James Hinnant

Email: hinnantj@aol.com
Website: www.jameshinnant.com

Location: South Bay Area, California

Summary

Design, code, optimization, and unit and integration test of real-time embedded software and firmware, including satellite flight software development and testing (unit, integration, validation/acceptance), on-orbit patch development, training simulator and ground software, and consumer electronics sensor and serial bus processing, with firmware running or residing on over 80 satellites on-orbit.
Education: M.S./B.S. Electrical Engineering with C.S. minor, Texas A&M-Kingsville.

Skills

Software: C and C++ (gcc, Visual), assembly (8051 microcontroller, 1750A, RH-32), Unix tools (awk, bash, GRUB, U-Boot, gparted, sfdisk, gdisk, virsh, guestfish, etc.), debuggers (gdb, Visual, Keil), Linux device drivers for PCI boards, Java, Netty / ActiveMQ / STOMP, Python, Ada, Matlab, gnuplot, SCM (git, Perforce, Swarm, Confluence, Jira, Subversion), test languages, IDEs (Visual, Rational, Keil, NetBeans), Wireshark network analyzer, Ubuntu Server, FreeRTOS, FreeRTOS+Trace real-time diagnostics, etc.

Hardware: Lab equipment (logic analyzers, oscilloscopes, serial bus analyzers), serial buses (1553, RS-485, RS-232C, I^2C, SPI), dev boards (ARM, Raspberry Pi, etc.), flight computers (Federal Sys. ASPS & CCP, Honeywell RH-32, UTMC 8051), Perle IOLan DS1 TCP/IP-to-RS232C terminal server, MYK-14 Centurion encryption unit RS-232C driver, General Standards OPTO32D optoisolator PCI board, Acromag PMC482 Counter/Timer PCI board, Total Phase SPI / I^2C bus analyzers, emulators, JTAG HW debuggers, UARTs, SN76477 sound chip, SP0256 voice synthesis chip, CTS256A text-to-speech chip, etc.

Experience

Software Contractor, agent Kleen Koncepts SG (consultant to Space Systems/Loral division of Maxar), San Jose and Palo Alto, CA, 2019-present

NASA's Lunar Gateway Power and Propulsion Element (PPE): Integrated VectorCAST unit test framework with PPE's Mission Processor flight code in VxWorks 7 compilation environment, for lunar space station flight code unit testing.
NASA's Psyche and Restore-L missions: Code and unit test of Linux PCI device drivers and thruster timing application code on headless development boards, interfacing to optoisolator instrumentation boards used for thruster pulse timing

verification, to be used for satellite flight software integration testing on lab hardware. Used gcc for coding, and oscilloscope, signal generator, and gdb (Gnu Debugger) for debug and test. (The Space Systems/Loral division of Maxar is the world's leading provider of geostationary commercial satellites.)

Sr. Firmware Engineer at Knowles/Audience, Inc., Mountain View, CA, 2015-2016

Audio project (Audience IP cores for audio processing on cellphones and tablets): Completed integration of Percepio Tracealyzer real-time diagnostics as a patch to FreeRTOS instances running on three Audience + Tensilica Xtensa IP cores on Xilinx vc709 FPGA, with C (gcc) and Perforce SCM. Debugged crashes in existing integration that were preventing release, and made stack analysis and other debugging tools for this effort. Made extensive in-house wiki in Confluence for installation and use of the Tracealyzer runtime and GUI; presented Tracealyzer and the wiki to the Mountain View and India firmware teams. **Motion project** (Audience IP core for Android sensor hub core on cellphones and tablets): Code and test of sensor hub config commands with Android sensor batching host protocol over SPI bus, running on Audience + Xtensa core on vc709 FPGA. Updates to code and test of external SPI test host running on STM M4 ARM dev board (STM32L152RCT6 / ARM Cortex-M4), with Keil IDE and git SCM. Code and test of SPI driver for NXP ARM Cortex-M4F sensor hub on NXP LPCXpresso dev board. Debugged using Total Phase SPI serial bus analyzers.

