

Maggie A. Collier

Birmingham, Alabama
collierm@uab.edu | maggiannecol@gmail.com
Webpage : collierma.github.io
Github : github.com/collierma

UNDERGRADUATE RESEARCHER, ELECTRICAL AND BIOMEDICAL ENGINEERING, UAB

| | |
|-----------|--|
| EDUCATION | University of Alabama at Birmingham (UAB) , Birmingham, Alabama <i>Bachelor of Science</i> , Electrical Engineering (EE), <i>Aug' 16 - Apr' 19 (Expected)</i> <i>Bachelor of Science</i> , Biomedical Engineering (BME), <i>Aug' 13 - Apr' 19 (Expected)</i> GPA: 3.97/4.0 (Cumulative) |
|-----------|--|

| | |
|--------------------|---|
| RESEARCH INTERESTS | Human Robot Interaction, Assistive Robotics, Healthcare Robotics, Machine Learning, Reinforcement Learning, Deep Reinforcement Learning |
|--------------------|---|

| | |
|--------------------------|--|
| SELECTED HONORS & AWARDS | Awarded 2018 Scholarship from Tau Beta Pi, an engineering honors society Selected for 2018 Carnegie Mellon Robotics Institute Summer Scholars Program * 1 of 35 selected out of 800 applicants Named 2017 Goldwater Scholar Selected for 2017 Georgia Tech SURE Robotics Summer Program Named 2017 Outstanding Student Engineer in Biomedical Engineering at UAB Inducted into Tau Beta Pi, an engineering honors society Inducted into Phi Kappa Phi, an honors society Awarded 2016 Science and Technology Summer Research Scholarship Accepted into UAB's Science and Technology Honors Program * 1 of approximately 50 Honors students interviewed and selected from freshman class Awarded UAB's Golden Excellence Scholarship |
|--------------------------|--|

| | |
|---------------------|---|
| RESEARCH EXPERIENCE | Automating Robot Assistance during Complex Tasks Using Anticipatory Eye Gaze <i>Human and Robot Partners Lab, Carnegie Mellon University</i> <i>June '18 - Present</i> Principal Investigator: Henny Admoni, Ph.D. Aim: Enable a teleoperated assistive system to anticipate the next subtask during a multi-stage task <ul style="list-style-type: none">- Designed and conducted a user study to collect eye gaze during complex robot manipulation- Characterizing eye gaze behavior while users teleoperate a robot to perform a multi-stage task- Creating an algorithm for subtask anticipation during a multi-stage task using eye gaze Human Pose Tracking with Capacitive Proximity Sensor in Robot Assisted Dressing <i>Healthcare Robotics Lab, Georgia Institute of Technology</i> <i>May '17 - Aug '17</i> Principal Investigator: 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 <ul style="list-style-type: none">- 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 |
|---------------------|---|

Alarm Clock for People with Deaf-Blindness

Department of Biomedical Engineering, UAB

Sept '16 - April '17

Principal Investigator: Prof. Alan Eberhardt

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

Improving Coil Embolization of Brain Aneurysms

Department of Biomedical Engineering, UAB

Oct '14 - May '17

Principal Investigators: 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 the strategy used to increase occlusion rates
- Independently designed and conducted the *in vitro* experiments
- Built a robust 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

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*

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)*

CONFERENCE PRESENTATIONS

M. Collier, M. Chan, D. Chasteen-Boyd, S. Holder, A. Eberhardt (2017). "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 (2017). "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

M. Collier, T. J. Hwang, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, and H.-W. Jun (2016). "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 (2016). "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

T. J. Hwang, M. Collier, G. Alexander, B. Brott, R. Hergenrother, R. Kardivel, D. Kallmes, H.-W. Jun (2016). "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 (2016). "Nitric Oxide Releasing Nanomatrix to Enhance Dialysis Fistula Maturation" presented at the *2016 Biomedical Engineering Society Annual Meeting*

G. Alexander, J. Vines, M. Collier, T. J. Hwang, J. Kim, B. Brott, H.-W. Jun (2015). "Evaluation of Inflammation on a Self-Assembled Nanomatrix Stent Coating *In Vitro*" presented at the *2015 Biomedical Engineering Society Annual Meeting*

| | |
|-----------------------------|---|
| ADDITIONAL PRESENTATIONS | M. Collier, R. Aronson, H. Admoni (2018). “Eye Gaze Behavior during Telemanipulation of a Multi-stage Task” presented in the <i>2018 Robotics Institute Summer Scholars Research Showcase</i> at Carnegie Mellon University |
| | M. Collier, M. Chan, D. Chasteen-Boyd, S. Holder, A. Eberhardt (2017). “An Independent Alarm Clock Designed for Individuals with Deaf-Blindness” presented in the <i>UAB Spring 2017 EXPO</i> |
| | M. Collier (2017). “Capacitive Proximity Sensing for Dynamic Robot-Assisted Dressing” presented in completion of the 2017 SURE Robotics REU at Georgia Institute of Technology |
| | M. Collier, T. J. Hwang, G. Alexander, R. Kardivel, D. Kallmes, H.-W. Jun (2016). “Improving Coil Embolization of Intracranial Aneurysms through the Application of a Nitric Oxide-Releasing Nanomatrix Coating” presented at the <i>UAB Spring 2016 EXPO</i> |

