

Merrill Edmonds

W.E.B. DuBois Fellow
Mechanical and Aerospace Engineering
Rutgers, The State University of New Jersey
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EDUCATION

PhD Mechanical and Aerospace Engineering Sep 2014 – Jul 2021 (Expected)
Rutgers University, Piscataway, NJ GPA: 3.86

BSE Mechanical Engineering Sep 2008 – May 2012
Duke University, Durham, NC GPA: 3.65

WORK EXPERIENCE

Graduate Researcher Jan 2015 – Present
Robotics, Automation and Mechatronics (RAM) Lab, Rutgers University Piscataway, NJ

Advised by Dr. Jingang Yi

Research focusing on optimal control, machine learning, artificial intelligence, multirobot systems, robot vision and perception, and mobile robotics

- Designed and built agile quadcopter platform for learning-based optimal control applications
- Designed and developed multirobot/UAV testbed prototype
- Developed and studied model predictive control (MPC) based trajectory optimization method
- Built and programmed manipulator-based plant scanning system

Graduate Research Intern May 2019 – Oct 2019
Siemens Corporate Technology Princeton Princeton, NJ

CT RDA FOA ART-US / Future of Food

Food related research topics under the Automation Runtime Systems (ART) team.

- Design, fabrication, coding, testing related to food project in collaboration with Rutgers RAM Lab

Teaching Assistant Sep 2015 – May 2018
Dept. of Mechanical and Aerospace Engineering, Rutgers University Piscataway, NJ

Head TA for MAE 467/487 Senior Capstone Projects course with Prof. Assimina Pelegri.

- Responsible for: (1) course management, grading; (2) budget management, requisitions, receiving, distribution; (3) project management and advising; (4) annual MAE expo organization, logistics.
- Oversaw projects spanning all MAE topics. 240 students per class, divided into 40 groups.
- Created style guide and promotional material for the course and department.

PUBLICATIONS

- **M. Edmonds***, J. Yi. "Determining Spectrally-Optimal Next-Best-Views for Multi-View 3D Hyperspectral Reconstructions." In Preparation.
- **M. Edmonds***, J. Yi. "Learning-Based Near-Surface Modeling for Predictive Multirotor Landing Control." Submitted.
- **M. Edmonds***, T. Yigit, J. Yi. "Resolution-Optimal, Energy-Constrained Mission Planning for Unmanned Aerial/Ground Crop Inspections." Submitted.
- **M. Edmonds***, J. Yi. "Efficient Multi-Robot Inspection of Row Crops via Kernel Estimation and Region-Based Task Allocation." 2021 IEEE International Conference on Robotics and Automation (ICRA), Xi'an, China, 2021. Accepted.
- **M. Edmonds***, T. Yigit, V. Hong, F. Sikandar, J. Yi. "Optimal Trajectories for Autonomous Human-Following Carts with Gesture-Based Contactless Positioning Suggestions." 2021 American Control Conference (ACC), New Orleans, LA, USA, 2021. Accepted.

- **M. Edmonds***, T. Yigit, J. Yi. "Auto-Calibrated 3D Hyperspectral Scanning Using a Heterogeneous Set of Cameras and Lights with Spectrally-Optimal Next-Best-View Planning." 2020 IEEE 16th International Conference on Automation Science and Engineering (CASE). Hong Kong, Hong Kong, 2020, pp. 863-868. Virtual Conference.
- S. Luo, **M. Edmonds**, J. Yi*, X. Zhou, Y. Shen. "Spline-based Modeling and Control of Soft Robots." 2020 IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM). Boston, MA, USA, 2020, pp. 482-487. Virtual Conference.
- **M. Edmonds***, J. Yi, N. K. Singa, L. Wang. "Generation of High-Density Hyperspectral Point Clouds of Crops with Robotic Multi-Camera Planning." 2019 IEEE 15th International Conference on Automation Science and Engineering (CASE). Vancouver, BC, Canada, 2019, pp. 1475-1480.
- **M. Edmonds***, J. Yi. "A Model Predictive Control Based Iterative Trajectory Optimization Method for Systems with State-Like Disturbances." 2019 American Control Conference (ACC), Philadelphia, PA, USA, 2019, pp. 1635-1640.

CONFERENCE POSTERS

- A. Jalvani*, **M. Edmonds**, Y. Gong, K.Chen, J. Yi. "Development of a Bikebot with Mobile Manipulator for Evaluation and Intervention Systems for Densely-Grown Horticultural Crops." 2020 IEEE/ASME International Conf. on Advanced Intelligent Mechatronics (AIM). Boston, MA, USA. Virtual Conference.