Software Engineer (Consultant to SSL) at Space Software Systems, Palo Alto, CA, 2010 – 2013

Ground software design, code, and test at SSL/MDA (formerly Space Systems / Loral), the world's leading provider of geostationary commercial satellites.

- **Telemetry, Command, and Ranging Suitcase (TCRS):** Upgrades to the TCRS in Visual Studio C++ to support SSL's latest generation of satellites. The TCRS is a semi-portable satellite simulator shipped by SSL's Ground Segment Test team to remote customer sites, for the development of customers' ground stations. Work included new data handling and GUI code for CCSDS packet telemetry, for commanding, and for RS-232C serial bus driver for command encryption/decryption in hardware, for Eutelsat and Optus 10.

- **TCRS port to Java:** Completed initial port of TCRS to Java in a few weeks for NBNCo, with CCSDS telemetry piped to remote GUIs via ActiveMQ.

- **In-Orbit Test (IOT) software (Primate):** Initial prototype in Python of software for new IOT satellite performance measurement platform, to be used to characterize on-orbit transponder and antenna performance during satellite checkout period. Prototype included SCPI handshaking to remote instrumentation racks and local GUI display of spectrum plots of rack data. Administration of Ubuntu server installs and Linux Mint desktop installs for the team, and, for project management and bug tracking, of a Redmine stack with Apache, SQL, Subversion, and Redmine server apps running on Ubuntu server, shared by the IOT and TCRS Java projects.

Senior Software Engineer, Flight Software Integration Group (Payload and Bus), Albin Engineering Services, Inc., on contract to Lockheed-Martin, Sunnyvale, CA, 2005-2009

- Responsible for design, code, and test of satellite payload and bus flight software integration tests, on lab hardware, for common utilities, EEPROM uploads, boot, initialization, vehicle configuration, anomaly detection/resolution, and off-nominal shutdown. Duties included analysis, debugging, and fix verification for problems determined during testing, and burning and verification of releases in EEPROM for functional verification by integration and test groups. Developed disassembly / logic analyzer log merge tool for worst case timing of flight processor boot process.

- Analyzed and debugged Ada code, including use of target debuggers. Debugged real-time ethernet issues with Wireshark.

- Developed many Unix shell tools (in sh/gawk/sed) to speed workflow, including various code generators and data filters. Coded and tested the great majority of common and batch scripts and Unix tools for the three areas I worked on at Lockheed (Bus Test, and Payload and Bus Integration).

Senior Software Engineer, Flight Software Test Group (Bus), Albin Engineering Services, Inc. on contract to Lockheed-Martin, Sunnyvale, CA, 2003-2005

- Responsible for design, code, and test of satellite flight software functional requirement tests on lab hardware, for boot, initialization, vehicle configuration, flight image loading, patching, memory management, and scrubbing.

- Analyzed Ada code during debugging, and coded and debugged some test builds. Discovered and analyzed and reported to Rational a fatal bug in Rational's patching linker by patching between two test builds. Rational later fixed this in their product.

- Helped integrators debug problems, mentored new engineers, and provided generic solutions to other engineers.

- Coded, tested Unix utilities for the testers and integrators to speed the workflow, resulting in much time saved. Coded, tested flight software upload utilities.

Senior Software Engineer and Intelsat-IX ACS Tech Lead, Aerospace Consulting Group, Inc., on contract to Space Systems/Loral, Palo Alto, CA, 1995-2002

Responsible for design, code, real-time optimization, unit test, troubleshooting, documentation, and patching of satellite flight software for various applications on Loral's FS-1300 series, in Ada, 1750A assembly, C, and 8051 assembly. Sole telemetry flight firmware engineer for most of Loral's GEO programs during this time.

- Major upgrades to Intelsat-IX telemetry and solar array drive software, including telemetry changes to accommodate splitting of flight computers. Tested on simulators and h/w targets; advised/troubleshot integration test at satellite manufacturing level. Advised engineers and testers on telemetry, software environment, test equipment. Supported later programs based on I-IX design (1996-2002).