| | |
|------------------------|---|
| TEACHING EXPERIENCE | Supplemental Instruction <i>Jan '17 - Present</i> |
| | <i>Employer: Vulcan Materials Academic Success Center, UAB</i> |
| | Served as Supplemental Instruction leader to Introductory Physics course for four semesters |
| | <ul style="list-style-type: none"> - Teaching large groups of pre-medicine students about physics - Creating and working practice problems for students at two one-hour, weekly sessions - Creating and hosting mock tests for students prior to class tests - Collaborating with professors to develop useful content for sessions |
| | Teaching Assistantship <i>Aug '16 - Present</i> |
| | <i>Employer: School of Engineering, UAB</i> |
| | Signals and Systems (EE 318) – Dr. Arie Nakhmani, Fall 2018 |
| | - Providing one-on-one tutoring for math concepts in the course |
| | Bioimaging (BME 340) – Dr. Massimo Fazio, Spring 2017 |
| | - Graded tests |
| | Bioinstrumentation (BME 313) – Dr. Joel Berry, Fall 2016 |
| | - Taught BME students to build and debug bioinstrumentation circuits, including an EKG |
| | Tutoring <i>Jan '15 - Dec '16</i> |
| | <i>Employer: Vulcan Materials Academic Success Center, UAB</i> |
| | - Tutored approximately 10 hours a week in challenging courses such as Calculus, Physics, Biology, and Organic Chemistry |
| | - Certified with the Association of Tutoring Professionals |

| | |
|--------------------------|---|
| ADDITIONAL ACTIVITIES | Building Autonomous Robot for Hardware Competition <i>Aug '18 - Present</i> |
| | <i>Organizations: IEEE Southeast Conference & EE Senior Design</i> |
| | <ul style="list-style-type: none"> - Building an autonomous robot to compete in IEEE Southeast Conference - Implementing SLAM that uses 2D Lidar data - Gaining more experience with real-time processing and embedded systems |
| | Vice Chair of IEEE Chapter <i>Apr '18 - Present</i> |
| | <i>Organization: Institute of Electrical and Electronics Engineers (IEEE)</i> |
| | - Rebuilding UAB's chapter of IEEE by increasing membership |
| | - Engaging new members with IEEE hosted events such as hack-a-thons, software, and hardware competitions |
| | - Networking with local professional IEEE group to secure opportunities for members |

Chapter Secretary of Engineering Honors Society

Aug '17 - Apr '18

Organization: *Tau Beta Pi*

- Led recruitment of engineering students eligible for honors society
- Maintained and submitted important forms to headquarters

Journal Editorship

Sept '14 - May '17

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

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

SKILLS

Computer Skills:

- (*Proficient*) Python, MATLAB, Windows OS, Scikit-learn, Microsoft Suite, LTspice
- (*Competent*) C/C++, Java, ROS, Linux (Ubuntu), Jupyter Notebooks, OSX, SolidWorks
- (*Intermediate*) Cadence, LabVIEW
- (*Familiar*) Keras, Tensorflow, L^AT_EX, HTML, Assembly

Hardware Skills:

- (*Proficient*) Breadboarding, soldering, wiring and programming microcontrollers (Arduino, Raspberry Pi, BeagleBone), testing with function generators and oscilloscopes

Circuits Implemented:

- (*Amplifiers*) Op-amp (inverting, non-inverting, instrumentation), BJT (common emitter, common base, common collector), MOSFET (common drain, common source, class A, class AB)
- (*Filters*) Passive and active filters (low-pass, high-pass, band-pass)
- (*Precision Rectifiers*) Half wave and full wave
- (*Misc.*) Schmitt trigger, multivibrator, current mirrors
- (*Multistage Circuits*) EKG, microphone and speaker amplifier circuit, alarm clock

RELEVANT COURSEWORK

Software:

Engineering Graphics (CAD), Computer Methodology in Engineering (MATLAB), Engineering Programming Method (C), Engineering Programming using Objects (Java), Intro to Python (Udacity course)

Hardware:

Bioinstrumentation, Digital Logic, Circuits I and II, Intro to Microprocessors, Electromagnetics, Electronics, Machinery, Analog Integrated Electronics, Medical Instrumentation

Data Analysis:

Signal Processing - Biocomputing, Bioimaging, Methods of System Analysis (Signals and Systems)

Probability & Statistics - Living Systems Analysis (for biology), Engineering Problem Solving II

Misc. - Linear Algebra, Cardiac Electrophysiology (mathematical modeling), Machine Learning in EGR

Courses relevant to Human Robot Interaction:

Control Systems, Introductory Biology 1 and 2, Psychology, Sociology, Biomechanics of Solids, Principles of Human Physiology, Modern Control Theory (spring 2019 registration)