

# MICHAEL SCOTT FULTON

Currently in Minneapolis, MN

michaelscottfulton.com  $\diamond$  github.com/fultonms

+1-315-261-3170  $\diamond$  fulto081@umn.edu

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## EDUCATION

### Ph.D – Computer Science

August 2017 - Expected Fall 2022

*Advisor:* Junaed Sattar

College of Science and Engineering, University of Minnesota-Twin Cities

Focus in robotics, field robotics, and human-robot interaction.

### MS. – Computer Science

August 2017 - December 2019

*Advisor:* Junaed Sattar

College of Science and Engineering, University of Minnesota-Twin Cities

### B.S. – Computer Science

August 2013 - May 2017

College of Arts and Sciences, Clarkson University

Minor in Mathematics

## RESEARCH EXPERIENCE

### Research Interests

- Field robotics, particular underwater robotics.
- Human-robot interaction in challenging, unstructured environments, particularly underwater.
- Object detection and robot perception for marine fauna and litter.
- Development of new field robots for specific tasks and domains.
- Application of field robotics to biological field science.
- Heterogeneous teams of multi-domain field robots for coordinated task completion.

### Graduate Research Assistant

August 2017-Present

*Interactive Robotics and Vision Lab — Junaed Sattar*

*University of Minnesota—Twin Cities*

- Collaboratively designed and built a new low-cost, open-source, micro-AUV for general use.
- Designed and prototyped a buoyancy-controlled AUV for long-term sensor monitoring underwater.
- Created and released multiple annotated datasets including images of divers and marine trash.
- Improved upon pre-existing methods for underwater diver detection.
- Explored methods for underwater object detection for use in marine trash detection and cleanup.
- Prototyped an algorithm for localization of an AUV using bathymetric maps and observations.
- Created a new method for communicating information from an AUV to a human using motion.
- Created new methods and devices for underwater robot-to-human communication.
- Researched algorithms and methods for underwater localization, object detection, and interaction.
- Maintained and improved a variety of robots, both in terms of software and hardware.
- Coordinated numerous lab experimental trials in pools, lakes, and ocean.

### Undergraduate Research Assistant

January 2015 - March 2016

*RAIL Lab — Junaed Sattar*

*Clarkson University*

- Designed and explored vision algorithms for lane identification in driving videos.
- Developed a system for recording video, location, and accelerations while driving.
- Collected, organized, and analyzed over 200 GB of driving data.

## TEACHING EXPERIENCE

### Teaching Interests

- Robotics (Programming, Perception, and Navigation)
- Human Robot Interaction and Interfaces
- Computer Vision, Machine Learning, and Artificial Intelligence
- Programming (Basics, Data Structures, Operating Systems, Algorithms, etc.)

### Teaching Assistant, CSCI 5551

Fall 2020

*Introduction To Intelligent Robotic Systems*

*University of Minnesota—Twin Cities*

- Taught lectures (pre-recorded and live) on core ROS concepts.
- Designed, wrote, and created automated grading for a homework on navigation with ROS.
- Conducted weekly office hours to aide students in understanding course materials.
- Created innovative new course policies, structures, and materials with professor and TA's in order to cope with the online format forced by COVID-19.
- Collaborated with professor and TA's on course material and grading policies.
- Managed LMS software (Canvas) for the entire course.

### Teaching Assistant, CSCI 4061

Spring 2018

*Introduction to Operating Systems*

*University of Minnesota—Twin Cities*

- Taught weekly labs, teaching students operating systems programming concepts based on lectures.
- Conducted office hours to help students understand the course material and solve homework problems.
- Wrote a programming assignment testing students on their knowledge of socket-based network programming in C and developed grading tools for that assignment.
- Graded weekly labs and four programming assignments.
- Helped to respond to student emails and questions on a course-wide help email.
- Collaborated with professor and TA's on course material and grading policies.

### Substitute Lecturer, CSCI 5551

Fall 2017

*Introduction to Intelligent Robotic Systems*

*University of Minnesota—Twin Cities*

- Introduced students to programming for ROS (Robot Operating System).
- Explained core concepts of ROS including nodes, topics, services, messages, and the ROS graph.
- Covered simple ROS command line tools and ROS build system.

