

Andrew Loveless

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EDUCATION

Purdue University West Lafayette, IN
B.S. Electrical Engineering Dec. 2013
GPA: 3.67 (3.85 last six semesters)

PUBLICATIONS

- A Proposed Byzantine Fault-Tolerant Voting Architecture using Time-Triggered Ethernet
A. Loveless, C. Fidi, and S. Wernitznigg
SAE AeroTech Congress & Exhibition
Fort Worth, TX, Sept. 2017
- A Modular, Scalable Avionics Architecture for Future Exploration Missions
C. Fidi and A. Loveless
AIAA SPACE Forum and Exposition
Orlando, FL, Sept. 2017
- Approach for Sizing and Turndown Analysis of a Variable Geometry Spacecraft Radiator
L. Erickson and A. Loveless
NESC Thermal and Fluids Analysis Workshop
Huntsville, AL, Aug. 2017
- On TTEthernet for Integrated Fault-Tolerant Spacecraft Networks
A. Loveless
AIAA SPACE Forum and Exposition
Pasadena, CA, Sept. 2015
- On Augmented DVH Analysis
A. Loveless, A. Roy, I. Das, and O. Nohadani
AAPM Annual Meeting & Exhibition
Indianapolis, IN, Aug. 2013

PRESENTATIONS

- TTEthernet Development and CFS Integration
Deep Space Gateway Open Software Multi-lateral Technical Interchange Meeting
NASA JSC, Houston, TX, Sept. 2017
- Overview of TTE/CFS Integration
CCSDS Spring Technical Meetings
SwRI, San Antonio, TX, May 2017
- Notional 1FT Voting Architecture with Time-Triggered Ethernet
Avionics and Software FY17 Planning Meeting
NASA JSC, Houston, TX, Nov. 2016
- Overview of TTE Applications and Development at NASA/JSC
CCSDS Fall Technical Meetings
ASI, Rome, Italy, Oct. 2016
TTTech, Vienna, Austria, Oct. 2016

- Fault-Tolerant Flight Control with Time-Triggered Ethernet
Technical Review Meeting – 18 Month
NASA JSC, Houston, TX, Oct. 2015
- Progress in Time-Triggered Networking
Technical Review Meeting – 6 Month
NASA JSC, Houston, TX, Sept. 2014

PROFESSIONAL EXPERIENCE

NASA Johnson Space Center (JSC) Houston, TX
Command and Data Handling Branch

Avionics and Software (A&S) Oct. 2016 – Present
project Command and Data Handling Lead

- Lead development in the areas of processors, networks, and instrumentation in a multi-center project to design a flexible mission-agnostic avionics architecture for future spacecraft.
- Subject matter expert on Time-Triggered Ethernet (TTE) networking at JSC.
- Proposed a novel approach for constructing fault-tolerant voting systems using TTE when end systems may fail arbitrarily.
- Lead the development of a prototype triplex voting computer featured at JSC within a low-fidelity deep space habitat mockup.
- Wrote and maintain the TTE drivers and time-triggered scheduler for the Core Flight System (CFS), an open C-based software framework used for a variety of spaceflight missions.
- Built ground displays for the Integrated Test and Operation System (ITOS) for controlling multiple synchronized CFS systems in a distributed network.
- Use SURE, ASSIST, and other reliability analysis tools to model reconfigurable systems and make recommendations regarding different architectural approaches.

Network Development Engineer Mar. 2014 – Sept. 2016

- Built network drivers in C for several embedded platforms (e.g. Aitech SP0-100, Space Micro Proton 400K) and real-time operating systems (e.g. RTLinux, VxWorks).
- Developed a software-based network stack for the TTE Phoenix Chip-IP – including full UDP and IPv4 protocol layers for both synchronous and asynchronous traffic.
- Developed several methods for synchronizing CFS systems via a TTE network – using both scheduled messages and network interrupts.
- Wrote desktop software in C for loading TTE end systems and visualizing the contents of their status registers.

- Wrote Python program for monitoring the flow of traffic in a TTE network and displaying it in real time on a customizable isometric grid.
- Identified technology gaps preventing manned Mars exploration as the networking domain lead for JSC's L-8 effort.
- Regularly demonstrated my work to center and engineering directorate leadership.

INTERNSHIPS

NASA Johnson Space Center (JSC) Houston, TX

Command and Data Handling Branch Summer 2013

- Developed a network analyzer with Raspberry Pi and custom Power over Ethernet board.
- Built a Python program to monitor Ethernet traffic between simulated vehicles during rendezvous and docking.

Command and Data Handling Branch Summer 2012

- Developed a prototype data acquisition (DAQ) system with custom interface board and Freescale MCF51JF microcontroller.
- Designed an improved DAQ system in Altium to monitor thrusters in an experimental spacecraft testbed.

Spacecraft Software Engineering Branch Spring 2011

- Designed user interfaces for experimental touchscreen software to control subsystems of a lunar habitat from a tablet or phone.

Onboard Computer Systems Branch Summer 2010

- Operated console in Mission Control Center as a Space Shuttle flight control trainee during mission STS-132.

Data Processing Systems Branch Fall 2009

- Completed core Data Processing Systems (DPS) flight controller training regimen.
- Monitored Space Shuttle DPS in Flight Control Room during missions STS-128 and STS-129.

UNDERGRADUATE RESEARCH

Purdue University West Lafayette, IN

Fiber-Optic Controller for fMRI Testing Fall 2013

- Led team of undergraduates designing an improved fiber-optic joystick used to evaluate higher cognitive function during fMRI tests.

Robust Optimization in Radiation Therapy Fall 2012 – Spring 2013

- Developed a Python program enabling the quantitative comparison of dose-volume histograms based on historical data.
- Expanded existing C++ desktop and iPhone applications to compare proposed treatment plans using the new approach.

Electric Field Fringe Effect Simulation Fall 2012

- Used COMSOL to characterize field uniformity between conductor plates used for experiments to measure weak transition moments.

Rice University Houston, TX

Microscope Image Comparison Summer 2011

- Built a Java program to evaluate the clarity of microscope images by analyzing edge contrast.

TEACHING

Purdue University West Lafayette, IN

Teaching Assistant – ECE 362 Spring 2012

- Administered two laboratory sections in a junior level microprocessor systems design course.

NEW TECHNOLOGY REPORTS

- Time-Triggered Ethernet Application for NASA's Core Flight System (CFS) MSC-26370-1, Oct. 2017
- Time-Triggered Scheduler Application for NASA's Core Flight System (CFS) MSC-26369-1, Oct. 2017
- Method for Ensuring Data Consistency Between Devices Using Time-Triggered Ethernet MSC-26364-1, Sept. 2017
- Software Library Extension for TTEthernet Phoenix Intellectual Property MSC-26058-1, July 2015

OTHER ACTIVITIES

NASA Johnson Space Center (JSC) Houston, TX

CCSDS SOIS Working Group 2016 – Present

- Travel internationally for working group defining generic services that promote interoperability and reusability of onboard software and network technologies.

DSG-16-24 Interoperability Standard Spring 2017

- Authored first draft of international avionics standard for future deep space habitat.

TECHNICAL SKILLS

- Programming: C, Python, MATLAB, GTK+, wxPython, GNU Make, CMake, GDB, LaTeX, Doxygen
- Embedded Systems: Linux, VxWorks, Wind River Workbench, CFS, ITOS
- Reliability Analysis: SURE, ASSIST