Tyler M. Hummer

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Education

Northwestern University | McCormick School of Engineering | Evanston, IL
Doctor of Philosophy in Mechanical Engineering — Expected Graduation: 2027
Research Interests: Modular Robots, Shapeshifting Robots, Robotics Education
GPA: 4.00/4.00

Union College | Schenectady, NY
Bachelor of Science in Mechanical Engineering — Graduated June 2021
GPA: 3.87/4.00

Research Experience

ME Doctoral Research — Evanston, IL, Fall 2022 – Current
Shapeshifting Multi-cellular Robots and Modular Robotics Educational Toolkits
- Conceptualized, designed, and implemented non-cubic modular robots using rhombic dodecahedra shaped unit cells.
- Submit provisional patent application for rhombic dodecahedra cells as educational toy building blocks for spatial development.
- Mentor undergraduate and high school students on hardware implementation of robotics projects.

Technological Tools for Thinking and Learning — Evanston, IL, Winter 2023
Velo: Exploring Animal Behavior Modeling through Hybrid Robotics-Simulation Learning Experience
- Designed a low-cost, modular robotic platform that integrates with agent-based simulation to create a hybrid learning experience.
- Planned curriculum using the platform to teach underlying sensor-motor neural connections for complex behaviors in animals.
- Presented and demoed platform at *Interaction, Design, and Children Conference* (IDC 2023).

ME Undergraduate Research Capstone — Schenectady, NY, Fall 2020 – Spring 2021
Associations Between Humeral Head Surface and Habitat Use in Cercopithecids
- Investigated the articulating surface of 3D-scanned proximal humeri for various primate species.
- Designed pipeline for mesh fixing, local curvature approximation, and data analysis of scanned samples.
- Showcased research findings during Union College's Steinmetz Symposium.

Leadership Experience

Recruitment Chair — Evanston, IL, Winter 2023 – Present
Mechanical Engineering Graduate Student Society
- Plan and organize accepted students' visit weekend including individual meeting schedules, facility tours, and social events.
- Coordinate peer mentorship program to help incoming students transition into graduate school.

Co-Founder and Project Mentor — Schenectady, NY, Winter 2019 – Spring 2021
Entrepreneurs of the Nott (EON)
- Collaborated with interdisciplinary team to found Union College's first entrepreneurial focused club.
- Built a supportive environment to allow creative approaches to real world problem-solving on and off campus.
- Mentored individuals and project leaders on best practices for organization, teaming, and networking.

Co-Founder and President — Schenectady, NY, Fall 2017 – Spring 2021
Union College Club Basketball Team
- Composed club constitution, drafted annual budget, and organized student recruitment events.
- Fostered relationships and mentored younger students in academic, personal, and sports contexts.

Executive Board Schenectady, NY, Winter 2018 – Fall 2020

Intervarsity Christian Fellowship

- Organized weekly Large-Group meetings; including scheduling guest speakers, church sign-ups, and weekly study topics.

Vice President Schenectady, NY, Fall 2018 – Spring 2020

Union College Outdoors Club

- Planned weekend hiking, camping, and paddling trips in NY Capital Region, Catskill Mountains, and Adirondacks
- Organized transportation, student sign-ups, budget, and equipment necessary to carry out trips.

Work Experience

English Language Teacher Sop Prap, Lampang, Thailand, Summer 2021 – Spring 2022

Sop Prap Pittayakhom, American Thai Foundation

- Taught conversational English to middle and high school students situated in rural northern Thailand.
- Instituted extracurricular efforts to further student interest in foreign language and culture including basketball club, lunchtime jam sessions, and an English speech competition.

3D Printing Technician Schenectady, NY, Winter 2019 – Spring 2021

Union College MakerCore

- Communicated with students and faculty to provide 3D printed parts and models using FDM and SLA printers.
- Troubleshoot machine malfunctions and tune parameters for optimal printing consistency.
- Led facility tours for high school students showing equipment, demos, and answering technical and non-technical questions.

Construction and Maintenance Staff Central Region, NY, Summer 2018 – Summer 2020

New York State Parks and Historic Preservation

- Carried out general maintenance tasks across three different parks and historic sites in the central region.
- Assisted in new construction, demolition, and restoration of facilities.