### Substitute Lecturer, CS 141

Fall 2016

*Introduction To Computer Science*

*Clarkson University*

- Introduced basic programming concepts such as variables, types, and data representation.
- Reviewed concepts including loops and flow control.
- Provided informal tutoring for a number of students in this course through the semester.

### Workshops and Seminars

Fall 2015-Fall 2016

*Clarkson Open Source Institute*

*Clarkson University*

- Taught workshops covering topics such as computer vision and Android development basics.

- Taught a series of workshops covering simple robotics concepts and ROS use.
- Gave a number of brief, informative talks on subjects in computer science.

## FELLOWSHIPS AND AWARDS

- NSF Graduate Research Fellowship September 2019 - Present
- UMN Graduate School Excellence Research Grant September 2019 - Present
- Graduate Assistance in Areas of National Need Fellowship September 2018 - September 2019
- Miller/Davis Service Award for Computer Science, Clarkson University May 2017

## SCHOLARSHIP

### Journal Articles

- **Michael Fulton**, Chelsey Edge, Junaed Sattar. *Robot Communication Via Motion: A Study on Modalities for Robot-to-Human Communication in the Field*, accepted for publication in ACM Transactions on Human-Robot Interaction, October 2021.
- Md Jahidul Islam, **Michael Fulton**, Junaed Sattar. *Towards a Generic Diver-Following Algorithm: Balancing Robustness and Efficiency in Deep Visual Detection.*, Robotics and Automation Letters, in IEEE Robotics and Automation Letters, vol. 4, no. 1, pp. 113-120, Jan. 2019, doi: 10.1109/LRA.2018.2882856.

### Conference Publications

- **Michael Fulton**, Jungseok Hong, Junaed Sattar. *Using Monocular Vision and Human Body Priors for AUVs to Autonomously Approach Divers*. Accepted for publication at IEEE International Conference on Robotics and Automation, Philadelphia, 2022.
- Tanmay Agarwal, **Michael Fulton**, Junaed Sattar. *Predicting the Future Motion of Divers for Enhanced Underwater Human-Robot Collaboration*. IEEE/RSJ International Conference on Intelligent Robots and Systems, Prague, 2021.
- Karin de Lagnis, **Michael Fulton**, Junaed Sattar. *Towards Robust Visual Diver Detection Onboard Autonomous Underwater Robots: Assessing the Effects of Models and Data*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Prague, 2021.
- Chelsey Edge, Sadman Sakib Enan, **Michael Fulton**, Jungseok Hong, Jiawei Mo, Kimberly Barthelemy, Hunter Bashaw, Berik Kallevig, Corey Knutson, Kevin Orpen, Junaed Sattar, *Design and Experiments with LoCO AUV: A Low Cost Open-Source Autonomous Underwater Vehicle*, International Conference on Intelligent Robots and Systems, Virtual, 2020. (Authors listed semi-alphabetically)
- Jungseok Hong, **Michael Fulton**, Junaed Sattar. *A Generative Approach Towards Improved Robotic Detection of Marine Litter*. IEEE International Conference on Robotics and Automation, Paris, 2020.
- **Michael Fulton**, Chelsey Edge, Junaed Sattar. *Robot Communication Via Motion: Closing the Underwater Human-Robot Interaction Loop*. IEEE International Conference on Robotics and Automation, Montreal, 2019.
- **Michael Fulton**, Jungseok Hong, Md Jahidul Islam, Junaed Sattar. *Robotic Detection of Marine Litter Using Deep Visual Detection Models*. IEEE International Conference on Robotics and Automation, Montreal, 2019.
- Md Jahidul Islam, **Michael Fulton**, Junaed Sattar. *Towards a Generic Diver-Following Algorithm: Balancing Robustness and Efficiency in Deep Visual Detection*. IEEE International Conference on Robotics and Automation, Montreal, 2019.

