

## PROFILE

Robotics engineering leader with 13 years developing robotics and embedded systems across NASA JPL, Caltech, and commercial engineering. Group Lead for Robotic Manipulation & Sampling at JPL, combining formal people mentorship with technical and program leadership of multidisciplinary robotics teams.

Deep hands-on expertise in contact-rich manipulation, autonomy, perception-guided robotics, embedded systems, and full-stack deployment on physical robots; experienced taking research from architecture through integrated hardware demonstration and representing robotics capabilities to external technology partners and industry.

## LEADERSHIP & TECHNICAL EXPERTISE

**Leadership:** Group leadership & mentoring • Task/program management • Technical strategy & architecture • Cross-functional execution • External partner/vendor collaboration • Research-to-hardware delivery

**Manipulation & Autonomy:** Contact-rich/force control • Grasping • Kinematics • Collision detection • Motion planning • Perception-guided manipulation • Functional autonomy • RL/PPO • VLA research

**Systems:** C++ • Python • C99 • ROS 1/2 • F Prime • DDS • Isaac Lab • ONNX • Linux • EtherCAT • TSN • CAN • x86/ARM/RISC-V • Docker/CI

## WORK HISTORY

### NASA Jet Propulsion Laboratory

Pasadena, CA, USA

*Robotics Technologist, Group Lead - Robotic Manipulation & Sampling*

March 2020 - Present

- **Serve as Group Lead for Robotic Manipulation & Sampling**, a formal leadership role with dedicated management effort for mentoring engineers and interns beyond my direct projects; provide technical guidance across manipulation, controls, autonomy, embedded systems, and robot integration.
- **Task Manager and software lead, Europa Lander Sampling Autonomy**: led a multidisciplinary team integrating kinematics, control, perception, proprioception, science targeting, fault response, and autonomous execution through an end-to-end field demonstration on Matanuska Glacier, Alaska; work resulted in a first-author [Science Robotics paper](#).
- **Cognizant Engineer, Mars Sample Return Wrench Estimation & In-Contact Manipulation**: led and mentored two controls specialists and two software developers developing dexterous continuous force-controlled behavior for a 7-DoF flight robotic arm. Directed wrench estimation, gravity/temperature compensation, contact behaviors, and [sample-tube insertion](#) into the Mars Ascent Vehicle under the original MSR architecture; the capability was intended to enable the first continuous robotic-arm force-control manipulation behavior on another planet. [Technical paper](#).
- **Inter-vehicle robotic docking, Mars Sample Return**: after the 2024 rearchitecture, served as Cognizant Engineer adapting validated Perseverance 5-DoF arm self-docking capabilities for direct vehicle-to-vehicle sample transfer, culminating in an end-to-end Engineering Model demonstration in JPL's Mars Yard [\[video\]](#).
- **HPSC robotics technical lead**: lead developers demonstrating robotic algorithms and deterministic Time-Sensitive Networking across heterogeneous compute architectures for NASA High Performance Spaceflight Computing, including RISC-V targets, cross-compilation, middleware, communications, and systems integration.
- **External partner and ecosystem interface**: worked directly with **Acontis** on EtherCAT and **eProxima** on DDS integration/interoperability; represented JPL robotics on an industry-facing panel and gave live capability demonstrations at the IEEE Space Computing Conference Space Robotics Workshop to stakeholders including Microchip, BAE Systems, Disney, and others.

## WORK HISTORY (CONTINUED)

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- **Learning-policy mentorship:** technical mentor for PPO locomotion policies in NVIDIA Isaac Lab for an 18-DoF three-legged wheel-on-limb robot; guide the deployment path through ONNX toward RISC-V HPSC inference. Mentor a separate VLA effort focused on dexterous manipulation.
- **Robot-platform architecture and integration:** developed motor-controller infrastructure for the [EELS](#) snake robot [\[video\]](#); maintain reusable ROS 1/ROS 2, EtherCAT, force/torque sensing, CAN/serial, Linux/CI, and heterogeneous-compute infrastructure; developed an autogenerator for a ROS 2-F Prime DDS bridge.

### NASA Jet Propulsion Laboratory

Pasadena, CA, USA

Research Affiliate

April 2016 - February 2020

- **RoMan autonomous manipulation:** developed an end-to-end system combining RGB-D perception, object selection, grasp planning, proprioceptive control, and force/wrench-reactive extraction of previously unseen debris on a human-scale mobile manipulator; resulted in a first-author [Field Robotics paper](#) [\[video\]](#).
- **Autonomy and controls research:** applied reinforcement-learning multi-armed-bandit methods to manipulation-mode selection, investigated deep-learning manipulation outcome assessment, and developed MPC/input-shaping techniques for compliant manipulators.

### PowerbyProxi Ltd

Auckland, New Zealand

Embedded Electronics Engineer / Engineering Intern

November 2011 - July 2014

- Developed embedded C software and electrical/mechanical hardware for commercial inductive-power products, including PIC32 controllers, PCBs, CAN, RS-232, Ethernet, and industrial test equipment.
- **Led an engineering-intern team** developing a novel RF pairing technique and worked directly with commercial customers including John Deere to define requirements, scope new products, and establish engineering schedules. Developing embedded S software with PIC32 controllers, PCBs, CAN, UART, others.

## SELECTED PUBLICATIONS & DEMONSTRATIONS

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Bowkett et al., [“Autonomous Surface Sampling for the Europa Lander Mission Concept,”](#) Science Robotics, 2025 - first-author integrated autonomy/manipulation field system.

Dolci, Bowkett et al., [“Robotics Capabilities Development for Mars Sample Return Transfer Activities,”](#) IEEE Aerospace Conference, 2025.

Bowkett et al., [“Challenges in Closed-loop Compliant Motion Control for Planetary Robotics,”](#) IEEE Aerospace Conference, 2024.

Vaquero et al., including Bowkett, [“EELS: Autonomous Snake-like Robot with Task and Motion Planning Capabilities for Ice World Exploration,”](#) Science Robotics, 2024.

Bowkett, Karumanchi & Detry, [“Grasping and Transport of Unstructured Collections of Massive Objects,”](#) Field Robotics, 2022 - first-author perception-guided, force-reactive manipulation.

Full publication list: [Google Scholar](#) • [JPL Robotics profile](#)

## EDUCATION

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### California Institute of Technology - Burdick Robotics Group

Pasadena, CA, USA

Doctor of Philosophy in Mechanical Engineering

2020

Master of Science in Mechanical Engineering

2016

Sir William Pickering Fellowship

Doctoral research in functional autonomy for manipulation in uncertain environments, including reinforcement-learning-based mode selection, neural-network outcome assessment, visual grasp reasoning, force-aware manipulation, motion planning, and robot control.

### University of Auckland

Auckland, New Zealand

Bachelor of Engineering (Honours) in Mechatronics Engineering

2013

GPA: 8/9 (A), approximately 4.0/4.0 equivalent