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Engineering & Scientific Consulting

Jennifer Molnar, Ph.D., CFEI

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Professional Profile

Dr. Molnar's expertise is in electrical and mechatronic systems, with particular experience in robotics, virtual reality, and computer architecture. At Exponent, she applies her multidisciplinary background to provide technical professional services spanning a range of areas, from analysis of complex electronic and robotics systems to fire investigation and software review for clients in multiple industries.

Prior to joining Exponent, Dr. Molnar worked as a computer logic designer at IBM, where she designed microarchitecture for high performance servers to accelerate execution of computationally intensive, multithreaded processes. She has also conducted research for Meta's AR/VR Research group on the design and teleoperation of non-anthropomorphic avatars and has characterized serial communication link performance for the Circuits Research Group at Nvidia.

She completed her PhD in Robotics at the Georgia Institute of Technology, where she was an NSF fellow in a joint Georgia Tech/Emory Medical Robotics Traineeship program. Her graduate work focused on improving the controllability of bio-inspired soft robots, and particularly on identifying control schemes that would enable their intuitive teleoperation. She developed novel optical sensors for proprioceptive feedback, prototyped robots with bio-inspired locomotion, and designed a virtual reality environment to capture motion data from users to serve as a basis for designing teleoperation control schemes. Her multidisciplinary background allows her to apply her knowledge of soft robots, sensing, embedded systems, virtual reality, rapid prototyping, user-centered design, neuromechanics, and computer architecture to solve clients' technical challenges.

Dr. Molnar has broad experience with many programming languages, software tools and frameworks, and utilities relevant to interfacing with a variety of hardware ranging from embedded computing circuitry within electronic devices to control systems and interfaces for robotic applications. These include: Python, C, C#, Matlab, ROS, Very High-Speed Integrated Circuit Hardware Description Language (VHDL), Unity (VR), Solidworks, Quartus, and practical prototyping skills such as machining, 3D printing, PCB etching, and surface-mount soldering.

Academic Credentials & Professional Honors

Ph.D., Robotics, Georgia Institute of Technology, 2024

M.S., Mechanical Engineering, Georgia Institute of Technology, 2020

B.S., Electrical & Computer Engineering, Duke University, 2012

Woodruff Strong Fellow, 2023

Woodruff President's Fellow (2016-2020)

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National Science Foundation (NSF) Accessibility, Movement and Rehabilitation Science (ARMS) Scholar, Georgia Institute of Technology, 2016

Tau Beta Pi Engineering Honor Society

Licenses and Certifications

Certified Fire and Explosion Investigator (CFEI)

Prior Experience

PhD Student, Georgia Institute of Technology, 2016-2024

Research Intern, Facebook Reality Labs, 2020

Research Intern, Nvidia Circuits Research Group, 2016

Logic Designer, IBM, 2012-2015

Professional Affiliations

IEEE Member

ACM Member

National Association of Fire Investigators (NAFI)

University of Utah – HRE Lab Industry Collaborator

Patents

US Patent 9,798,549: Out-of-order processor that avoids deadlock in processing queues by designating a most favored instruction, 2017 (MJ Boersma, RA Cordes, DA Hrusecky, JL Molnar, BW Thompto, AJ Van Norstrand, KL Ward).

US Patent App. 15/184,106: Techniques for implementing store instructions in a multi-slice processor architecture, 2017 (S Ayub, MJ Boersma, S Chadha, DA Hrusecky, JL Molnar, DQ Nguyen).

US Patent 9,934,033 & US Patent 9,940,133: Operation of a multi-slice processor implementing simultaneous two-target loads and stores, 2018 (RA Cordes, DA Hrusecky, JL Molnar, JA Paredes, BW Thompto).

US Patent 9,983,875: Operation of a multi-slice processor preventing early dependent instruction wakeup, 2018 (S Chadha, DA Hrusecky, EA McGlone, JL Molnar).

