Andrew Loveless

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EDUCATION

- **University of Michigan**   Ann Arbor, MI
  Ph.D. in Computer Science and Engineering   *Sep. 2018 – May 2023 (expected)*
  Advisors: Prof. Ronald Dreslinski and Prof. Baris Kasikci

- **Purdue University**   West Lafayette, IN
  B.S. in Electrical Engineering   *Aug. 2008 – Dec. 2013*

PUBLICATIONS

- Development and Testing of a Vehicle Management System for Autonomous Spacecraft Habitat Operations
  G. Aaseng, J. Frank, M. Iatauro, C. Knight, R. Levinson, J. Ossenfort, M. Scott, A. Sweet, J. Csank, J. Soeder, D. Carrejo, **A. Loveless**, T. Ngo, and Z. Greenwood
  AIAA SPACE Forum and Exposition 2018

- A Proposed Byzantine Fault-Tolerant Voting Architecture using Time-Triggered Ethernet
  A. Loveless, C. Fidi, and S. Wernitznigg
  SAE AeroTech Congress and Exhibition 2017

- A Modular, Scalable Avionics Architecture for Future Exploration Missions
  C. Fidi and **A. Loveless**
  AIAA SPACE Forum and Exposition 2017

- Approach for Sizing and Turndown Analysis of a Variable Geometry Spacecraft Radiator
  L. Erickson and **A. Loveless**
  NESC Thermal and Fluids Analysis Workshop 2017

- On TTEthernet for Integrated Fault-Tolerant Spacecraft Networks
  A. Loveless
  AIAA SPACE Forum and Exposition 2015

- On Augmented DVH Analysis
  A. Loveless, A. Roy, I. Das, and O. Nohadani
  AAPM Annual Meeting and Exhibition 2013

PROFESSIONAL EXPERIENCE

- **NASA Johnson Space Center**   Houston, TX
  Command and Data Handling Software Architect   *Sep. 2018 - Present*
  - Provide Time-Triggered Ethernet (TTE) and fault tolerance expertise to the Gateway and Advanced Exploration Systems (AES) Avionics and Software (A&S) Projects.

  AES A&S Project Command and Data Handling Lead   *Oct. 2016 - Aug. 2018*
  - Led development of a triplex voting system that reduces cost, size, weight, and power by eliminating the need for a fourth computer to tolerate one Byzantine fault, can use commercial boards and operating systems, and was successfully demonstrated in the Integrated Power, Avionics, and Software (iPAS) facility.
  - Proposed and successfully demonstrated a novel approach for constructing fault-tolerant voting systems using TTE when end systems may fail arbitrarily.
  - Wrote and maintained 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.
  - Successfully integrated 80+ data flows and 15+ software applications from the A&S, Autonomous Systems and Operations (ASO), and AES Modular Power Systems projects for the A&S FY17 Integrated Test.
  - Updated the Subnetwork Packet Service book to suit time-triggered networks as part of the Consultative Committee for Space Data Systems (CCSDS) Spacecraft Onboard Interface Services (SOIS) working group.

  Network Development Engineer   *Mar. 2014 - Sep. 2016*
  - Built network drivers for several embedded platforms (e.g. Aitech SP0-100, Space Micro Proton 400K) and operating systems (e.g. RTLinux, VxWorks), forming the foundation for all future Engineering Directorate projects using TTE.

- Extended the TTE technology by creating a full network stack in software – increasing the max message size from 1500 to 64K bytes with <10% overhead, and enabling a demo of the Orion Ascent Abort-2 flight software during the A&S FY15 Mid-Year Integrated Test.
- Identified eight pathstones enabling manned Mars exploration and presented suggested next steps and partnerships to Engineering Directorate management as the networking domain lead for JSC's L-8 effort.

INTERNSHIPS

- **NASA Johnson Space Center**   Houston, TX
  Command and Data Handling Branch   *Summer 2013*
    - Successfully developed an embedded network analyzer enabling real-time visualization of hand controller commands sent from the Flight Deck of the Future to flight computers running in the iPAS facility.

  Command and Data Handling Branch   *Summer 2012*
    - Successfully developed a data acquisition system with custom I/O board and MCF51JF microcontroller enabling real-time monitoring and logging of pressure data from cold gas thrusters in the iPAS facility.

  Spacecraft Software Engineering Branch   *Spring 2011*
    - Collaborated with Tietronix Software to design several graphical user interfaces successfully demonstrated within the Habitat Demonstration Unit to control camera and power subsystems from a tablet or phone.

  Onboard Computer and Information Systems Branch   *Summer 2010*
    - Spearheaded knowledge capture program to archive technical specifications and other valuable records related to the Space Shuttles avionic systems prior to retirement of the vehicle.

  Data Processing Systems Branch   *Fall 2009*
    - Completed core Data Processing Systems (DPS) flight controller training and Single Systems Trainer exams.
    - Monitored Space Shuttle DPS in the Mission Control Center during missions STS-128 and STS-129.

UNDERGRADUATE RESEARCH

- **Purdue University**   West Lafayette, IN
  Fiber-Optic Controller for fMRI Testing (PI: Prof. Thomas Talavage)   *Fall 2013*
    - Led team of four undergraduates designing an improved fiber-optic joystick used by clinicians to evaluate a patient's higher cognitive function during functional magnetic resonance imaging (fMRI) tests.

  Optimization in Radiation Therapy (PI: Prof. Omid Nohadani)   *Fall 2012 – Spring 2013*
    - Created software enabling the quantitative comparison of radiation treatment plans based on historical data – eliminating bias by allowing clinicians to distinguish plans that otherwise appear visually identical.

  Electric Field Fringe Effect Simulation (PI: Prof. Daniel Elliott)   *Fall 2012*
    - Developed models characterizing electric field uniformity between conductor plates and produced results used in creating a new technique for measuring the amplitude of optical transitions in atomic Cesium.

- **Rice University**   Houston, TX
  Microscope Image Comparison (PI: Prof. Weiwei Zhong)   *Summer 2011*
    - Developed algorithm to compare the clarity of photos taken by a microscope imaging robot in real time – reducing the number of pictures requiring manual review from 5K+ to <500 per run.

NEW TECHNOLOGY REPORTS

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

Awards and Honors

- NASA JSC Engineering Directorate Academic Fellowship (*Sep. 2019 – Present*)
- NASA JSC Engineering Directorate Academic Fellowship (*Sep. 2018 – Aug. 2019*)
- NASA Honor Award, Early Career Achievement Medal (*Aug. 2018*)
- [Nomination] NASA AES Innovation Award, Fault-Tolerant Voting Architecture using CFS and TTE (*Mar. 2018*)
- [Nomination] Rotary National Stellar Team Award for Space Achievement, NASA AES A&S Team (*Jan. 2018*)
- [Nomination] NASA Honor Award, Group Achievement, AES ASO Project (*Dec. 2017*)
- NASA AES Certificate of Achievement, A&S Project FY16 Integrated Test (*Oct. 2016*)
- NASA JSC Avionic Systems Division Recognition Award, Time-Triggered Ethernet Development (*Oct. 2015*)
- Purdue Trustees Merit Scholarship (*Aug. 2008 – May 2013*)