MATTHEW D. HANLEY

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EDUCATION

University of Colorado Boulder

- B.S./M.S. in Mechanical Engineering, minor in Computer Science | 3.7 GPA — Boulder, Colorado
  Focus in Robotics and Controls — August 2014 – May 2019

RELEVANT EXPERIENCE

Senior Systems Engineer — June 2019 – Present

Rocket Lab USA, Space Systems

- Grew Space Systems

- Hardware in the Loop (HITL)
  - Developed test framework built on Robot Framework to run automated testbed operations
  - Designed, built, and operated flatsats for all Photon vehicles
  - Developed software test plan to approve flight software releases for use in production environments
  - Setup and operated Kratos and USRP SDRs (RF frontend and Linux applications) for RF testing
  - Setup and operated Spirent GPS simulator for both test and flight hardware
  - Designed and built Eb/N0 simulation rackmount unit for S-Band radios
  - Designed, built, and operated 6-DoF spacecraft simulation HITL rigs
- Spacecraft Operations
  - Co-authored first generation of web-based spacecraft operations automation software
  - Designed and implemented ground software integration with KSAT ground station network
  - Wrote software to interface with Rocket Lab's 5-meter dish and infrastructure to automate spacecraft contacts
  - Implemented software and procedures to capture images with First Light spacecraft
  - Set up ground data system for time series data storage, visualization, and alarming for spacecraft and GSE telemetry using InfluxDB, Grafana, Pager Duty, and Docker
  - Setup Grafana dashboards for all aspects of missions, from AIT to decommissioning
  - Led operations for First Light spacecraft launch, LEOPs, anomaly response, and nominal operations
  - Guided operations team to success for Lunar Photon mission after losing team lead
  - Designed and implemented data pipelines for all Photon spacecraft
  - Developed interactive Gantt style timeline for Lunar Photon mission event visualization
  - Continue to act as SME for operations team
- Systems Engineering
  - Developed generalized budgets (power, data, link, delta-v, mass, radiation) to inform proposals for the original Photon platform
  - Developed requirements and managed technical budgets for the First Light spacecraft
  - Implemented b-dot algorithm for embedded hardware on the First Light spacecraft
  - Owned radiation SPENVIS analysis for First Light and Pathstone spacecraft
  - Performed detailed design of the avionics system architecture for the Pathstone spacecraft
  - CONOPS development for First Light, Pathstone, and Lunar Photon spacecraft
  - Initial Jira administrator for all of space systems
  - Wrote high fidelity spacecraft power system simulation software, using battery test data to influence EPS system design, validate energy budgets, and drive CONOPS changes
  - Owned the complex data budget for the Lunar Photon Moon mission
  - Developed toolchain to take Excel version of the data budget and convert it into flight software configuration files
  - Built test stand and developed software to characterize in house made magnetic torquer bar active and residual dipoles
  - Owned CONOPS document for the Lunar Photon fluidics system
  - Developed automated trajectory analysis tool leveraging STK to generate artifacts to validate technical budgets
- Harnessing
  - Designed harnessing to interface new avionics on the First Light spacecraft with the legacy Electron Stage 3 vehicle
  - Designed, procured, fabricated, tested, and installed harnessing for Pathstone spacecraft
  - Designed, procured, fabricated, tested, and installed harnessing for EGSE, environmental test systems, flatsats, and hardware in the loop systems
- Electrical Engineering
  - Designed and tested spacecraft inhibit PCB for Pathstone spacecraft to interface with Electron Stage 3 vehicle
  - Designed, built, tested, and operated EGSE for all spacecraft
  - Performed PCB level debugging for multiple different avionics units

