

BLAKE R. BUCHANAN

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SUMMARY

I currently reside at Sarcos Robotics as an Autonomy-Perception 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

*Master of Science in Robotics, GPA: 3.76 / 4.00
School of Computer Science, Robotics Institute*

Pittsburgh, PA
August 2020

University of North Carolina at Charlotte

*Bachelor of Science in Mechanical Engineering, GPA: 3.48 / 4.00
Department of Mechanical Engineering and Engineering Science*

Charlotte, NC
May 2018

EXPERIENCE

Sarcos Robotics

Autonomy-Perception Engineer

Pittsburgh, PA

January 2023 - Present

- Developing real-time software in C++ for embedded linux, high-level autonomy, and control applications for solutions leveraging the Guardian XM (Guardian XM)

Sarcos Robotics

Software Engineer

Pittsburgh, PA

October 2021 - January 2023

- Developing real-time software in C++ for embedded linux, high-level autonomy, and control applications for solutions leveraging the Guardian XM (Guardian XM)
- Implemented admittance control on the embedded platform for the Guardian XM 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

Biorobotics Lab, Researcher

Pittsburgh, PA

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

Biorobotics Lab, Robotics Intern

Pittsburgh, PA

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

Faculty Lab, Undergraduate Research Assistant

Charlotte, NC

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 Beaniebots Coupled to a Platform through Nonholonomic Constraints," *ASME DSCC 2020* (PDF)

T. Dear, **B. Buchanan**, R. Abajian-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 Beaniebots 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