

Dept. of Electrical and Computer Engineering  
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## Joshua G. Mangelson

### Personal

#### Degrees / Professional Preparation

Post-doctorate	Field Robotics Carnegie Mellon University, Field Robotics Center, Robotics Institute, Pittsburgh, PA. Advisors: Dr. Michael Kaess	2020
Post-doctorate	Marine Robotics University of Michigan, Dept. of Naval Arch. and Marine Engineering, Ann Arbor, MI. Advisors: Dr. Ryan M. Eustice	2019
Ph.D.	Robotics University of Michigan, Robotics Institute, Ann Arbor, MI. Advisors: Dr. Ryan M. Eustice and Dr. Ram Vasudevan	2019
M.S.	Robotics University of Michigan, Robotics Institute, Ann Arbor, MI. Advisors: Dr. Ryan M. Eustice and Dr. Jessy Grizzle	2016
B.S.	Electrical Engineering Brigham Young University, Dept. of Elec. and Comp. Engineering, Provo, UT. Advisors: Dr. Brent Nelson, Dr. Mike Wirthlin, and Dr. Brad Hutchings	2014

#### Positions

2020 - Present	Assistant Professor, Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT.
2019 - 2020	Postdoctoral Investigator, Robotics Institute, Carnegie Mellon University, Pittsburgh, PA.
2019	Postdoctoral Investigator, Department of Naval Architecture and Marine Engineering, University of Michigan, Ann Arbor, MI.
2016	Course Assistant (Perceptual Mobile Robotics), Department of Naval Architecture and Marine Engineering, University of Michigan, Ann Arbor, MI.
2014 - 2019	Graduate Research Assistant, Department of Naval Architecture and Marine Engineering, University of Michigan, Ann Arbor, MI.
2013 - 2014	Digital Systems Teaching Lab Manager, Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT.

- 2013 R&D Software Engineering Intern, LabVIEW FPGA High Level Synthesis, National Instruments, Austin, TX.
- 2012 - 2013 Undergraduate Research Assistant, NSF Center for High-Performance Reconfigurable Computing, Brigham Young University, Provo, UT.
- 2012 Teaching Assistant (Digital Systems), Department of Electrical and Computer Engineering, Brigham Young University, Provo, UT.
- 2008 - 2009 Teaching Assistant (Calculus, Trigonometry, Algebra), Math Lab, Brigham Young University, Provo, UT.

## Honors and Awards

- 2021 IEEE ICRA Best Service Robotics Paper - Finalist, IEEE International Conference on Robotics and Automation: "Tactile SLAM: Real-time Inference of Shape and Pose from Planar Pushing", by S. Suresh, M. Bauza, K. Yu, J. G. Mangelson, and M. Kaess.
- 2021 David C. Evans Chair, Brigham Young University
- 2018 IEEE ICRA Amazon Robotics Multi-Robot Systems Best Paper Award, IEEE International Conference on Robotics and Automation: "Pairwise Consistent Measurement Set Maximization for Robust Multi-robot Map Merging", by J. G. Mangelson, D. Dominic, R. M. Eustice, and R. Vasudevan.
- 2018 1st Place in OCEANS Student Poster Competition, IEEE OES/MTS OCEANS Conference: "Communication Constrained Trajectory Alignment For Multi-Agent Inspection via Linear Programming," by J. G. Mangelson, Ram Vasudevan, and R. M. Eustice.
- 2014 – 2016 University of Michigan, Robotics Institute Fellowship Recipient.
- 2013 Tau Beta Pi Scholarship Recipient.
- 2011 – 2013 Raytheon FIRST Robotics Scholarship Recipient.
- 2009 – 2014 Brigham Young University, Academic Scholarship Recipient.

## Research

### Interests

My research interests include robotic perception and mapping, autonomous underwater vehicles, vision, mobile robotics, robotic state estimation, simultaneous localization and mapping (SLAM), machine learning, graph theory, convex optimization, and multi-robot coordination and planning. I'm especially interested in developing methods that take advantage mathematical and computer engineering techniques to enable the development of field robotic systems that are guaranteed to operate reliably in complex unstructured environments. Particular application areas of interest include coral reef monitoring, infrastructure

inspection, agricultural robotics, marine robotics, and autonomous vehicles.