US Patent 10,169,046: Out-of-order processor that avoids deadlock in processing queues by designating a most favored instruction, 2019 (MJ Boersma, RA Cordes, DA Hrusecky, JL Molnar, BW Thompto, AJ Van Norstrand, KL Ward).

US Patent 10,346,174: Operation of a multi-slice processor with dynamic canceling of partial loads, 2017 (EA McGlone, JL Molnar).

Publications

Molnar J, Lovald S, Campbell I, Easley S. “Safety Standards and Risk Evaluation for Physical Human-Robot Interaction.” Workshop on Public Trust in Autonomous Systems, ICRA 2025.

Semenikhin, N., Brooke, P., Bennett-Kennett, R., Lemberg, J., Dodaran, M., Molnar, J., “Abnormal Failures of Table Knives During Operation.” IMAT 2025, Detroit, MI, 2025

Molnar J, Agrawal V, Chernova S. "Clustering user preferences for personalized teleoperation control schemes via trajectory similarity analysis." Frontiers in Robotics and AI, Apr 2024. doi: 10.3389/frobt.2024.1330812. PMID: 38654756; PMCID: PMC11035831.

Molnar J, Menguc Y. "Toward Handling the Complexities of Non-Anthropomorphic Hands." CHI 2023, Extended Abstracts; 1-9.

Guo X, Blaise B, Molnar J, Coholich J, Padte S, Zhao Y, Hammond FL. "Soft foot sensor design and terrain classification for dynamic legged locomotion." Robosoft 2020; 550-557.

Aydin Y, Molnar J, Goldman D, Hammond F. "Design of a soft robophysical earthworm model." Robosoft 2018; 83-87.

Molnar J, Cheng CA, Tiziani L, Boots B, Hammond FL. "Optical sensing and control methods for soft pneumatically actuated robotic manipulators." ICRA 2018; 3355-3362.

Caralt F, Molnar J, Stingel J, Cahoon T, Hammond FL. "Diffusion-based optical sensors for multimodal strain measurement in soft devices." IEEE Sensors, 2017; 1-3.

Presentations

Molnar J, Lovald S, Campbell I, Easley S. “Safety Standards and Risk Evaluation for Physical Human-Robot Interaction.” Workshop on Public Trust in Autonomous Systems, ICRA 2025.

Molnar J. “The Puppet-Master Problem: Uncovering Intuitive Teleoperation Schemes through VR.” Puppetry Workshop, ICRA 2025.

Molnar J. Controlling Non-Anthropomorphic Hands. Invited speaker for NeuroDesign in Human-Robot Interaction Workshop, SMC 2022.

Molnar J, Chernova S. Trends in the Design of Control Mappings for Non-Anthropomorphic Appendages. Poster presentation, 4th Workshop on Integrating Multidisciplinary Approaches to Advance Physical Human-Robot Interaction, ICRA 2022.

Molnar J, Menguc Y. Toward Handling the Complexities of Non-Anthropomorphic Hands. Poster presentation, CHI 2022.

Aydin Y, Molnar J, Goldman D, Hammond F. Design of a soft robophysical earthworm model. Poster presentation, Robosoft 2018.

Molnar J, Cheng CA, Tiziani L, Boots B, Hammond FL. Optical sensing and control methods for soft pneumatically actuated robotic manipulators. Poster presentation, ICRA 2018.

Molnar J. “Futuristic Robots, Realistic Plot Points.” Oral presentation and demonstration, Atlanta Multicultural Sci-Fi Film Festival, 2018.

Caralt F, Molnar J, Stingel J, Cahoon T, Hammond FL. Diffusion-based optical sensors for multimodal strain measurement in soft devices. Short oral presentation, IEEE Sensors, 2017

Peer Reviews

Conference on Human/Robot Interaction

IEEE Robotics and Automation Letters

IEEE International Conference on Robotics and Automation

IEEE Soft Robotics Conference (RoboSoft)

IEEE Sensors