Teacher Assistant Madison, NY, Winter 2019 – Winter 2021

Madison Central School District

- Taught lessons alone or in assistance to lead teachers for Pre-K to 12th Grade classes in all subject areas.
- Chaperoned field trips and helped with after school activities including Mathletics, JV basketball, and Varsity basketball.

Floor Manager Madison, NY, Fall 2013 – Present

Cherry Valley Auction Barn

- Direct team on responsibilities, assist team members, and problem solve to ensure a smooth and enjoyable auction experience.
- Foster professional relationships with customers to encourage repeat attendance.

Project Experience

ME Mechanical Design Capstone Project Schenectady, NY, Winter 2021

Custom Robotic End-Effector for Laying Up Carbon Fiber Drone Bodies, Vistex Composites LLC

- Toured manufacturing facilities and interviewed technicians and supervisors to understand pain points towards an MVP.
- Brainstormed multiple design approaches for effectively forming carbon fiber sheets to target mold shape.
- Prototyped and iterated designs with engineering team.
- Presented engineer design process, final design concept, and prototype to engineering faculty and industry mentors.

ME Thermal/Fluid Design Capstone Project Schenectady, NY, Spring 2020

Heat Source Portable Air Conditioner

- Collaborated with a team to conceptualize and design a portable air conditioning system utilizing ice as a cooling source.
- Carried out heat transfer and fluid mechanic analysis to arrive at a design within the desired constraints.
- Conducted full FMEA of all subsystems and devised a thorough business plan for potential product marketing.
- Presented final product design and business sales pitch virtually to peers and faculty.

Manufacturing and Assembly Optimization Schenectady, NY, Fall 2019 – Winter 2020

Entrepreneurs of the Nott, Schenectady ARC

- Networked with local non-profit agencies to develop plans for interdisciplinary projects with EON.
- Toured manufacturing and assembly facilities, interviewed managers and employees, and identified pain points.
- Designed, prototyped, and iterated with interdisciplinary team of students to streamline processes for increased efficiency.

Volunteer Experience

Youth Basketball Coach and Referee Chicago, IL, Winter 2023 – Present

Chicago City Parks District

- Plan and lead drills and scrimmages weeknights for groups of 10 – 20 student athletes.
- Coach a high school division team, referee games for younger age groups on Saturday mornings.

Assistant Soccer Coach Sop Prap, Lampang, Thailand, Winter 2022

Sop Prap Pittayakhom

- Coached and travelled with high school level team for league, province, and northern region tournaments.
- Connected with students outside of the classroom through sports medium.

Adoption Processing Assistant Schenectady, NY, Winter 2017 – Winter 2020

Homeward Bound Dog Adoption Center

- Cared for dogs of all ages and breeds up for adoption.
- Answered questions and helped with paperwork processing for prospective homes.

Youth Basketball Coach Madison, NY, Winter 2016 – Winter 2018

Madison Youth Basketball

- Planned practices, communicated with parents, and mentored young student athletes.

Awards and Recognitions

- Omicron Delta Kappa National Leadership Honor Society
- Pi Tau Sigma Mechanical Engineering Honor Society
- Tau Beta Pi Engineering Honor Society
- Dean’s List (2017-2021)
- Klemm Fellowship
- Presidential Scholarship
- Donna Phillips Endowed Scholarship
- American-Thai Foundation Fellowship

Skills & Abilities

- Programming Languages: Python, C, MATLAB
- Software Packages: SolidWorks, Fusion360, Onshape, KiCad, Blender, Adobe Premier Pro, Adobe Illustrator
- Design Skills: 3D Modeling, FDM 3D Printing, SLA 3D Printing, breadboarding, soldering, laser cutting, stick welding, MIG welding, oxyacetylene torch cutting, metal forging, general woodworking.

Publications and Presentations

Hummer, Tyler M., Sam Kriegman. "A non-cubic space filling modular robot." *2024 IEEE International Conference on Robotics and Automation (ICRA)*. IEEE, (in review).

Mongkhonvanit, Kritphong, Tyler M. Hummer, and John Chen. "Velo: Exploring Animal Behavior Modeling through Hybrid Robotics-Simulation Learning Experience." *Proceedings of the 22nd Annual ACM Interaction Design and Children Conference*. 2023.

Hummer, Tyler M., “Association Between Humeral Head Surface and Habitat Use in Cercopithecids.” *Union College Steinmetz Symposium*. June 2021.