# Maggie A. Collier

Ph.D. Student in Robotics, Robotics Institute, CMU

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## Education

**Carnegie Mellon University (CMU)**, Pittsburgh, Pennsylvania *2019 - present*
*Ph.D.* in Robotics, Robotics Institute
*Advisor*: Prof. Henny Admoni, Human and Robots Partners (HARP) Lab
*Areas of Study*: Human Robot Interaction, Assistive Robotics, Assistive Teleoperation

**University of Alabama at Birmingham (UAB)**, Birmingham, Alabama *2013 - 2019*
*B.S.* in Electrical Engineering (EE), *Summa Cum Laude*
*B.S.* in Biomedical Engineering (BME), *Summa Cum Laude*
*Thesis*: Eye Gaze Behavior during Teleoperation of a Robot in a Multi-stage Task
*GPA*: 3.98/4.0

## Summary

I am a researcher with multidisciplinary experience in *robotics*, *biomedical device development*, and *tissue engineering*. My current research interests include *Human Robot Interaction*, *Assistive Robotics*, and *Healthcare Robotics*.

## Research Experience

**Users' Preferences for Assistance throughout Human-Robot Collaboration Tasks**
*Human and Robot Partners Lab, CMU* *Feb '21 - present*
Advisor: Prof. Henny Admoni

Aim: Study users' preference for assistance during teleoperated object manipulation tasks

- Wrote code to enable people to directly adjust the way their input commands and the robot's commands are arbitrated in an assistive teleoperation paradigm
- Designing and building a user study to test how people's preferences for assistance change throughout an object manipulation task

**Eye Gaze Behavior during Teleoperation of a Robot in a Multi-stage Task**
*Human and Robot Partners Lab, CMU* *June '18 - Dec '20*
Advisor: Prof. Henny Admoni

Aim: Study eye gaze behavior during complex, teleoperated object manipulation tasks

- Designed and conducted a user study to collect eye gaze during complex robot manipulation
- Studied eye gaze behavior while users teleoperate a robot to perform a multi-stage task
- Studied approaches for distinguishing subtasks during a teleoperated multi-stage task with gaze

**Human Pose Tracking with Capacitive Proximity Sensor in Robot Assisted Dressing**
*Healthcare Robotics Lab, Georgia Institute of Technology* *May '17 - Aug '17*
Advisor: Prof. Charlie Kemp

Aim: Equip a robot to manage errors in human pose estimation and adapt to human motion in real time during robot assisted dressing

- Built a sensor that can estimate the distance between a robot's end effector and a person
- Aided in implementing a PD controller on a PR2 robot
- Helped design a human study to evaluate a novel approach to error management during robot assisted dressing

**Improving Coil Embolization of Brain Aneurysms**
*Department of Biomedical Engineering, UAB* *Oct '14 - May '17*
Advisors: Prof. Ho-Wook Jun; Patrick Hwang, Ph.D.

Aim: Increase occlusion rates of brain aneurysms treated with coil embolization in an effort to phase out a more invasive treatment

- Assisted in the project's creation by providing ideas for strategies to increase occlusion rates
- Independently designed and conducted the *in vitro* experiments
- Built a statistical analysis program in MATLAB to process data from the *in vitro* studies
- Prepared and sent samples to collaborators at the Mayo Clinic for the *in vivo* studies

## Publications

Z. Erickson, **M. Collier**, A. Kapusta, C. C. Kemp (2018). "Tracking Human Pose During Robot-Assisted Dressing using Single-Axis Capacitive Proximity Sensing" in *IEEE Robotics and Automation Letters (RA-L)*

**M. Collier**, R. Aronson, H. Admoni (2018). "Eye Gaze Behavior during Teleoperation of a Robot in a Multi-stage Task" in *Robotics Institute Summer Scholars (RISS) Working Papers Journal*

## Conference Presentations

T. J. Hwang, **M. Collier**, G. Alexander, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, H.-W. Jun (Oct '17). "Nitric Oxide Releasing Bionanomatrix Coating for Brain Aneurysm Coils to Improve Healing" presented at the *2017 Biomedical Engineering Society Annual Meeting*

**M. Collier**, M. Chan, D. Chasteen-Boyd, S. Holder, A. Eberhardt (Apr '17). "An Independent Alarm Clock Designed for Individuals with Deaf-Blindness" presented in the *2017 Design of Medical Devices Conference* at the University of Minnesota

**M. Collier** (Apr '17). "Novel Endothelium-Mimicking Nanomatrix Coating to Enhance Healing of Ruptured Intracranial Aneurysms Treated with Coil Embolization" presented at the *2017 National Conference on Undergraduate Research (NCUR)* at the University of Memphis