### Current Grants and Contracts

1. Ira A. Fulton College of Engineering, Seed Funding, "Long-term 4D Reconstruction of Individual Plants/Trees for Precision Agriculture/Forestry", \$12,500. Dec. 2021. PI:Mangelson.
2. Office of Naval Research, "Cross-Modality Localization and Mapping", \$554,840. May. 2021 - Apr. 2023. PI:Mangelson. Support 2 Grad RAs, 3-4 Undergrad RAs.
3. Office of Naval Research, "DURIP: A Re-configurable Testbed for Autonomous Heterogeneous Marine Mapping, Sensing, and Search", \$837,047. Feb. 2021 - Jan. 2022. PI:Mangelson Co-PIs: Cammy Peterson, Tracianne B. Neilson, and Brent Nelson. Support Capital Equipment.
4. Ira A. Fulton College of Engineering, Seed Funding, "An Autonomous Underwater Vehicle for Remote Sensing and Mapping Research", \$15,000. Dec. 2020. PI:Mangelson.
5. Department of Electrical and Computer Engineering, Brigham Young University, Capital Equipment Funding, "Building Modifications for AUV Test Tank", \$16,170. Aug. 2020. PI:Mangelson.

### Publications and Scholarly Presentations

\* PDFs of published and submitted papers are accessible on my website.

#### Refereed Journal Publications

1. E. R. Potokar, K. Norman, and J. G. Mangelson, "Invariant Extended Kalman Filtering for Underwater Navigation." *IEEE Robotics and Automation Letters*, 2021.
2. J. G. Mangelson, M. G. Jadidi, R. Vasudevan, and R. M. Eustice, "Characterizing the Uncertainty of Jointly Distributed Poses in the Lie Algebra." *IEEE Transactions on Robotics*, 2020.

#### Refereed Conference or Symposium Proceedings Papers

1. E. R. Potokar, S. Ashford, M. Kaess, J. Mangelson, "HoloOcean: An Underwater Robotics Simulator." *Proceedings of the IEEE International Conference on Robotics and Automation*, Philadelphia, PA, USA, May 2022.
2. S. Suresh, Z. Si, J. G. Mangelson, W. Yuan, and M. Kaess, "Efficient Shape Mapping through Dense Touch and Vision." *Proceedings of the IEEE International Conference on Robotics and Automation*, Philadelphia, PA, USA, May 2022.
3. M. Chang, W. Dong, J. Mangelson, M. Kaess, and S. Lucey, "Map Compressibility Assessment for LiDAR Registration," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Prague, Czech Republic (Online Due to COVID-19 Pandemic), Sep. 2021.
4. M. Abello, J. G. Mangelson, and M. Kaess, "A Graph-based method for joint instance segmentation of point clouds and image sequences," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Xi'an, China, May 2021.
5. M. Chang, J. Mangelson, M. Kaess, and S. Lucey, "HyperMap: Compressed 3D Map for Monocular Camera Registration," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Xi'an, China, May 2021.

6. S. Suresh, M. Bauza, K. Yu, J. G. Mangelson, A. Rodriguez, and M. Kaess, "Tactile SLAM: Real-time inference of shape and pose from planar pushing," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Xi'an, China, May 2021. **Finalist for Best Service Robotics Paper.**
7. M. Hsiao, J. G. Mangelson, S. Suresh, C. Debrunner, and M. Kaess, "ARAS: Ambiguity-aware Robust Active SLAM based on Multi-hypothesis State and Map Estimations," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, USA, Oct. 2020.
8. E. Dexheimer, J. G. Mangelson, and M. Kaess, "Efficient Multiresolution Scrolling Grid for Stereo Vision-based MAV Obstacle Avoidance," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, USA, Oct. 2020.
9. J. Jaekel, J. G. Mangelson, and M. Kaess, "A Robust Multi-stereo Visual-Inertial Odometry Pipeline," in *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems*, Las Vegas, NV, USA, Oct. 2020.
10. P. Sodhi, S. Choudhury, J. G. Mangelson, and M. Kaess, "ICS: Incremental Constrained Smoothing for State Estimation," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Paris, France, May 2020.
11. S. Suresh, P. Sodhi, J. G. Mangelson, D. Wettergreen, and M. Kaess, "Active SLAM using 3D Submap Saliency for Underwater Volumetric Exploration," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Paris, France, May 2020.
12. J. G. Mangelson, J. Liu, R. M. Eustice, and R. Vasudevan, "Guaranteed Globally Optimal Planar Pose Graph and Landmark SLAM via Sparse-Bounded Sum-of-Squares Programming," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Montreal, Canada, May 2019.
13. J. G. Mangelson, D. Dominic, R. M. Eustice, and R. Vasudevan, "Pairwise Consistent Measurement Set Maximization for Robust Multi-robot Map Merging," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Brisbane, Australia, May 2018. (40.6% Acceptance Rate). **IEEE ICRA Best Paper on Multi-Robot Systems.**
14. R. Hartley, J. G. Mangelson, L. Gan, M. G. Jadidi, J. M. Walls, R. M. Eustice, and J. W. Grizzle, "Legged Robot State-Estimation Through Combined Forward Kinematic and Preintegrated Contact Factors," in *Proceedings of the IEEE International Conference on Robotics and Automation*, Brisbane, Australia, May 2018. (40.6% Acceptance Rate).

