Maia Stiber

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Research Overview

My research focuses on understanding and modeling human behaviors with the goal of enabling human-aware capabilities in HRI/HCI to promote effective interactions. I analyze and leverage implicit human behavioral responses arising from unexpected robot errors in physical-HRI to automatically detect robot errors.

Keywords: Human-Robot Interaction, Human Computer Interaction, Human Behavior Modeling, Human-Aware Human-Machine Interaction, Human-Subjects Research

Education

Doctor of Philosophy in Computer Science, *Johns Hopkins University* **August 2019 — Present**
- Advised by Dr. Chien-Ming Huang and Dr. Russell Taylor

Master of Science in Engineering (Computer Science), *Johns Hopkins University* **December 2021**

Bachelor of Science in Computer Science, *California Institute of Technology* **June 2019**

Honors/Awards

ACM/IEEE International Conference on Human Robot Interaction (HRI) Pioneers **March 2024**

ACM International Conference on Multimodal Interaction (ICMI) Doctoral Consortium **November 2022**

Intuitive Surgical Best Project Award (DetectaTrip: Early Detection of Unexpected Action) **December 2020**
- DetectaTrip uses deep learning to detect and localize falls in videos
- Determined by a committee

Best Project Award (HMD-Based Navigation for Ventriculostomy), *Johns Hopkins University* **May 2020**
- Awarded by the Engineering Research Center for Computer-Integrated Surgical Systems and Technology
- Voted on by audience consisting of students, faculty, and doctors

Jay D. Samstag Engineering Fellowship, *Johns Hopkins University* **August 2019**
- Fellowship awarded to one graduate student a year.

Computer Science Department Fellowship, *Johns Hopkins University* **August 2019**
- Awarded by the CS PhD Admissions Committee for a prospective CS PhD student who has shown exceptional promise.

Best Paper Award Honorable Mention, ACM *CHI* **May 2016**
- For "SpiroCall: Measuring Lung Function over a Phone Call"; Top 2% of submissions

Publications

Maia Stiber, Dan Bohus, and Sean Andrist "Detecting Confusion using Behavioral Signals for AI-Assisted Physical Tasks," 2024. [In Preparation]

Maia Stiber, "Flexible Robot Error Detection Using Natural Human Responses for Effective HRI," ACM/IEEE International Conference on Human Robot Interaction, 2024. [HRI Pioneers]

Maia Stiber, Yuxiang Gao, Russell Taylor, and Chien-Ming Huang "Forging Productive Human-Robot Partnerships via Group Formation Exercises," ACM Transactions on Human Robot Interaction, 2023.

Maia Stiber, Russell Taylor, and Chien-Ming Huang "On Using Social Signals to Enable Flexible Error-Aware HRI" ACM/IEEE International Conference on Human-Robot Interaction (HRI), 2023.

- Human Response to Robot Errors in HRI Dataset: https://github.com/intuitivecomputing/Response-to-Errors-in-HRI-Dataset
- Example Error-Aware Robotic System: https://github.com/intuitivecomputing/Error-Aware-Robotic-System

Maia Stiber, "Effective Human-Robot Collaboration via Generalized Robot Error Management Using Natural Human Responses." International Conference on Multimodal Interaction, 2022. [ICMI Doctoral Consortium]

Maia Stiber, Russell Taylor, and Chien-Ming Huang "Modeling Human Response to Robot Errors for Timely Error Detection," International Conference on Intelligent Robots and Systems (IROS), 2022.

Gopika Ajaykumar, **Maia Stiber**, and Chien-Ming Huang "Designing User-Centric Programming Aids for Kinesthetic Teaching of Collaborative Robots," Robotics and Autonomous Systems 145, 2021.

Maia Stiber and Chien-Ming Huang "Not All Errors Are Created Equal: Exploring Human Responses to Robot Errors with Varying Severity," International Conference on Multimodal Interaction Late-Breaking Report, 2020.

Xingtong Liu, **Maia Stiber**, Jindan Huang, Masaru Ishii, Gregory Hager, Russell Taylor, and Mathias Unberath, "Reconstructing Sinus Anatomy from Endoscopic Video — Towards a Radiation-free Approach for Quantitative Longitudinal Assessment," International Conference of Medical Image Computing and Computer Assisted Intervention, 2020.

