BLAKE R. BUCHANAN

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SUMMARY

I currently reside at Sarcos Robotics as a software engineer, working with a team to develop software for robotic solutions that alleviate people from performing dangerous tasks. I also highly value contributing to research that pushes the boundaries of what is possible in robotics and AI, and am particularly passionate about optimization-based motion planning and control.

EDUCATION

Carnegie Mellon University Pittsburgh, PA
Master of Science in Robotics, GPA: 3.76 / 4.00 *August 2020*
School of Computer Science, Robotics Institute

University of North Carolina at Charlotte Charlotte, NC
Bachelor of Science in Mechanical Engineering, GPA: 3.48 / 4.00 *May 2018*
Department of Mechanical Engineering and Engineering Science

EXPERIENCE

Sarcos Robotics Pittsburgh, PA
Software Engineer *October 2021 - Present*
- Developing real-time software in C++ for embedded linux, high-level autonomy, and control applications for the Sapien 6M product line (Sapien 6M)
- Implemented admittance control on the embedded platform for the Sapien 6M manipulator product line to support human-robot interaction capabilities
- Developing software to support the manipulation of photovoltaic modules for solar field construction (example)

The Robotics Institute at Carnegie Mellon University Pittsburgh, PA
Biorobotics Lab, Researcher *May 2018 - August 2021*
- Introduced a novel perspective in finding optimal controls for nonholonomic multi-robot systems in dynamic environments using geometric optimal control techniques
- Developed software in Python, Julia, and MATLAB to test and validate dynamical systems and control strategies

The Robotics Institute at Carnegie Mellon University Pittsburgh, PA
Biorobotics Lab, Robotics Intern *May 2017 - August 2017*
- Designed and developed a robot contributing to published research concerning underactuated snake robot control (PDF)

University of North Carolina at Charlotte Charlotte, NC
Faculty Lab, Undergraduate Research Assistant *May 2016 - May 2018*
- Designed experiments and developed motion control electronics for biologically inspired terrestrial and aquatic robots using Arduino microcontrollers
- Developed an affordable RTK-based differential positioning Raspberry Pi package to track the position of biologically inspired terrestrial and aquatic robots

TECHNICAL SKILLS

Languages: C++, Python, Julia, MATLAB
Platform / Tools: ROS2, Docker, GitLab, GitLab CI, VS Code, MoveIt

ACADEMIC PROJECTS

Swimming In Potential Flow (GitHub) **Language**: Julia
- Implemented two-dimensional fluid simulation of a flexible fish robot in point vortex flows using Julia

PID Control for Planar Aquatic Vehicle in Point Vortex Flows (Project Website) **Language**: MATLAB

- Implemented PID control for a novel impulsively actuated two-dimensional aquatic vehicle in an inviscid fluid using MATLAB

PUBLICATIONS

B. Buchanan, T. Dear, S.D. Kelly, M. Travers, H. Choset, (2021) "The Geometric Structure of Externally Actuated Planar Locomoting Systems in Ambient Media," *arXiv.org Preprint*, (PDF)

B. Buchanan (2020) "Mechanics and Control of Coupled Interactions in Ambient Media," *Master's Thesis*, Carnegie Mellon University, Pittsburgh, PA. (PDF)

B. Buchanan, M. Travers, H. Choset, and S. D. Kelly (2020) "Stability and Control of Chaplygin Beanies Coupled to a Platform through Nonholonomic Constraints," *ASME DSCC 2020* (PDF)

T. Dear, **B. Buchanan**, R. Abrajan-Guerrero, S. D. Kelly, M. Travers, and H. Choset, (2020) "Locomotion of a multi-link nonholonomic snake robot with passive joints," *International Journal of Robotics Research* (PDF)

TALKS

Buchanan, B. (2019, May). *Modeling and Dynamics of Planar Swimmers Coupled through Wake Vorticity*. Presentation given at the 2019 SIAM Conference on Applications of Dynamical Systems (DS19)

Buchanan, B., Travers, M. Choset, H., Kelly S. (2020, October). *Stability and Control of Chaplygin Beanies Coupled to a Platform Through Nonholonomic Constraints*. Presentation given at the ASME 2020 Dynamic Systems and Control Conference (mp4)

ADDITIONAL EXPERIENCE

University of North Carolina at Charlotte January 2016 - May 2018

Department of Mechanical Engineering, Undergraduate Teaching Assistant

- Delivered supplemental lectures for undergraduate dynamics courses, resulting in an overall increase in comfort with course material and performance
- Assisted students in learning the PTC Creo CAD package

COURSEWORK

Underactuated Robots / Machine Learning / Kinematics, Dynamics, and Control / Convex Optimization / Optimal Control / Advanced Topics in Dynamics / Computer Vision / Nonlinear Control