#### Conference Papers Refereed Via Extended Abstract

1. J. G. Mangelson, R. Vasudevan, and R. M. Eustice, "Communication Constrained Trajectory Alignment For Multi-Agent Inspection via Linear Programming," in *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, Charleston, SC, October 2018. **1st Place in IEEE OCEANS Student Poster Competition**
2. J. G. Mangelson, R. W. Wolcott, P. Ozog, and R. M. Eustice, "Robust Visual Fiducials for Skin-to-Skin Relative Ship Pose Estimation," in *Proceedings of the IEEE/MTS OCEANS Conference and Exhibition*, Monterey, CA, September 2016.

#### Technical Reports and Arxiv Papers

1. R. Hartley, J. G. Mangelson, L. Gan, M. G. Jadidi, J. M. Walls, R. M. Eustice and J. W. Grizzle, "Supplementary Material: Legged Robot State-Estimation Through Combined Kinematic and Preintegrated Contact Factors," University of Michigan, 2017.

#### Dissertation

1. J. G. Mangelson, "Toward Robust Multi-Agent Underwater Inspection with Consistency and Global Optimality Guarantees," University of Michigan, 2019.

### **Invited Talks**

1. "Towards Intelligent Reliable Fully-Autonomous Information Gathering in Unstructured Marine Environments", Brigham Young University, Computer Science Seminar, Provo, Utah, Apr. 2022.
2. "Robotics in the Real World: Developing Reliable Field-Robotic Systems via Mathematical Guarantees and In-Field Testing", Oregon State University, Corvallis, Oregon, Feb. 2019.
3. "Robotics in the Real World: Developing Reliable Field-Robotic Systems via Mathematical Guarantees and In-Field Testing", Worcester Polytechnic Institute, Worcester, Massachusetts, Feb. 2019.
4. "Robotics in the Real World: Developing Reliable Field-Robotic Systems via Mathematical Guarantees and In-Field Testing", Brigham Young University, Provo, Utah, Feb. 2019.
5. "Robotics in the Real World: Developing Robust Field-Robotic Systems via Mathematical Guarantees and In-Field Testing", Stevens Institute of Technology, Hoboken, New Jersey, Jan. 2019.
6. "Robust Multi-agent Search", Unmanned Maritime Systems Technology, Program Review, Office of Naval Research, Miramar Beach, Florida, Jan. 2019.
7. "Robust Cooperative Mapping for Multi-Vehicle Ship Hull Inspection", (On Behalf of Ryan Eustice), Unmanned Maritime Systems Technology, Program Review, Office of Naval Research, Miramar Beach, Florida, Jan. 2018.
8. "Perception and Planning for In-Water Autonomous Ship Hull Inspection", (On Behalf of Ryan Eustice), Workshop on Perception and Planning for Robotic Inspection, IEEE/RSJ International Conference on Intelligent Robots and Systems, Vancouver, BC, Canada, Sept. 2017.

### **Workshop Presentations**

1. J. G. Mangelson, "Convex Optimization Techniques for Multi-Agent Autonomous Underwater Inspection," in *Robotics Science and Systems Conference Pioneers*, Pittsburgh, PA, Jun. 2018.
2. J. G. Mangelson, "Robust Multi-Agent Autonomous Underwater Inspection with Guarantees," in *Australian Centre for Robotic Vision, Robotic Vision Summer School*, Kioloa, Australia, Feb. 2018.
3. J. G. Mangelson, D. Dominic, R. M. Eustice, and R. Vasudevan, "Pairwise Consistent Measurement Set Maximization for Robust Multi-robot Map Merging," in *Multi-robot Perception-Driven Control and Planning at the IEEE International Conference on Robotics and Automation*, Singapore, Jun. 2017.
4. J. G. Mangelson, D. Dominic, R. M. Eustice, and R. Vasudevan, "Choosing Consistent Measurement for Robust Multi-robot Map Merging," poster presentation in *Midwest Robotics Workshop*, Chicago, IL, May. 2017.
5. S. A. Parkison, V. Bichucher, J. G. Mangelson, and R. M. Eustice, "Feature Learning for Estimation, A Look at Supervised Dictionary Learning for Covariance Prediction," poster presentation in *Midwest Robotics Workshop*, Chicago, IL, Mar. 2016.