Ehsan Azimi, Zhiyuan Niu, **Maia Stiber**, Ruby Liu, Nicholas Greene, Camilo Molina, Judy Huang, Chien-Ming Huang, and Peter Kazanzides, "An Interactive Mixed Reality Platform for Bedside Surgical Procedures," International Conference of Medical Image Computing and Computer Assisted Intervention, 2020.

Mayank Goel, Elliot Saba, **Maia Stiber**, Eric Whitmire, Josh Fromm, Eric C. Larson, Gaetano Borriello, and Shwetak N. Patel, "SpiroCall: Measuring Lung Function over a Phone Call", ACM CHI, 2016. (**Honorable mention paper**; top 2% of submissions.)

Research/Work Experience

Research Intern, *Microsoft Research* **Summer 2023**

- Conducted research on situated intelligence in mixed reality. Modeled implicit human behavioral signals for confusion detection during physical tasks.
- Mentored by: Dr. Sean Andrist, Dr. Dan Bohus
- Research submitted to conference

Research Assistant, *Johns Hopkins University* **August 2019 — Present**

- Conducts research in Laboratory for Computation Sensing and Robotics and Intuitive Computing Lab

Software Development Intern, *Expedia* **Summer 2018**

- Developed machine learning algorithms to improve customer service efficiency and responsiveness.

Undergraduate Researcher, *Caltech Aerospace Robotics and Control Lab* **January 2018 — June 2018**

- Designed reconfigurable hexacopter to investigate performance of different arrangements.

Summer Undergraduate Research Fellow, *Caltech Choo Lab* **Summer 2016**

- Tested and analyzed implantable electric generator for medical devices.
- Designed using Solidworks and 3D printed harness to maximize harvester efficiency.

Research Intern, *University of Washington Seattle UbiComp Lab* **Summers 2014 and 2015**

- Designed using Solidworks and 3D printed vortex whistle flow meter for mobile spirometer.
- Wrote Matlab and Python signal processing code to analyze spirometry data.
- Project now part of startup company Senosis

Teaching Experience

Instructor, *Johns Hopkins University* **January 2023 — May 2023**
- Taught CS 601.491/691 (Human-Robot Interaction)

Teaching Assistant, *Johns Hopkins University* **August 2021 — December 2021**
- Ran office hours and discussion sections for CS 601.455/655 (Computer-Integrated Surgery I)
- Organized grading of homework and programming assignments

Course Assistant, *Johns Hopkins University* **August 2020 — December 2020, August 2022 — December 2022**
- Graded written and programming assignments for CS 601.455/655 (Computer-Integrated Surgery I)

Computer Science Teaching Assistant, *Caltech* **October 2017 — December 2018**
- Graded and held office hours for the CS 11(Computer Language Shop) C++ Track.
- Graded and held office hours for the CS 156a (Learning Systems) Machine Learning class.

Service

Organizer for HRI 2024 Workshop **October 2023 — Present**
- Social Signal Modeling for HRI

Student Volunteer for HRI **2023, 2024**

Reviewer for HRI, THRI, IROS, ICRA **2021, 2022, 2023, 2024**

Organizer for RSS 2022 Workshop **January 2022 — July 2022**
- Close Proximity Human-Robot Collaboration Workshop: Challenges and Opportunities

Member of CS Graduate Student Council, *Johns Hopkins University* **September 2019 — Present**

Skills/Experience

Programming Language Python (PyTorch, Tensorflow), C#, Matlab, C++, C, Java, R, SQL, Ocaml, Mathematica

Software ROS, Unity, JMP, SPSS, Microsoft's Platform for Situated Intelligence

Hardware Kinova Gen3, UR5, Pupil Labs Invisible (gaze tracking), Hololens

Empirical Study Knowledge empirical human-subject studies, quantitative and qualitative user data, statistical analysis (hypothesis testing), inferential statistics

Computer Science Knowledge computer vision, machine learning, deep learning, generative AI (LLMs, GANs, prompt engineering, multimodal LLM), LFMs, robotics, linear algebra, object oriented programming, basic networking, caches, embedded systems, ICP, deformable registration techniques