Mike Hagenow

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RESEARCH INTERESTS

HUMAN-ROBOT PHYSICAL INTERACTION MODELING AND SHARED CONTROL/AUTONOMY

Research focuses on answering how shared control and shared autonomy in robotics can assist skilled workers in completing complex and often injury-prone tasks. Broad research interests include controls, applications of learning models (e.g., DMPs, HMMs) in human-robot interaction models, and dynamics of physical interaction. Co-advised by Michael Zinn, Michael Gleicher, and Bilge Mutlu (NASA ULI).

EDUCATION

UNIVERSITY OF WISCONSIN - MADISON | PhD in Mechanical Engineering
In Progress | Madison, WI
• Minor: Computer Science • Advisor: Michael Zinn, Ph.D. • 4.0/4.0

UNIVERSITY OF WISCONSIN - MADISON | MS in Mechanical Engineering
Dec 2019 | Madison, WI
• Phi Kappa Phi • 4.0/4.0

TUFTS UNIVERSITY | BS in Mechanical Engineering
May 2014 | Medford, MA
• Tau Beta Pi • Dean's List (7/7 eligible semesters)

EXPERIENCE

NASA - JOHNSON SPACE CENTER | Intern - ER4
2021 | Houston, TX (remote)

- Supervisor: Dr. Kimberly Hambuchen, Mentor: Evan Laske
- Investigating human-in-the-loop corrective methods for semi-automated fitting of affordance templates/primitives for use in remote robot programming during intra-vehicular activities (IVAs).

UW-MADISON | Graduate Research Assistant
2019 – Present | Madison, WI

- NSF grant exploring communication in human-robot interaction.
- NASA University Leadership Initiative focused on aircraft manufacturing and development of shared robotic assistants for physically demanding and challenging tasks.

EPIC SYSTEMS | Manager - MyChart - Technical Services
2014 – 2017 | Verona, WI

- Managed 5-6 direct reports. Development and planning lead for Clinical Data for MyChart. Responsible for technical support for several large hospital contracts. VB development of internal tools for accounting.

PUBLICATIONS

Up-to-date publications on Google Scholar

JOURNAL ARTICLES

- **J3.** Senft, E., **Hagenow, M.**, Welsh, K., Radwin, R., Zinn, M., Gleicher, M., and Mutlu, B. (2021) "Task-Level Authoring for Remote Robot Teleoperation," Front. Robotics, AJ 8:707149.
- **J2. Hagenow, M.**, Senft, E., Radwin, R., Gleicher, M., Mutlu, B. and Zinn, M. "Informing Real-time Corrections in Corrective Shared Autonomy Through Expert Demonstrations," IEEE Robotics and Automation Letters, vol. 6, no. 4, pp. 6442-6449, Oct. 2021.
- **J1. Hagenow, M.**, Senft, E., Radwin, R., Gleicher, M., Mutlu, B. and Zinn, M. "Corrective Shared Autonomy for Addressing Task Variability," IEEE Robotics and Automation Letters, vol. 6, no. 2, pp. 3720-3727, April 2021.

REFEREED CONFERENCE PAPERS

- **C4.** Zhang, B., **Hagenow, M.**, Mutlu, B., Gleicher, M, and Zinn, M. "Assessing the Perceived Realism of Kinesthetic Haptic Renderings Under Parameter Variations" 2022 IEEE Haptics Symposium (HAPTICS). IEEE, Accepted for Publication.
- **C3.** Senft, E., **Hagenow, M.**, Radwin, R., Zinn M., Gleicher, M., and Mutlu, B. "Situated Live Programming for Human-Robot Collaboration,"The 34th Annual ACM Symposium on User Interface Software and Technology. 2021.
- **C2. Hagenow, M.**, Zhang, B., Mutlu, B., Zinn, M., and Gleicher, M. "Recognizing Orientation Slip in Human Demonstrations," 2021 International Conference on Robotics and Automation (ICRA), 2021.
- **C1.** W. Hu, Q. Fan, A. H. Nicholas, **M. C. Hagenow**, and A. T. Ohta. "Bubble micro-manipulator for co-operative micro-manipulation," 9th IEEE International Conference on Nano/Micro Engineered and Molecular Systems (IEEE-NEMS), Honolulu, HI, Apr. 2014.

WORKSHOP PAPERS

- **W2. Hagenow, M.**, Zinn, M., Fong, T., Laske, E., and Hambuchen, K. "Affordance Template Registration via Human-in-the-loop Corrections," Advances in Space Robotics and Back to Earth Workshop at 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021.
- **W1.** Zhang, B., **Hagenow, M.**, Mutlu, B., Zinn, M., and Gleicher, M. "Characterizing the Effects of Haptic Rendering Parameter Variations on Perceived Kinesthetic Rendering Accuracy," 2021 IEEE World Haptics Conference (WHC), 2021, pp. 868-868.