## **Advised Students**

### **BYU Phd Students Advised**

1. Kalin Norman (Current Position: PhD Student at BYU)
2. Kalliyen Lay (Current Position: PhD Student at BYU)
3. Chad Samuelson (Current Position: PhD Student at BYU)
4. Derek Benham (Current Position: PhD Student at BYU)

### **BYU Masters Students Advised**

1. Devon Webb (Current Position: MS Student at BYU)
2. Easton Potokar (Current Position: MS Student at BYU)
3. Szu-Wei Lin (Current Position: MS Student at BYU)
4. Luke Heslington (Current Position: MS Student at BYU)

### **BYU Undergraduate Students Advised**

1. Aaron Newman (Current Position: Undergrad Student in Computer Engineering at BYU)
2. Spencer Ashford (Current Position: Undergrad Student in Computer Engineering at BYU)
3. Daniel Butterfield (Current Position: Undergrad Student in Computer Engineering at BYU)
4. Austin Brown (Current Position: Undergrad Student in Mechanical Engineering at BYU)
5. Kiley Atkinson (Current Position: Undergrad Student in Electrical Engineering at BYU)
6. Ethan Durrant (Current Position: Undergrad Student in Computer Engineering at BYU)
7. Nate Jacobs (Current Position: Software Development Engineer at Amazon)
8. Bridget Beatson (Current Position: Undergrad Student in Mechanical Engineering at BYU)
9. Bryton Smith (Current Position: Northrop Grumman)
10. Levi Pike (Current Position: Industry)

### **CMU Phd Students Mentored/Advised**

1. Montiel Abello (Current Position: PhD Student at CMU)
2. Sudharshan Suresh (Current Position: PhD Student at CMU)
3. Allie Chang (Current Position: PhD Student at CMU)
4. Paloma Sodhi (Current Position: PhD Student at CMU)
5. Ming Hsiao (Current Position: Research Scientist at Facebook Reality Labs)
6. Eric Westman (Current Position: Robotics Software Engineer at Argo AI)

### **CMU Masters Students Mentored/Advised**

1. Allison Wong (Current Position: Mechanical Engineer II at Martin Defense Group)
2. Chenfeng Tu (Current Position: Computer Vision Research Engineer at Apple)
3. Eric Dexheimer (Current Position: Masters Student at CMU)
4. Joshua Jaekel (Current Position: Software Engineer at Argo AI)

## Dissertation or Thesis Chair/Committee Member

### PhD Dissertation Committee

1. Kalin Norman, **Committee Chair**, Preliminary Title: "Cross-modality Multi-Agent Localization for Autonomous Underwater Navigation", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
2. Kalliyan Lay, **Committee Chair**, Preliminary Title: "Communication-Constrained Multi-agent Underwater Mapping/Search", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
3. Chad Samuelson, **Committee Chair**, Preliminary Title: "Active AUV Data-collection using Hyperspectral Cameras", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
4. Derek Benham, **Committee Chair**, Preliminary Title: "Gaussian Process-Based 3D Mapping", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
5. Casey Sun, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
6. Zheng Sun, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
7. Jen Jui Liu, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
8. Montiel Abello, **Committee Member**, Title: TBD, Robotics Institute, Carnegie Mellon University, Status: In Progress

### Masters Thesis Committee

1. Easton Potokar, **Committee Chair**, Preliminary Title: "Invariant Kalman Filtering for AUV Localization", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
2. Luke Heslington, **Committee Chair**, Preliminary Title: "Autonomous Wheelchair Localization from 2D Floor Plans", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
3. Devon Webb, **Committee Chair**, Preliminary Title: "Automatic Robotic System Fault Detection and Diagnosis", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
4. Szu-Wei Lin, **Committee Chair**, Preliminary Title: "In-FPGA Robotic Localization and Mapping via HLS", Electrical and Computer Engineering, Brigham Young University, Status: In Progress
5. Richard Henrichsen, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
6. Jian-wei Lin, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
7. Joseph Meira, **Committee Member**, Title: TBD, Electrical and Computer Engineering, Brigham Young University, Status: In Progress
8. Tanner Norton, **Committee Member**, Title: TBD, Computer Science, Brigham Young University, Status: In Progress