- 8051 microcontroller firmware on 1553-to-RS-485 command/telemetry hub for Satmex-6 and ipStar (sole 8051 firmware engineer on this project). Coded, hand-optimized for time and PROM, unit/integration tested, verified worst-case timing with oscilloscope. 8K lines of flight code and 14K lines of test code, most of it in 8051 assembly and the rest in C, all flying in 32K of PROM and 256 bytes of RAM on a radiation-hardened 8051. Produced full doc set (SRS, SDD, VDD) (2000-2002).
- Major upgrades to MTSAT attitude control software (1996-1998). Updates to attitude control software for Chinasat-8, MCI-2, Telstar-7, Eurostar, Intelsat-IX (1996-2002). Updates to command software for Tempo, Panamsat-6, Intelsat-IX, Mabuhay (Agila)/Telstar/Apstar (1995-1996).
- Development of code generators, code patch tools, and various other utilities, using shell, awk, and sed scripts under Unix. Coded and used a coverage analyzer that merged 8051 simulator output with disassembled 8051 flight build. Coded and used a bus instruction trace tool that merged logic analyzer output with disassembled 1750A flight build to help pinpoint root cause of random flight processor reboots to a wait state error in vendor's documentation, after a 9-month flight software team effort failed to find cause by code and coverage analysis.

Consultant, Booz • Allen & Hamilton, Inc., NASA subcontractor at Johnson Space Center, TX, 1992-1993, 1994-1995

Software development on various astronaut training simulators for NASA.

NASA Space Station Training Facility (SSTF), subcontracted to Hughes-Link
- In the Onboard Computer Systems group (OBCS), designed, coded, and tested several class objects for the firmware controller 1553 interface, part of the simulation of the Station's 1553 network; integration-tested on SGI Challenge targets (including 1553 bus logging and analysis, with serial bus analyzers).

Satellite Ground Station Training System, Booz • Allen & Hamilton
- Ported satellite operations manual to real-time C, for training model of customer's satellite, including sensor, controller, and actuator models.

NASA Shuttle Mission Training Facility (SMTF), subcontracted to CAE-Link
- PDR design for training model of the entire Space Station Data Management System, to be run on the Shuttle Mission Simulator, including all on-orbit computers and networks. Coded and used data filters for comparing flight Shuttle Canadarm Robotic Arm data vs. simulator-modeled arm data, in C.

Contract programmer, Bridgeway S/W, Inc., 1992; C, Win SDK, Paradox DB Engine.

Education

M.S. Electrical Engineering, C.S. Minor, Texas A&M University, Kingsville.

B.S. Electrical Engineering, C.S. Emphasis, Texas A&M University, Kingsville.

Electrical Engineering Merit and Presidential Merit scholarships (undergraduate).

Neural network flight control simulation in C++ (M.S. thesis): Designed, coded, and tested 12K-line OOP NN/MRAC controller model, with NASA aircraft math models.

8051 microcontroller-based home security system (senior project): Designed, coded, and tested all firmware for the project, including sensor and actuator processing and voice synthesis coprocessor handling. Analyzed board's functionality for the group.

Lab instructor for undergraduate digital systems and control systems labs.

Training

IEEE-Boston online courses: EL805: Embedded Linux Board Support Packages (BSPs) and Device Drivers, 2019; EL201: Intro. to Embedded Linux, Part 1, 2017.

Coursera, Development of Real-Time Systems, August 2016, cert. AK2DMQNP5E49.

STMicroelectronics STM32L4 low-power ARM Cortex M4 dev board seminar, Oct. 2015.

First PocketQube Workshop, for the CubeSat-derived PocketQube tinysat, by Kentucky Space at NASA Ames, April 2014; attendee.

Export Control / ITAR briefings at Space Systems Loral, 2011 and 2012.

Memberships: IEEE, and the IEEE Robotics and Automation, Aerospace and Electronic Systems, and Controls Systems Societies.

Volunteering: Eagle Scout. Past merit badge counselor and webmaster (CA), Senior Patrol Leader and Assistant Scoutmaster (TX). First Lego League coach (2006, 2013-2015).