanding in Autonomous Vehicles. Co-presenter: Giudice, N. A. Talk given at *8th International Conference on Spatial Cognition (ICSC 2021).* Rome, Italy (virtual).

2021 (July 26) Designing Trustworthy Anthropomorphic AIs for the Complete Trip. Talk given at *VEMI Colloquium.* The University of Maine, Orono, ME.

2021 (July 21) Help Drive the Future of Driving. Co-presenter: Giudice, N. A. Talk given at *American Council of the Blind 60th Annual Conference and Convention.* ACB, Alexandria, VA (virtual).

2021 (May 13) Federal Accessibility Standards for Autonomous Vehicles. Co-presenter: Giudice, N. A. Talk given at *Day One Technology Policy Accelerator Showcase.* Day One Project, Washington D.C. (virtual).

2021 (Apr. 12) Autonomous Vehicles and Haptic Displays. Talk given at *Finland-Maine Idea Exchange.* The University of Maine, Orono, ME and Aalto University, Espoo, Finland (virtual).

2020 (Oct. 2) Learning to Trust Autonomous Vehicles. Talk given at *UMaine Student Symposium*. The University of Maine, Orono, ME.

2020 (Apr. 27) Driving Trust in Fully Autonomous Vehicles. Talk given at *Spatial Computing Graduate Seminar Talks.* The University of Maine, Orono ME, USA.

2020 (Jan. 17) The Effects of Distance on Cognitive Task Performance. Co-presenters: DeMaris, C., Hanscom, D., & Nygaard, Z. Talk given at *Fifth Annual Rapid Research Week*. VEMI Lab at The University of Maine, Orono, ME.

2019 (Jan. 18) Eye Tracking for Emotional States. Co-presenters: Abay, B., & Brown, N. P. Talk given at *Fourth Annual Rapid Research Week.* VEMI Lab at the University of Maine, Orono, ME.

Teaching and Advising Experience

Human-Computer Interaction: *Co-Instructor and Teaching Assistant, University of Maine SIE 515*
Fall 2019, 2020, 2021, 2022

Interaction Design and Prototyping: *Lab Instructor, University of Maine NMD 102*
Spring 2018

New Student Seminar: *Instructor, University of Maine EHD 100*
Fall 2016

Race and Racism in Education: *Teaching Assistant, The University of Vermont College of Education*
Spring 2014

Academic Advisor: *The University of Maine College of Education and Human Development*
Fall 2015 – Spring 2017

Financial Aid Advisor: *The University of Maine Office of Student Financial Aid*
Summer 2015 – Spring 2016

Editorial and Review Service

AIP Biointerphases Journal

- 2023: Peer reviewer for (1) submission

ACM Conference on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)

- 2022: Peer reviewer for (1) submission

ACM Conference on Human Factors in Computing Systems (CHI)

- 2023: Peer reviewer for (1) submission
- 2022: Peer reviewer for (2) submissions

IEEE The International Conference on Robotics and Automation (ICRA)

- 2022: Peer reviewer for (1) submission

ACM International Conference on Mobile Human-Computer Interaction (MobileHCI)

- 2022: Peer reviewer for (2) submissions

ACM Transactions on Accessible Computing (TACCESS)

- 2023: Peer reviewer for (1) submission
- 2022: Peer reviewer for (1) submission
- 2021: Peer reviewer for (2) submissions

Chair of Editorial Board, VEMI Lab Publications

- Spring 2020 – Current: Editor and peer reviewer for (7) R&D papers

University Service

Executive Committee Member*: VEMI Lab*
Fall 2019 – Current

Hiring Committee Member: *Scholars Strategy Network*
Spring 2022, 2023

Strategic Planning Assessment Coordinator: *The University of Maine*
Summer 2017 – Spring 2018

Treasurer: *The University of Maine Student Development Association*
January 2016 – January 2017

Professional Staff Hiring Committee Member: *The University of Maine*
Spring 2016, 2017