    - Experience with interfaces including, but not limited to, CAN, UART, SpaceWire, USB, Ethernet
    - Built out two brand new avionics labs and assisted in the fitout of a brand-new cleanroom
    - Designed and executed test campaign of battery balancing boards
- Assembly, Integration, and Test (AIT)
    - Member of launch site integration and test team for all Photon spacecraft
    - Wrote and executed functional and performance test procedures for all spacecraft
    - Trained technicians and engineers how to safely operate spacecraft and ESGE during testing
    - Assembled Pathstone spacecraft
    - Supported all environmental campaigns on the spacecraft level
    - Supported many qualification and acceptance campaigns of multiple in-house built avionics units
    - Involved in engine hot fires and full spacecraft hot fires
    - SME for debugging electrical systems

Space Flight Operations Team Member — May 2016 – May 2019

Laboratory for Atmospheric and Space Physics (LASP)

- Created and controlled CSTOL procedures being executed on multiple NASA spacecraft
- Developed tools in IDL and Python to analyze spacecraft telemetry for anomalous trending, science experiment success, and performance during off-nominal activities such as orbit maintenance burns
- Created and presented reports on spacecraft and payload status on a weekly, monthly, and quarterly cadence
- Trained new employees in many coding languages and taught best practices for programming
- Was promoted to the Graduate Student Lead of LASP's 19-year-old QuikSCAT mission
    - Scheduled, organized, and led meetings with spacecraft subsystem teams and industry professionals
    - Played key role in the decommissioning and passivation process of the spacecraft
    - Managed teams of undergraduate students to ensure tasks were completed on time and to expected quality
- Led effort to prepare CSIM Flight Demonstration cubesat mission for post-launch operation
    - Wrote data processing tools to retrieve, decode, and store large amounts of telemetry data
    - Transferred operations team from outdated revision control software (RCS/CVS) to Git
    - Configured ground command and control software to interface with Blue Canyon XB1 bus and CSIM payload
    - Wrote and tested post-launch commissioning scripts on flight hardware
    - Helped interface CSIM ground software systems with pre-existing ground station hardware

Master's Thesis in GPU Computing — January 2018 – May 2019

University of Colorado Boulder

- Studied NVIDIA's parallel computing platform, CUDA, in conjunction with multiple different GPUs
- Investigated application of parallel computing with GPUs to the engineering field (numerical computation/computer vision)
- Gained deep understanding of computer systems and code optimization techniques

NASA Robotic Mining Challenge — January 2016 – May 2019

- Worked alongside interdisciplinary students to build competition-ready autonomous mining robot
- Led the software subsystem to develop embedded systems and implement teleoperations on ROS
- Led design and fabrication of multiple mechanical systems of the robots
- Taught incoming students the intricacies of both the software and hardware of the robot

Mechanical Engineering Senior Design Project — August 2017 – May 2018

University of Colorado Boulder in conjunction with Los Alamos National Labs (LANL)

- Created functional device to protect IoT devices from malicious cyber-attacks by physically locking out users in the event of an incorrect input sequence
- Acted as lead CAD, Manufacturing, and Electrical engineer on a team of six members
- Designed, created proper drawings for, and manufactured many small mechanical components
- Developed, produced, tested, and interfaced custom printed circuit boards to interface with mechanical sensors and actuators

TECHNICAL SKILLS

Software Engineering

- Experience with many languages and operating systems
    - Proficient with Python, UNIX/Linux, Git, systemd, Grafana
    - Comfortable with C/C++, Perl, Bash, JavaScript, HTML, CSS, SQL, ROS, NVIDIA CUDA, Matlab, IDL, TeamCity, Docker, Gitlab CI, Make, cross-compilers, Wireshark/tcpdump, networking, InfluxDB, Loki

Mechanical Engineering

- Knowledgeable with machines in machine shop used to fabricate custom components
- Well versed in rapid prototyping techniques including 3D printing and laser cutting
- Certified SOLIDWORKS Associate

Electrical Engineering

- Complex, distributed system design, reading circuit schematics, PCB debugging
- Experience with Altium, RapidHarness, LTSpice
- Comfortable with operating and automating electrical lab equipment
- Soldering
- Electrical harness fabrication

Additional Skills

- STK, Microsoft Office, Adobe Creative Suite, LaTeX, SIEMENS Teamcenter, SPENVIS