NEIL ABCOUWER

ROBOTICS SOFTWARE ENGINEER

nabcouwer@gmail.com
717-497-2855
U.S. Citizen

IRON OX, San Carlos, CA   June 2022 - November 2022
Senior Robotics Engineer
Developed C++ and Python software for the Grover robot, which moves modules of plants within greenhouses
- Created several safety systems, including anomaly and overcurrent detection and audiovisual alerts
- Reduced straight-line path deviation with an improved path-following algorithm
- Designed method for detecting module grid characteristics and negative-space "slots" for insertion

NASA JET PROPULSION LABORATORY, Pasadena, CA   2014 - 2022
Robotics Systems Engineer III, Mobility and Robotic Systems
Mars 2020 (Perseverance) Rover Flight Software, 2017 - 2022
- Developed new software modules and updated heritage software for Mars 2020 rover mission
  - Backlash and torque compensation for milliradian pointing accuracy for Laser-Induced Breakdown Spectroscopy
  - JPEG, gzip, and optimized Malvar demosaicing to enable faster and more compact image and data compression
  - Queuing and blending rover arcs with progress notifications, enabling continuous autonomous driving
  - Visual-odometry pose estimation while driving and sun-gaze for high-sun-elevation heading estimation
  - Frame management for tracking poses of rover mechanisms and targets on Mars surface
- Conducted code and design reviews; unit, simulation, and regression testing; and flight software mentorship
- Supported mission operations, verification and validation activities, and hardware testing

COLDArm Flight Software, 2020 - 2022
- Architected flight software design to control cold-operable (-180ºC) actuators for tech demo on lunar lander
- Developed F' software framework components for motor and thermal control, parameter management

CubeRover for Affordable, Modular, and Scalable Planetary Exploration, 2020 - 2022
- Developed compression software for Astrobotic's CubeRover platform, served as JPL lead co-investigator

Machine Learning based Path Planning for Improved Rover Navigation, 2019 - 2021
- Integrated machine learning heuristics into Mars 2020 flight software navigation algorithm
- Demonstrated improved success rate (13%) and increased path efficiency (35%) in complex terrains

Freeclimber, 2015 - 2018
- Designed kinematics, mobility, and autonomy algorithms for limbed rock-climbing robot with microspine grippers
- Combined high-level ROS environment and low-level QNX RTOS
- Deployed and operated robot in successful lava tube and desert field tests with science teams
- Demonstrated semi-autonomous traverses of several meters to conduct spectroscopy and X-ray lithochemistry

Mars On-orbit Sample Transfer Technologies, 2014 - 2017
- Architected software to support cyber-physical simulations of sample capture event with rapidly prototyped designs
- Developed LIDAR perception algorithms for tracking objects using RANSAC, Hough transform, and sensor fusion

THE ROBOTICS INSTITUTE, Pittsburgh, PA   2012 - 2014
Student Researcher, Biorobotics Laboratory
- Constructed, programmed and operated four omnidirectional co-planar manufacturing research robots
- Developed algorithms for localization, multi-robot coordination, and distributed visual servoing of large assemblies
- Designed electronics and firmware for hybrid passive-active linear manipulator tool and other mechatronic devices

CARNEGIE MELLON UNIVERSITY, Pittsburgh, PA   2014, 2013
Master of Science, Robotics; Bachelor of Science, Electrical and Computer Engineering

SKILLS

Robotics (Mobility, Kinematics, Pose Estimation, Planning, Perception), Software (C, C++, Python, MATLAB, GoogleTest, Gcov, git), Frameworks (ROS, F'), Safety-Critical Systems, Motor Control, Sensors (Cameras, LIDARs, IMUs, Encoders)