Andrew Thompson

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Education

- Ph.D. in Mechanical Engineering, Northwestern University, Evanston, IL **Ongoing**
- Master of Science in Robotics, Northwestern University, Evanston, IL **Dec 2019**
- Bachelor of Science in Physics, Indiana University, Bloomington, IN **May 2017**
- Bachelor of Art in Folklore/Ethnomusicology, Indiana University, Bloomington, IN **May 2017**

- ***Coursework*:** Classical Mechanics, Dynamics, Thermodynamics, Digital Electronics, Biological Physics, Embedded Systems, Mechatronics, Feedback Systems and Control, Control Mapping, Cardiovascular Instrumentation, Prosthetic Limb Design and Control, Optimization, Soft Robotics, Multi-axis Robotic Systems, Machine Learning, Artificial Intelligence, Active Learning

Relevant Skills

- **Languages:** C/C++ (*intermediate*), Python (*advanced*), Mathematica (*intermediate*), Matlab (*intermediate*), JavaScript (*beginner*), CSS (intermediate), HTML (beginner)
- **Software:** Matlab/Simulink (*intermediate*), ROS (*advanced*), ROS2 (*intermediate*), rviz (*intermediate*), LaTeX (advanced), Autodesk (*intermediate*), Ubuntu/Linux (*intermediate*), MS Office Suite/LibreOffice (*advanced*)
- **Hardware:** Machining (*intermediate*), Circuit Design (*intermediate*), Robot Maintenance (*advanced*), 3D Printing/Prototyping (*advanced*), Precision Measurements and Drafting (*intermediate*)

Publications and Workshops

- A. Thompson, F. Rizzoglio, F.A. Neylon, D.R. Barsoum, L.E. Ammon, M.N. McCune, L. Miller, B. Argall, "An Evolution of Assistive Robot Control to Meet End-User Ability." To appear in *Companion of the 2024 ACM/IEEE International Conference on Human-Robot Interaction (HRI '24 Companion).*
- A. Thompson, M. Lee, L. Y.C. Loke, K. Rowland, B. Martinez, M.N. Javaremi, B. Argall, "Identifying Accessibility Barriers to Robotics Research." *Robotics: Science and Systems 2023: Lowering Barriers in Robotics Research (Workshop).*
- A. Thompson, L. Y.C. Loke, and B. Argall. "Control Interface Remapping for Bias-Aware Assistive Teleoperation." *Proceedings of the IEEE International Conference on Rehabilitation Robotics 2022.*
- D. Gopinath, A. Thompson, and B. Argall. "Information Theoretic Intent Disambiguation via Contextual Nudges for Assistive Shared Control." *Proceedings of the International Workshop on the Algorithmic Foundations of Robotics 2022.*

Related Project Experience

Northwestern University, argallab

- Working alongside industry partners (LUCI, Relay Robotics, Function Engineering) and end-users (Team Gleason) to develop autonomous assistive behaviors for the LUCI PWC safety system.
- Continued work on the lab's Body-Machine Interface testing a variety of encoding methods to transform residual body motion into 6-DOF control signals for individuals with SCI.
- Supervised summer research projects for 1 masters student and 2 undergraduates.
- Designed a streaming and mapping pipeline for wearable, flexible IMU sensors from the Rogers Lab/QSIB to be used as a repositionable control interfaces using residual body motion to teleoperate a PWC.

- Expanded a 2-d. GUI package for designing virtual teleoperation tasks (using OpenGL to give maximal control over visualization and timing).
- Collaborated on a modular potential field package for ROS which includes goal inference, visualization, custom mesh obstacles (graph-decomposition scheme for faster compute), and linear control blending.
- Co-lead refactoring the lab's canonical powered wheelchair autonomy codebase.
- Hosted demo booth at the Museum of Science and Industry's Robot Block Party 2019, 2022, 2023.

Northwestern University, MSR Projects

- Designed, assembled, tested, and documented a human-controlled (via Bluetooth) hexapod (6-legged) robot, including the development and programming of a bio-inspired gait cycle.
- Built (and recorded with) an electrocardiogram device in a two-person team.
- Assembled and programmed a PID controller for a motor encoder using the PIC32 microcontroller.
- Programmed dynamic simulation of two-legged rappelling robot.
- Developed novel, hybrid soft actuator (MMVS + McKibben muscle) alongside a switching manifold for programmable fluid-actuation.
- Collaborated with teammates using ROS and ultrasonic range sensors to program a Baxter robotic arm to play human-interactive Pong.
- Studied applications of screw theory to robot kinematics; dynamics of N-dimensional systems; programming and visualizing moving mechanical systems through ROS.
- Implemented feedback control to simulate a mobile robotic (KUKA) arm mounted on a mecanum wheel base.

Related Work Experience

Summer Internship **June 2019 – August 2019**

Intelligent Automation, Inc., Rockville, MD

- Participated in the REMS group on several R&D projects involving dynamics, haptics, and sensor fusion.

Research Assistant/Lab Manager **May 2016 – Aug 2018**

de Ruyter Lab, Bloomington, IN

- Completed updated compilation of lab materials providing online accessibility.
- Bred, maintained and performed experiments on model organisms (C. Vicina) for electrophysiological research.
- Applied statistical methods using C++ and Matlab to generate stimuli, conduct analysis and produce reports and educational material.