### Presentations

- **Michael Fulton**, *Predicting the Future Motion of Divers for Enhanced Underwater man-Robot Collaboration*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Virtual, 2021. (Presentation recorded as a video due to COVID-19).
- **Michael Fulton**. *LoCO-AUV*, IEEE/RSJ International Conference on Intelligent Robots and Systems, Virtual, 2020. (Presentation recorded as a video due to COVID-19).
- **Michael Fulton**. *Robot Communication Via Motion: Closing the Underwater Human-Robot Interaction Loop*. University of Minnesota — Twin Cities, Visual Computing and Artificial Intelligence Seminar [VCAI]

### Interactive Presentation Sessions

- **Michael Fulton**, Chelsey Edge, Junaed Sattar. *Robot Communication Via Motion: Closing the Underwater Human-Robot Interaction Loop*. International Conference on Robotics and Automation, Montreal, 2019.
- **Michael Fulton**, Jungseok Hong, Md Jahidul Islam, Junaed Sattar. *Robotic Detection of Marine Litter Using Deep Visual Detection Models*. International Conference on Robotics and Automation, Montreal, 2019.
- Md Jahidul Islam, **Michael Fulton**, Junaed Sattar. *Towards a Generic Diver-Following Algorithm: Balancing Robustness and Efficiency in Deep Visual Detection*. International Conference on Robotics and Automation, Montreal, 2019.

### Workshop Presentations

- Chelsey Edge, Sadman Sakib Enan, **Michael Fulton**, Jungseok Hong, Junaed Sattar. *Power-On-and-Go Capabilities for a Low-Cost Modular Autonomous Underwater Vehicle*, Robotics: Science and Systems – Power-On-and-Go Workshop, Virtual, 2020.

## SERVICE

**Minnesota Robotics Institute Outreach (MnRI Gadgets)** Spring 2020-Present  
*Content Creator* *University of Minnesota*

- Created a new outreach program for children stuck at home during COVID-19.
- Designed, built, and programmed multiple Arduino gadgets for children.
- Taught Arduino programming and device design through tutorials on said gadgets.
- Recorded video tutorials available at <https://cse.umn.edu/mnri/mnri-video-hub>

**Computer Science Graduate Student Association** Fall 2019-Summer 2020  
*Student Officer* *University of Minnesota*

- Planned and managed social events for the computer science graduate student association.
- Planned and participated in welcome events for new and prospective graduate students.

**Graduate Research and Discussion Seminar** Spring 2019-Summer 2020  
*Coordinator* *University of Minnesota*

- Managed a bi-weekly seminar for graduate students to present their work.
- Coordinated speakers, announced seminars, solicited support from local business, and purchased food for bi-weekly seminars.

**MNDrive Scholars Tech Camps** Summer 2018  
*Counselor for middle school STEM camp* *University of Minnesota*

- Taught STEM concepts, including circuits, simple Arduino programming, and soldering to children from local middle schools.
- Developed and improved curriculum for future summer tech camps.

**Clarkson Open Source Institute**

August 2015 - May 2017

*Lab Director and Member*

*Clarkson University*

- Director from October 2015 to April 2017, responsible for day-to-day lab operations, meetings, events.
- Mediated discussions and performed conflict resolution when necessary.
- Founded COSI Project For Robotics, Beowulf Cluster interest group.
- Taught basic robotics programming to fifteen students over the years.

**IMPETUS Summer Roller Coaster Camp**

Summer 2014, Summer 2015

*Counselor for middle school STEM camp for underprivileged children*

*Clarkson University*

- Taught STEM concepts, simple mathematics and physics to middle and junior high school children.
- Acted as a general counselor to under-privileged students, teaching encouraging them in the pursuit of higher education and careers in STEM.

**INDUSTRY EXPERIENCE**

**Software Engineering Intern at C Speed LLC.**

May 2016 - August 2016

*Programming with C#, ASP.NET, Java, JavaFX*

*Liverpool, NY*

- Developed a system for managing over 1 TB of operating system image backups.
- Took part in development of internal time-logging web application.
- Researched programming interfaces for a RF test device, both their usability and construction.

**REFERENCES AVAILABLE UPON REQUEST**