MENTORING AND ADVISING

GRADUATE STUDENTS

Megh Doshi
• 2020-Present • Design of a mobile bidirectional haptic input

UNDERGRADUATE STUDENTS

Mohamed Safwat
• 2021-Present • State estimation and Ergonomic Comanipulation
Ahmed Khalil
• 2021-Present • State estimation and Ergonomic Comanipulation
Kevin Macauley
• 2021-Present • Affordance Template Registration Using Corrections
Nicole Gathman
• 2021 • Affordance Template Registration Using Corrections
Yash Hindka
• 2021 • Dynamic camera during robot teleoperation via UAV
Michael Matuszewski
• Summer 2020 • Real-time force display for robot physical interaction
Saheen Feroz
• 2019-2020 • Synopsis of robot trajectories and interaction using optimization
Eric Wang
• 2019-2020 • Force sensing and visualization using low-cost sensors

HONORS & AWARDS

PHI KAPPA PHI
• 2019 • UW-Madison

MITCHELL FELLOWSHIP (INSTRUCTIONAL DESIGN)
• 2018 • The Mitchell Institute

O'LEARY DESIGN AWARD
• 2014 • Tufts University

TAU BETA PI
• 2014 • Tufts University

SENATOR GEORGE J. MITCHELL SCHOLARSHIP
• 2010 • The Mitchell Institute

RENSSELAER MEDAL
• 2009 • Rensselaer Polytechnic Institute

INVITED TALKS

- NASA University Leadership Initiative Tech Talk (9/2021)
- NASA Intelligent Robotics Group (IRG) (7/2021)
- NASA Transformative Aeronautics Concepts Program (TACP) Showcase (2/2021)

ACADEMIC SERVICES

REFERREE SERVICES

• IEEE Robotics and Automation Letters (RAL)
• International Journal of Social Robotics (SORO)
• Human-Computer Interaction
• IEEE International Conference on Robotics and Automation (ICRA)
• Artificial Intelligence for Human-Robot Interaction (AI-HRI)

ORGANIZATION

• Co-organizer - Wisconsin Robotics Seminar Series (https://robotics.wisc.edu/seminar-series/)
• Co-chair - PHRI & Shared Autonomy for PHRI sessions at IROS 2021

TEACHING

FORMAL INSTRUCTION

Guest Lecturer, ME739 - Advanced Robotics
• 2020 • UW-Madison
Instructor of Record, ME346 - Intro to Feedback Controls
• 2019 • UW-Madison
Teaching Assistant, ME739 - Advanced Robotics*
• 2019 • UW-Madison
Teaching Assistant, ME346 - Intro to Feedback Controls
• 2018 • UW-Madison
Teaching Assistant, ME446 - Automatic Controls*
• 2018-2019 • UW-Madison
Teaching Assistant, ME370 - Energy Systems Laboratory
• 2018 • UW-Madison
Teaching Assistant, COMP11 - Intro to Computer Science
• 2013-2014 • Tufts University

* Distance Learning

EXTRACURRICULAR

Teaching-As-Research Project (Delta Program)
• 2019 • How does problem-based learning instruction of loop-shaping in the frequency domain affect student adaptive expertise and student perceived value of material?
Tutorial Contributor (CTMS)
• 2018-2021 • Developing tutorial for Lead motor position control (In Progress). Tutorials will be hosted on the official website (http://ctms.engin.umich.edu).
Lab Development
• 2018 • Developed real time control platform using Simulink and three labs (system identification, PID, and Frequency Domain Lead Control). Fabricated 10 control platforms using industrial connectors and hardware (B&R Automation). Co-authored posters at the 2018 Midwest Robotics Workshop (TTIC) and 2018 ADEIL Conference.

TECHNICAL SKILLS

PROGRAMMING:

• Python • C/C++ • CUDA • Java • HTML/CSS/JS

TOOLS:

• ROS • V-REP • git • LaTeX• CMake

ROBOTIC PLATFORMS:

• Franka Emika Panda • Rethink Sawyer • UR3/UR5 • Kinova Mico/Jaco

ENGINEERING:

• Solidworks • Matlab • Simulink (control system design certified) • Labview • EES

RECENT SERVICE

Workshop Volunteer, New Engineering Orientation
• 2019-2021 • UW-Madison
REACH Lab Tours (3-5 Annually)
• 2018-2021 • UW-Madison
Volunteer Tutor - Algebra/Geometry
• 2018-2019 • West High School
Alumni Interviewer
• 2017-2019 • Tufts University
Event Supervisor - Mechatronics & Aerial Scrambler
• 2019 • Science Olympiad