### Undergraduate Honors Thesis

1. Spencer Ashford, **Adviser**, Title: TBD, Computer Engineering, Brigham Young University, Status: In Progress

**Other****AUV (Autonomous Underwater Vehicle) and Marine Field Testing Deployments and Experiments**

1. BYU Clearpath Heron ASV autonomous reef mapping and reconstruction, Molokai, Hawaii, Nov. 2021.
2. Multi-Vehicle Bluefin HAUV hull inspection mapping of the *USNS Curtiss*, San Diego, California, Nov. 2018.
3. Multi-Vehicle Bluefin HAUV testing at Field Robotics Center, Carnegie Mellon University, Pittsburgh, PA, Jun. 2018.
4. Multi-Vehicle Bluefin HAUV hull inspection mapping of the *USNS Curtiss*, San Diego, California, Mar. 2018.
5. Multi-Vehicle Bluefin HAUV hull inspection mapping of the *USCGC Spencer*, Boston, Massachusetts, Jul. 2017.
6. Multi-Vehicle Bluefin HAUV hull inspection mapping of the *USS Mercy*, San Diego, California, Mar. 2017.
7. Bluefin HAUV initial vehicle testing after vehicle upgrade, Quincy, MA, Feb. 2017.
8. Bluefin HAUV hull inspection mapping of the *USNS Curtiss*, San Diego, California, Aug. 2016.
9. Ship motion estimation field trial on board the *USNS John Glenn* and the *USNS Bob Hope* off the coast of Oceanside, California as part of the Environmental Ship Motion Forecasting (ESMF) project, Nov. 2015.
10. Bluefin HAUV testing at Marine Hydrodynamics Laboratory, University of Michigan, Ann Arbor, Michigan, Nov. 2017.
11. Bluefin HAUV hull inspection mapping of the *USNS Curtiss*, San Diego, California, Jun. 2015.
12. UMich Iver2 AUV cooperative acoustic navigation testing, University of Michigan Biological Station, Douglas Lake, Pellston, Michigan, Jul. 2014.



## Teaching

### New courses introduced at Brigham Young University

#### ECEN 633 Robotic Localization and Mapping

Mobile robotic systems depend on the ability to perceive their environment, determine their location, and build up a model of their surroundings. Furthermore, when operating in the real-world, these tasks must be accomplished simultaneously and in real-time, while taking into account the effects of uncertainty derived from noisy sensors, incorrect models, and complex unstructured environments. In this course, we will explore fundamental problems central to mobile robotic systems, including localization, mapping, simultaneous localization and mapping (SLAM), and path planning. Students in the course will gain hands-on experience implementing and working with fundamental and state-of-the-art algorithms and methods for solving these problems. Topics include Bayesian filtering; sensor-fusion; sensor models (for a variety of sensing modalities); and applications to autonomous marine ground, and air vehicles.

After taking this course, students will be prepared to begin contributing to research relating to mobile robotic localization, mapping, SLAM, and perception. Students will be able to analyze specific instances of common mobile robotic system challenges such as localization, mapping, SLAM, and navigation planning and then evaluate and apply historical and modern solutions to solve them.

- This course was adapted from courses taught by Ryan Eustice and Edwin Olson at the University of Michigan and Michael Kaess at Carnegie Mellon University. It was introduced at BYU Fall 2020.

### Courses taught at Brigham Young University

#### Regular Courses

Course #	Course Title	Teaching Role	Term	Enrolled
ECEN 633(522R)	Robotic Localization and Mapping	Instructor	Fall 2020	12
ECEN 424	Computer Systems	Instructor	Winter 2021	46
ECEN 633(522R)	Robotic Localization and Mapping	Instructor	Fall 2021	25
ECEN 424	Computer Systems	Instructor	Winter 2022	32

#### Independent Study/Research Courses

Course #	Course Title	Term	Student
ECEN 493R	Independent Res. (Embedded Wheelchair Interface)	Winter 2021	Nate Jacobs

#### Capstone/Senior Projects

Cap./Sen. Proj.	Project Title	Role	Term(s)	# of Students
Capstone	Samoan Reef Characterization	Liaison Engineer	F20-W21	7
Capstone	Virtual RobotX Competition	Sponsor/Advisor	F21-W22	4

### Invited Educational Talks

- “Perceptual Robotics Lab (PeRL) an overview,” Introduction to Engineering (ENGR 100), University of Michigan, Ann Arbor, Michigan, USA, Mar. 2016.
- “Real World Robotics,” CubScouts Pack 3200, Ann Arbor, Michigan, USA, Mar. 2017.
- “Robotic Perception,” Introduction to Computers and Programming (ENGR 101), University of Michigan, Ann Arbor, Michigan, USA, Apr. 2017.

