Keely Hill

Software engineer, systems thinker, space explorer

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January 2023 – Present | *August 2019 – January 2023*
Director of Software **Software Engineer, Astro Digital**

A "mission-as-a-service" satellite bus manufacturer and operator. (6U, 16U, "micro", "XL"; ~10-90 Kg; LEO).

All-round flight and ground software writing, maintenance, and lead.

- Deeply supports customers, writing software to integrate their payload into the bus, from **driver-level to Con-Op.**
- Plays a key part in **mission decision making** from design to operations, providing a valued software perspective.
- Works heavily with ASI MAX Flight Software (as a user and developer, C++), embedded Linux, and embedded micro-controllers.

Details

- Works cross-team, especially with systems and electrical on: contract proposals, requirement writing, vendor subsystem compatibly assessment, system design, con-ops definition, team load-balancing, continual improvement, and anomaly troubleshooting (both in-production and on-orbit). All in addition to writing and maintaining software.
- Leads the software aspect of the company's next generation radiation tolerant bus targeting GTO and GEO.
  - Schematic reviews, requirement definitions, implementation guidance.
  - Owns the software design and bring up of the TI AM64-based "FC2", the next version of the core flight computer.
  - Created a board support package (in **Yocto**): Wrote custom **board specific device tree** and customized the Linux kernel and root filesystem with a detailed eye to achieve performance and a small size.
  - *(Ask me about: corse attitude sensor, torque controller, flexible IO)*
- Wrote and tested a ground software service for taking **abstracted customer payload tasking** (e.g. target vectors, angles, quaternions) and generating a **flight "run time schedule"** (e.g. actual slew commands) for automatic upload and deploy to a fleet of in-orbit remote sensing spacecraft.
- Transitioned into a guidance role for the ground software suite as a whole (python services and django), still working on specific sub-projects occasionally. Continues to design telemetry viewing dashboards.
- Champions the software team hiring effort in support of company goals, performing screening calls and technical interviews.
- Debugged several issues with Xilinx-based Ka-down/S-up **DVB-S2** internally developed Gigabit speed radio.
  - Analyzed in-orbit telemetry and performed months of ground testing to get the product from minimally functional state *at launch* to an operation cadence while in orbit.
  - Wrote and frequently updates a "Flight Jas" sequence in support of this effort.
  - Worked with link budgets, and was in constant communication with the RF team, I learned lot more about RF along the way.
  - *(Ask me about: DMA, Demod lock issue, SD card failure, metrics)*
- Refactored, modernized, and maintained the **Electrical Power System (EPS)** and Battery Management System (BMS).
- Helps maintain and add features to Linux-based **Flight Computer (FC)** and Payload Computer (PayC) software (Linux), usually using Python. All of this flight software is tested on a "flatsat", then deployed to flight models.
- **Re-architected ground operations SDR pipeline**, including vastly improving the TTC GNU Radio SDR, and making a SDR (located anywhere in the world, over a variety of transport backbones from different providers) a virtual internet protocol (IP) interface for Operations center computers (tuntap).
- **Operated spacecraft** in support of the full-time team during early operations of spacecraft and some backfill.
- Assisted in **system testing of flight spacecraft** during and between thermal cycle, TVAC, or vibe. Worked with lead system testing engineer to develop ground tools for test automation. Helped to develop (and then use) "TopHat", a relay connector-pin multiplexer for automated unit-level acceptance testing.

May 2018 – July 2018
Robotics Engineer Intern, Leidos (formerly SAIC) Advanced Solutions. Worked on computer vision, simulation, and testing for georegistration for GPS-denied aerial and ground autonomous vehicles.

January 2014 – Present
iOS App Developer, independent. Free time side project.

May 2015 – July 2015
Web Developer and Designer Intern, Naked Digital, a branding and marketing firm. Used HTML5, CSS3, Javascript, and PHP.

Skills

Languages (Strongest): Python, C, C++, Swift, Javascript

Tools: Zephyr RTOS, Yocto, buildroot, numpy, git, matplotlib, GNU Radio, django, PyCrypto, Grafana, GNU Radio, TunTap, openCV, Keras

Misc: Linux, ASI MAX FSW, web-stack, PostgreSQL, embedded C, MicroPython, TI AM64, SamV71, Nvida NX, and basic electronics. Exposure to: Electronic Design, MATLAB, Verilog, CAD

Interests: space systems, robotic autonomy, software-defined radio, Research & Development, scientific instruments.

Education

Computer Science & Information Technology, B.S. (2018) (GPA: $3.94_{/4}$)
Florida Polytechnic University Concentration: Information Assurance & Cyber Security

- **Autonomous Vehicle, Independent Study** – Lead software engineer of a team to construct and program a scale model self-contained autonomous car using various sensors including LIDAR and a stereo camera. Robot Operating System (ROS) on a NVIDA Tegra.
- **ASTRO Rocket Design Club** – Created the payload computer (ARM Cortex M0), and radio telemetry system for the club's first IREC sounding rocket.