JOE GIBSON

Flight Software Engineer

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Overview

Flight software engineer at NASA with over 10 years of experience specializing in critical embedded software, computer vision and pose algorithm optimization, and software quality/reliability.

Skills

- Programming languages: **C**, **C++**, **Python**, and **Bash**
- Linux and real time operating systems (VxWorks) on x86, PowerPC, and MicroBlaze platforms
- NASA Core Flight System (cFS) and OSAL
- Optimization of image processing, computer vision, and pose estimation algorithms
- Hybrid computing systems and interfacing with FPGAs for hardware acceleration of math/algorithms
- Systems programming and Unix terminal (make, gdb, ssh, etc.)
- **Git** version control, coding standards, static analysis, and process control
- Documentation with Doxygen, Markdown, and LaTeX
- In-space Servicing, Assembly, and Manufacturing (ISAM), space systems, radiation tolerant design, and sub-orbital telescopes
- Basic knowledge of VHDL, Perl, Awk, Sed, HTML, CSS, PHP, and JavaScript
- Basic knowledge of circuit analysis, PCB layout, astrophysics/cosmology, and particle physics
- Fluent in **English** and **Spanish**, intermediate in French, beginner in Russian and German

Experience

NASA Goddard Space Flight Center   **Greenbelt, MD**

Principal Flight Software Engineer [Intuitive Machines, Inc.]   **Jan 2016 - Present**

Code 480: NASA Exploration and In-space Services (NExIS)

- OSAM-1 robotic servicing mission to autonomously grapple and refuel a US gov client satellite
- Hybrid Flight Computing System (HFCS) team
- Remote since late 2019 (Michigan)
- Develop mission critical flight software in C and C++ on PowerPC and x86 architectures
- Design software for VxWorks real time operating system and Linux using cFE/cFS framework
- Optimize and implement various image processing, computer vision, and pose algorithms for autonomous spacecraft rendezvous and robot arm grapple
- Interface with Xilinx FPGA cores for hardware acceleration of image processing code
- Transform non-flight computer vision and pose estimation algorithms into flight-ready code
- Improve code quality and reliability by writing well-documented code, performing code reviews, leveraging static analysis tools (CodeSonar), and unit/regression testing
- Develop ground tools in Python and Bash for data analysis/plotting, image conversion, and latency analysis using libraries such as pandas, numpy, bokeh, etc.
- Write and maintain official HFCS C/C++ Flight Coding Standards
- Present technical information to reviewers at critical subsystem reviews (PDR, CDR, etc.)
- Experience at multiple high-profile test campaigns with flight hardware (avionics, robotic arms, sensor, etc.) and ground support equipment
- Teach Git version control to multiple teams at NASA

CERN (European Center for Nuclear Research)   **Geneva, Switzerland**

Research Assistant   **Aug 2014 - Jan 2015**

ATLAS Experiment, Large Hadron Collider

- Research assistant to Dr. Tancredi Carli (quantum chromodynamics, proton-proton collisions)
- Developed scientific analysis software in C++ and Python on SLC6 (Scientific Linux CERN 6)
- Co-developed the C++ program Spectrum to plot experimental data, theory predictions, and PDF (Parton Density Function) convolutions
- Created file format for Spectrum to parse data, grid, and PDF configurations
- Interfaced with ROOT, APPLgrid, LHAPDF, and FastJet QCD libraries
- Created the Spectrum website

NASA Goddard Space Flight Center   **Greenbelt, MD**

Computer Engineering Co-op   **Jan 2014 - May 2014**

Codee 665: Astrophysics, Observational Cosmology Laboratory

- BETTII project: high-altitude far-infrared balloon observatory for star formation and active galactic nuclei
- Interfaced with stellar image processing software in C and C++ in a Unix environment
- Developed StarTracker software for Star Cameras
- Implemented an RS-422 communication network with a shared circular buffer in C
- Created an FPGA RS-422 receiver using LabVIEW

L-3 Communications, Avionics Systems   **Grand Rapids, MI**

Computer Engineering Co-op   **May 2013 - Sep 2013**

- Designed software to configure and test avionics instruments
- Developed GUIs in C using LabWindows/CVI
- Tested units under environmental conditions and analyzed data

Custom Electronics, Inc.   **Grand Rapids, MI**

Computer Engineering Co-op   **Nov 2011 - May 2013**

- Programmed 8-bit Microchip microcontrollers in C using MPLAB X
- Wrote software for scientific instrumentation buoys
- Designed a series of eight electric guitar effect pedals
- Designed electrical schematics and PCBs in Altium Designer

Education

Grand Valley State University

B.S.E, Computer Engineering, 2015

- GPA: 3.957
- ASEE CEED National Co-op Student of the Year 2014
- Academic Excellence Award in Computer Engineering 2015
- Oustanding Co-op Student 2015
- Oustanding Senior in Computer Engineering 2015