PROJECTS

Cloud-Based Autonomous Robotic Evaluation System for Agriculture App., <i>Project Lead</i>	2018-Present
RAM Lab Agile Quadcopters, <i>Project Lead</i>	2017-Present
Energy Harvesting Buoy, <i>Data Collection, Analysis, CAD</i>	2011-2012
Ship Scrubbing ROV, <i>Design, Manufacturing, Testing</i>	2011
Magnetic Levitation Controller, <i>Coding, Testing</i>	2010
Modular Toy Design, <i>CAD, Prototyping</i>	2008

AWARDS AND HONORS

Siemens FutureMakers 2018 First Place, Team Leader	May 2018
Rutgers TA/GA Excellence Award	March 2017, March 2018
MAE Design and Manufacturing Leadership and Support Award	May 2016, May 2017, May 2018
Travel Awards	
ACC 2021 Student Registration Grant	April 2021
CASE 2019 Student Travel Award	June 2019
MAE Conference Travel Award	May 2019
ACC 2019 Student Travel Award	April 2019
Rutgers SOE W.E.B. DuBois Fellowship	April 2014

PROFESSIONAL ACTIVITIES

Reviewer for

- Conferences: *IEEE Intelligent Transportation Systems Conference (ITSC)* (2019), *American Control Conference (ACC)* (2019), *IEEE/RSJ International Conference on Intelligent Robots and Systems Mechatronics (IROS)* (2018, 2021), *International Symposium on Applied Abstraction and Integrated Design (AAID)* (2017), *ASME Dynamic Systems and Control Conference (DSCC)* (2020), *IEEE International Conference on Advanced Intelligent Mechatronics (AIM)* (2020), *IEEE International Conference on Automation Science and Engineering (CASE)* (2020, 2021), *IEEE International Conference on Robotics and Automation (ICRA)* (2020), *Modeling, Estimation and Control Conference (MECC)* (2021)
- Journals: *IEEE Transactions on Automation Science and Engineering (T-ASE)* (2019, 2021), *Mechatronics* (2017, 2020), *IEEE Robotics and Automation Letters (RA-L)* (2020)

Judge/Panelist for

- Competitions: Rutgers MAE Expo Design Competition (May 2018, April 2019, May 2020), RBS Tech Ventures Rocket Pitch Competition (December 2016, April 2017, December 2017, April 2018)

Leadership Positions

- IEEE/ASME AIM2020, Volunteer Coordinator (July 2020)
- MAE Senior Capstone Projects, Head TA (2015-2018)
- Annual MAE Design & Manufacturing Expo, Organizer (2015-2018)

Guest Lecturer

- MAE467: Design and Manufacturing / Capstone
Prototyping Tools for Modern Electronics Projects (Nov 2020)
Crash Course on Prototyping with Electronics (Dec 2019)
Designing with Electronics: Using SBCs and Microcontrollers (Oct 2018)
Making Scientific Posters (Mar 2017, Feb 2018)
- MAE401: Dynamic Systems and Control
Root locus method, Bode plots (Nov 2019)
Open loop vs. Closed loop systems (Nov 2019)
Stability, Routh criterion, Equations of motion (Oct 2019)
- MAE524: Optimal Design in Mechanical Engineering
Nonlinear optimization with equality and inequality constraints (Apr 2019)

MENTORSHIP/SUPERVISING

Tyler Zhao (Spring 2021 - Summer 2021) Victoria Hong (Summer 2020 - Summer 2021), Kian Agrawala (Fall 2019 - Fall 2020), Faiza Sikandar (Fall 2019 - Fall 2020), Kenneth Cantos (Fall 2019 - Fall 2020), Meghan McSpirtt (Spring 2019), Greg Geueke (Spring 2019), David Ezrapour (Fall 2018), Jason Feng (Summer 2018), Ravina Jani (Summer 2017 - Spring 2018), Vikram Para (Spring 2018)

AFFILIATIONS

ASME Member (2013-), IEEE Student Member (2014-), Pi Tau Sigma Engineering Honor Society Pi Iota Chapter (2010-), Robert College of Istanbul / RCAA (2008-)

CERTIFICATIONS

Engineer in Training, N.C. (2012), Preparing for the Professoriate (2015), Teaching with Technology (2015)

SKILLS

Engineering/Math Applications (MATLAB, Simulink, LabVIEW, Maple, SolidWorks, Git, Arduino IDE, ROS)
Programming Languages (C++, C, Python, Java, C#, JavaScript, CSS)
Development Libraries/Toolkits (TensorFlow/Keras, OpenCV, OpenGL, CUDA)
Languages (English: Native, Turkish: Native, German: Elementary, Spanish: Beginner, French: Beginner)