

# Matt Hartnett

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## SKILLS

- **Digital Design:** SystemVerilog RTL, Vivado, DSP, High Speed Interfaces, Tcl, VHDL, Quartus, Libero
- **Digital Verification:** SystemVerilog TB, Cocotb, Verilator, xsim, Modelsim
- **Software Development:** Python, C++, C, Java
- **Linux Development:** Ubuntu, Fedora, Buildroot, Yocto, PetaLinux
- **Embedded Programming:** Embedded C, Cudasip, Arduino, Raspberry Pi
- **Software Systems:** Git, CI/CD, Matlab, Simulink Real-time, OpenCV, SVN
- **Debugging:** Simulation with Testbenches, Hardware with Logic Analyzers, Scopes, and other tools
- **Project Management Tools:** Agile PLM, Confluence, DOORS NG, OpenText MBPM

## EXPERIENCE

### Embedded Systems Engineer - FIRST RF

10/2024–Present

Boulder, CO

- Architected and implemented the full FPGA/HDL stack for a production RADAR system, owning design from module-level RTL to system integration. Included high speed interfaces, on-chip processing, and device to device synchronization.
- Delivered a new DSP pipeline that increased usable bandwidth 4x, improved SNR by ~20 dB, reduced logic utilization, and lowered end-to-end latency; modeled algorithms in Python/NumPy and verified with exhaustive testbenches.
- Engineered a cycle-accurate, latency-constrained data path to meet strict RADAR timeline requirements; performed both simulation-based and on-hardware validation in partnership with embedded/software teams.
- Modernized the internal HDL build system, enabling Verilator + cocotb flows; authored FIRST RF's first cocotb testbenches and led full team adoption.

### Electrical Engineer II - Laboratory for Atmospheric and Space Physics

06/2022–10/2024

Boulder, CO

- Operated as the lead of electronic ground support equipment (EGSE) for NASA's Libera mission, including the design and implementation of several test systems; designs included integration of COTS equipment, custom PCBs, and FPGA logic.
- Developed test racks from scratch: specifying, procuring, and assembling IT hardware, writing hardware control firmware, designing interface harnesses, and authoring control software to enable long-duration, mission-critical testing and integration.
- Served as the cognizant EGSE engineer, owning multiple projects from concept through qualification; including rigorous design reviews and compliance processes, and multi-team coordination to ensure delivery-readiness and long-term mission support.

### Electrical Engineering Intern - Laboratory for Atmospheric and Space Physics

01/2021–06/2022

Boulder, CO

- Wrote low-level, hardware interface flight software for the Command and Data Handling (C&DH) Unit on the SPRITE cubesat mission.
- Developed an FPGA-based solution to test the scientific instrument on the ground with a simple, robust interface to enable rapid verification.
- Wrote an image compression algorithm that reduced the scientific data to 1/10th of the original size, enabling the mission to meet TX requirements.

## EDUCATION

### MSEE, Embedded Systems Engineering - University of Colorado, Boulder

08/2023–Present

Boulder, CO

### BS, Electrical and Computer Engineering - University of Colorado, Boulder

08/2019–05/2022

Boulder, CO

## PROJECTS

### Skyler Phased Array RADAR

- Designed the end-to-end DSP chain and datapath (filtering, decimation/interpolation, mixing, 1 Gb/s Ethernet framing), then implemented cycle-accurate RTL with thorough TB coverage.
- Built a layered verification strategy (SystemVerilog TB + cocotb with Verilator) to catch interface, timing, and algorithmic defects early; mirrored tests on hardware for parity and end product verification.
- Drove cross-functional integration and bring-up with embedded and application software, closing timing on high utilization designs while meeting RADAR timeline constraints.

### Libera SSIM

- Led the design of an advanced, high reliability test fixture used to validate the performance of the Libera instrument.
- Created a test rack to simulate the JPSS-3 spacecraft with 100% of interfaces accurately recreated to maximize “test as you fly” ideology.
- Integrated a precisely synchronized FPGA with <10 ns timing error.

### Libera EL Lifetest

- Designed, implemented, and qualified the test bed for a 5-year pre-flight motor verification lifespan test.
- Designed a custom interconnect PCB and multiple harnesses to integrate dozens of components into a cohesive system with minimal harnessing.

### 5-Stage RISC-V Processor

- Built a fully functional processor in Cudasip using C++, then adapted to synthesizable RTL with I/O management and off-chip RAM access.
- Achieved 100% verification coverage; designed with full ISA support and ECC memory.