Samuel J. Burns IV

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Education

Ph.D., Mechanical Engineering Fall 2021 – August 2025

Tufts University, *Medford, MA*

- GPA: 4.0, Advisor: Dr. Matthew Woodward
- Dissertation: *"Design, Control and Estimation with the MultiMo-MHR: a Multi-Modal Monopedal High Performance Hopping Robot"*

B.S., Mechanical Engineering, Minor in Robotics Fall 2017 – Spring 2021

University of Massachusets Lowell *Lowell, MA*

- GPA: 4.0

Publications

1. **Burns, S.**, "Design, Control and Estimation with the MultiMo-MHR: a Multi-Modal Monopedal High Performance Hopping Robot", PhD. dissertation, Tufts University. August 2025.
2. **Burns, S.**, and Woodward, M., (under review) "Optimized Kalman Filter based State Estimation and Height Control in Hopping Robots", *IEEE Transactions on Mechatronics*.
3. **Burns, S.**, and Woodward, M., "Design and Control of a High-Performance Hopping Robot", *IEEE Robotics and Automation Letters*, vol. 10, pp. 5641–5648, June 2025.
4. Baghirzade, M., **Burns, S.**, Sun, H., Sobkowicz, M., Johnston, S., Mack, J., "Experimental Evaluation of Microclimate Cooling Garments Under Controlled Ambient Conditions." 2019. *ASME 2019 International Mechanical Engineering Congress and Exposition*.

Experience

Graduate Research Assistant September 2021 – August 2025

Tufts University, *Medford, MA*

- The Robot Locomotion & Biomechanics Laboratory (RLB lab)
- Conducted research centered hopping robotics, to enhance design, control and estimation capabilities under high performance and high energy hopping.
- Assisted and led undergrad and high-school interns on their research projects like swarm robotics, robot foot design and a gliding robot.

Graduate Teaching Assistant September 2022 – May 2024

Tufts University, *Medford, MA*

- Bray Machine Shop
- Assisted and taught students how to operate machines including: Mill, Lathe, Waterjet, Laser cutter, bandsaw, and more. Design and fabrication consultation for class and personal projects. Personally operated a Motion Capture studio for class and research purposes.
- Provided office hours for a robotics course to assist with class related projects/assignments.

Undergraduate Research Assistant Spring 2021

University of Massachusets Lowell *Lowell, MA*

- The Terrain Robotics Advanced Control and Experimentation (TRACE) Lab
- Created a visualizer for two robot platforms, a quadrupedal robot (Laikago) and a bipedal robot (Digit). The visualizer will assist in debugging and testing by providing visual indications for sensors on the robots.

Undergraduate Research Assistant Fall 2018 – Spring 2021

University of Massachusets Lowell *Lowell, MA*

- The Energy and Combustion Research Laboratory (ECRL)
- Evaluation of Microclimate Cooling Garments for Military applications through designing and creation of a testing apparatus to determine the performance of current vests for further improvement.
- Data analysis and collaboration between Blackburn Energy and the UML Energy and Combustion research lab. Utilizing MATLAB, engine idle event data with accessory usage was analyzed and plotted to determine product effectiveness.

Undergraduate Research May 2019 – August 2019

Texas A&M *College Station, TX*

- Energy and Propulsion REU
- Utilizing high speed cameras, a cascade wind tunnel, and a Pressure Sensitive Paint to evaluate the effectiveness of coolant on gas turbine blades through variation of parameters to improve the performance and output of gas turbines.

Walmart Electronics Department Sales Associate June 2018 – August 2018

Lunenburg, MA

- Assist customers with questions regarding electronics, maintain inventory, utilize register, and ensure a good customer experience.

Skills

Languages : MATLAB, Python, C, C++, ROS, SIMULINK
Software : SOLIDWORKS (Certified SOLIDWORKS Associate), Arduino, LabVIEW, Microsoft Suite, SketchUp, Adobe Creative Suite, MATLAB Deep Learning Certificate
Technical : mill, lathe, laser cutter, water-jet

Relevant Coursework

Graduate Courses

Artificial Intelligence, Manufacturing Processes And Materials Technology, Digital Control Of Dynamic Systems, Numerical Methods, Solid Mechanics, Advanced Dynamics, Machine Learning, GPS & Inertial Navigation, Aerodynamics, Probabilistic robotics, Real-time embedded systems, Architectural Acoustics

Undergraduate Courses

Mobile Robotics, Modern Control Systems, Microprocessors Systems Design, Application Programming, Logic Design, Applied Strength of materials, Thermal Fluids, Fluid Mechanics, Heat Transfer, Thermodynamics, Statics, Dynamics, Kinematics, Dynamic Systems Analysis, Differential Equations

Fellowships

Stern Endowed Graduate Research Fellowship Fall 2024 – Spring 2025
Tufts University, Provost Leadership Fellowship – Doctoral Category Fall 2021

Honors

University of Massachusetts Lowell Trustee's Key May 2021
UMass Lowell Chancellor's Medal for Distinguished Academic Achievement May 2021
UMass Lowell Dean's Medal for Outstanding Academic Achievement May 2021
University of Massachusetts Lowell Commonwealth Honors College Fall 2017 – Spring 2021
University of Massachusetts Lowell Dean's Scholarship Fall 2017 – Spring 2021
University of Massachusetts Lowell Dean's List (GPA over 3.25) Fall 2017 – Spring 2021