T. J. Hwang, **M. Collier**, G. Alexander, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, H.-W. Jun (Oct '16). "A Self-assembled Bionanomatrix Coating for Intracranial Aneurysm Coils to Enhance Healing" presented at the *2016 Biomedical Engineering Society Annual Meeting*

T. J. Hwang, G. Alexander, M. Somarathna, **M. Collier**, B. Brott, J. Pollock, T. Lee, H.-W. Jun (Oct '16). "Nitric Oxide Releasing Nanomatrix to Enhance Dialysis Fistula Maturation" presented at the *2016 Biomedical Engineering Society Annual Meeting*

**M. Collier**, T. J. Hwang, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, and H.-W. Jun (May '16). "Novel Endothelium-Mimicking Nanomatrix Coating to Enhance Healing of Ruptured Intracranial Aneurysms Treated with Coil Embolization" presented at the *9th Frontiers in Chemistry and Biology Interface Symposium* at Johns Hopkins University

**M. Collier**, T. J. Hwang, G. Alexander, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, H.-W. Jun (Apr '16). "Improving Coil Embolization of Intracranial Aneurysms through the Application of a Nitric Oxide-Releasing Nanomatrix Coating" presented at the *2016 University of Alabama System Honors Research Conference* at the University of Alabama at Huntsville

G. Alexander, J. Vines, **M. Collier**, T. J. Hwang, J. Kim, B. Brott, H.-W. Jun (Oct '15). "Evaluation of Inflammation on a Self-Assembled Nanomatrix Stent Coating *In Vitro*" presented at the *2015 Biomedical Engineering Society Annual Meeting*

## Honors & Awards

**National Defense Science and Engineering Graduate Fellowship** *2019*
**National Science Foundation Graduate Research Fellowship** *(declined)* *2019*
**Goldwater Scholarship** *2017*
**Outstanding Student Engineer in Biomedical Engineering at UAB** *2017*

## Skills

**Programming:** Python (*proficient*), MATLAB (*experienced*), C++/C (*familiar*)
**Software:** ROS, MoveIt, Git, SolidWorks, LabVIEW

## Teaching Experience

**Teaching Assistantships**

- Human Robot Interaction (CMU, 16-467) – Prof. Henny Admoni *Spring 2021*
- Signals and Systems (UAB, EE 318) – Dr. Arie Nakhmani *Fall 2018*
- Bioimaging (UAB, BME 340) – Dr. Massimo Fazio *Spring 2017*
- Bioinstrumentation (UAB, BME 313) – Dr. Joel Berry *Fall 2016*

**Supplemental Instruction** *Jan '17 - Apr '19*

*Employer: Vulcan Materials Academic Success Center, UAB*

Served as Supplemental Instruction leader to Introductory Physics course for four semesters

- Taught large groups of pre-medicine students about physics
- Created and worked practice problems for students at two one-hour, weekly sessions
- Created and hosted mock tests for students prior to class tests
- Collaborated with professors to develop useful content for sessions

**Tutoring** *Jan '15 - Dec '16*

*Employer: Vulcan Materials Academic Success Center, UAB*

- Tutored approximately 10 hours a week in challenging courses such as Calculus, Physics, Biology, and Organic Chemistry
- Certified with the Association of Tutoring Professionals

## Service

**Reviewer**: *Int. Conference on Robotics and Automation*, *Robotics and Automation Letters* *Fall 2021*
**Reviewer**: *Int. Conference on Intelligent Robots and Systems* *Spring 2020*
**Reviewer**: Robotics Institute Summer Scholars Admissions Committee *Spring 2020, Spring 2021*
**Mentor**: Robotics Institute Summer Scholars Program *Summer 2020*

## Additional Experience

**Autonomous Robot for Hardware Competition**

*EE Senior Capstone Project, Department of Electrical Engineering, UAB* *Aug '18 - Apr '19*

Aim: Build an autonomous robot for IEEE Southeast Conference student competition

- Implemented the localization component of the project with a Lidar and a variant of ICP
- Setup the Raspberry Pi with light-weight versions of Linux and ROS
- Gained more experience with real-time processing and embedded systems

**Alarm Clock for People with Deaf-Blindness**

*BME Senior Capstone Project, Department of Biomedical Engineering, UAB* *Sept '16 - Apr '17*

Aim: Develop an alarm clock for individuals with deaf-blindness that can be set without assistance from a caretaker

- Implemented a novel time and alarm setting input mechanism to meet users' needs
- Designed the entire electrical circuit and programmed the Arduino
- Helped secure a provisional patent for novel input mechanism

**Journal Editorship** *Sept '14 - May '17*

Inquiro*, UAB's official peer-reviewed undergraduate research journal*

- Oversaw the publication of Volume IX and X
- Served on editorial board for Volume VIII
- Argued for and secured funding for a website rebuild from the Office of the Provost to make *Inquiro* a visually appealing, open-access online publication