Media, News, and Public Relations

Outlets that directly mention me or any of the projects I help lead

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2023 (Aug 15) Boston Globe: “A revolution in the making: How self-driving cars might transform the lives of blind and vision-impaired people.” News Piece

2022 (Jul 26) WiredFocus: "VEMI Lab researchers earn federal prize, invite to White House for software that makes self-driving cars more accessible.” News Piece

2022 (Jul. 26) News Center Maine: “UMaine researchers create software that will make rideshare inclusive.” News Piece

2022 (Jul. 26) U.S. Department of Transportation: “On anniversary of ADA, USDOT announces winners of its first-ever Inclusive Design Challenge.” Press Release

2022 (Apr. 12) Scholars Strategy Network: “Maine SSN Builds Relationships with State and Local Policymakers” Chapter Spotlight

2022 (Jan. 25) UMaine News: “BDN publishes Fink’s op-ed highlighting benefits of autonomous vehicles, VEMI lab research” News Piece

2021 (Apr. 13) Forbes: “How passengers with disabilities can drive the autonomous vehicle revolution” News Piece

2021 (Mar. 17) Inside Autonomous Vehicles: “Smartphone app may help seniors, people with disabilities enjoy robo-taxis” News Piece

2021 (Mar. 10) VEMI and Day One: “Fink and Giudice selected for Day One Technology Policy Accelerator” Press Release

2021 (Feb. 22) WABI 5: “UMaine researchers awarded $300k to make autonomous vehicles more accessible” News Piece

2021 (Feb. 2) Bangor Daily News: “App from VEMI Lab group will help people with visual impairments, seniors enjoy ride sharing with self-driving cars” News Piece

2021 (Feb. 1) Fox 22 WFVX: “Self-driving car app is coming to Maine” News Piece

2021 (Jan. 29) News Medical: “Smartphone app will people with disabilities and seniors use autonomous vehicles” News Piece

2021 (Jan. 29) Apple News: “App will help visually impaired, seniors enjoy ride-sharing with self-driving cars”

2021 (Jan. 29) UMaine News: “App from VEMI Lab group will help people with visual impairments, seniors enjoy ride-sharing with self-driving cars” News Piece

2021 (Jan. 29) EurekAlert AAAS: “App will help visually impaired, seniors enjoy ride-sharing with self-driving cars” News Piece

2021 (Jan. 23) Associated Press: “UMaine developing ride hailing tool for older residents” News Piece

2021 (Jan. 23) Lewiston Sun Journal: “UMaine developing ride hailing tool for visually impaired and older residents” News Piece

2021 (Jan. 23) US News and World: “UMaine developing ride hailing tool for older residents” News Piece

2021 (Jan. 23) WHDH TV 7 NEWS Boston: “UMaine developing ride hailing tool for older residents” News Piece

2021 (Jan. 19) Senator Susan Collins: “Senators Collins, King announce $300,000 to connect seniors with ride-hailing services” Press Release

2020 (Jan. 17) WABI 5: “VEMI Lab hosts fifth annual ‘Rapid Research Week’” News Piece

2019 (Aug. 26) Fox Bangor: “UMaine’s VEMI Lab receives $500,000 grant to research fully self-driving vehicle” News Piece

2019 (Aug. 23) UMaine News: “UMaine research project focuses on improving trust in autonomous vehicles using human-vehicle collaboration” News Piece

Skills and Knowledge Areas

Research Methods: Behavioral design and experimentation (i.e., usability evaluations, performance assessments, and interface comparisons). Physiological instrumentation (i.e., biometrics, eye-tracking, and gestural interaction). Psychological dependent measures (i.e., technology preferences, trust in interactions, and intention)

Programming Languages: SwiftUI (XCode), C# (Unity), Java, Python, SQL

Data Analysis: Quantitative (R, SPSS, JASP), Qualitative (thematic analysis, interview coding, spatial analysis)

Technical Experience: Interdisciplinary research focused on a broad range of information styles and user needs; human experimental design and analysis; technology integration and usability based on inclusive design.