## **Outreach/Other Activities Directly Related to Teaching**

- Experience mentoring and working with undergraduate and early PhD students, 2015 – present.
- Exhibitor with Perceptual Robotics Lab at Michigan Robotics Day, University of Michigan, Ann Arbor, Michigan, 2015 – 2016.

## **Service/Citizenship**

### **Service to Community**

- Cub Scout Den Leader, Boy Scouts of America, Southern Shores Field Service Council, Pack 3200, 2014 – 2017.

### **Service to the Department, College, and/or University**

#### **Brigham Young University**

- Member, Graduate Committee, Department of Electrical and Computer Engineering, 2020 – Present.
  - Managed Annual 3MT (Three minute thesis) Competition
  - Supported Graduate Student Admissions
- Organizer, BYU Robotics Seminar, 2020 – Present.

#### **University of Michigan**

- Member, University of Michigan College of Engineering Graduate Student Advisement Council, Robotics Rep, 2014 – 2016.
- Co-Founder, Robotics Graduate Student Council, 2014.

### **Service to Government or Professional Organizations**

#### **National Science Foundation - Review Panel**

- Review Panel Member - CISE Directorate - Division of Information and Intelligent Systems - 2021

#### **Associate Editor/Program Committee for International Conferences**

- Associate Editor, IEEE, International Conference on Intelligent Robots and Systems (IROS) - 2021
- Associate Editor-, IEEE, International Conference on Intelligent Robots and Systems (IROS) - 2022

#### **Conference/Workshop Organizing Committees**

- RSS Pioneers 2019 Organizing Committee, Local Arrangements Chair
- RSS Pioneers 2019 Organizing Committee, Program Committee Member

#### **Session Chair/Co-Chair for International Conferences**

- IEEE, International Conference on Robotics and Automation (ICRA) -
  - Marine Robotics and Localization Session - 2022

IEEE, International Conference on Intelligent Robots and Systems (IROS) -

- SLAM Session - 2020

#### **Reviewer for International Journals**

- IEEE, Transactions on Robotics (TRO) - 2019, 2020, 2021.
- IEEE, Robotics and Automation Letters (RAL) - 2019, 2020, 2021, 2022.
- Autonomous Robots (AURO) - 2019, 2020.
- IEEE, Journal of Oceanic Engineering (JOE) - 2021, 2022.

#### **Reviewer for International Conferences and Workshops**

- IEEE, International Conference on Robotics and Automation (ICRA) - 2016, 2017, 2018, 2019, 2020, 2021, 2022.
- IEEE, International Conference on Intelligent Robots and Systems (IROS) - 2017, 2018, 2019, 2020, 2022.
- Robotics: Science and Systems (RSS) - 2019.
- Robotics: Science and Systems Pioneers - RSS Pioneers, 2018.
- IEEE, International Symposium on Multi-Robot and Multi-Agent Systems, 2021.

#### **Professional Membership**

- Member, Institute of Electrical and Electronics Engineers (IEEE), 2019 – Present.
- Student Member, Institute of Electrical and Electronics Engineers (IEEE), 2013 – 2019.
- Member, IEEE Robotics and Automation Society (RAS), 2014 – Present.
- Member, IEEE Control Systems Society (CSS), 2014 – Present.
- Member, IEEE Signal Processing Society (SPS), 2016 – Present.
- Member, IEEE Eta Kappa Nu Honor Society (HKN), 2013 – Present.
- Member, Tau Beta Pi Engineering Honor Society (TBP), 2012 – Present.

## **Media**

- IEEE OES (Oceanic Engineering Society) Beacon, Dec. 2018.
- MTS (Marine Technology Society) Currents, Dec. 2018.
- “Speaking like dolphins, a robot fleet takes on underwater tasks”, The Michigan Engineer, Nov. 2018.