

# Stephan Esterhuizen<sup>1</sup>

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**OBJECTIVE** I am currently happily employed at NASA's Jet Propulsion Laboratory, my goal is to explore alternative avenues of interesting and challenging software and hardware.

**EDUCATION** **Electrical Engineering, M.S.** May, 2006  
University of Colorado, Boulder, CO.  
Cumulative GPA: **3.67**

**Electrical and Computer Engineering, B.S.** May, 2004  
University of Colorado, Boulder, CO.  
Cumulative GPA: **3.52**

**EXPERIENCE** **California Institute of Technology** **NASA/JPL-Caltech**  
Jet Propulsion Lab, Pasadena, CA **2006 – present**

I was hired at JPL as a member of the technical staff, interacting with a small group of about 15 engineers building scientific instruments for spacecraft. It is the task of our group to **build precise positioning instruments** using GPS (or custom solutions where GPS is not available, eg. when orbiting Earth's Moon). My position in the group varies depending on what stage we are in the design of the instrument. Work varies from circuit board design for RF (1-2 GHz) electronics, to writing FPGA code and the corresponding Linux drivers and application code. I have worked on various miscellaneous Engineering tasks over the years at JPL, including:

1. Designed hardware, firmware, and software for a 5 FPGA beamforming GPS reflections instrument as a Research and Development task.
2. Software architect for project to detect the GRAIL inter-spacecraft link using a 34-meter radio telescope to demonstrate sub 100 nanosecond time transfer from the Moon to Earth.
3. Designed weak signal tracking software for detecting (on Earth) the Mars rover Curiosity's 10W signal as transmitted from Mars during Entry, Descent, and Landing (EDL) using the 64 meter Parkes Radio Telescope. This software will be used to assist during Mars InSight's landing in September 2016.
4. Designed hardware/software for the LISA mission to perform precise phase locking of lasers to a cavity using the Pound-Drever-Hall (PDH) technique.
5. Software lead for an upcoming cubesat GPS Radio Occultation demonstration.
6. Software architect for the science instrument on the upcoming US/Taiwan Cosmic-II mission.
7. Part of the US delegation representing NASA at the United Nations Office of Outer Space Affairs, International Committee on GNSS.
8. Found and fixed subtle problem with software radio a few months before launch to the International Space Station.
9. Participated in testing of GPS receiver jamming by LightSquared at White Sands Missile Range.

**taxview.org** **self**  
Visualize your taxes **2010 – present**  
In order to help people visualize better where their taxes are going, I threw together a website over a few weekends: **taxview.org**. This allowed me to pick up javascript and learn the python django web frameworks.

**Colorado Center for Astrodynamics** **CCAR**  
**Research**  
UCB **2003 – 2006**  
Research Assistant at CCAR, work focus on the analysis of reflected GPS signals for bistatic radar

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applications (mainly altimetry). This work has opened up the opportunity to explore the many facets of GPS, including **DSP, CDMA, ADCs, software receivers, analog front ends, remote sensing, high-speed USB data bridges, and weak signal tracking.**

## **COSMIC**

UCB

**UCAR**

**2005 (3 months)**

Worked part-time for University Corporation for Atmospheric Research (UCAR) during 2005 building a **GPS bitgrabber system** (based on OpenGPS). The system will support the Formosat/COSMIC mission; UCAR plans to deploy 8 of these bitgrabber systems world wide in order to collect the 50Hz data message that the GPS satellites transmit. This data stream is sent back to UCAR for real-time processing.

## **National Radio Astronomy Observatory**

Green Bank, WV

**NRAO**

**2004 (1 Month)**

Worked for the NRAO at the Green Bank Telescope facility in Green Bank, WV. Wrote **python code for the 100m radio telescope**, allowing the telescope to track satellites given Keplerian elements. It is the plan of the GBT facility to use this code as a warning system to alert the observer when a satellite moves into the beam of the telescope.

## **Colorado Space Grant Consortium**

UCB

**CSGC**

**2000 – 2003**

Team lead for Three Corner Satellite Hardware Team and Citizen Explorer C&DH team. Designed embedded systems for satellites, including working with 8051/PPC823 microcontrollers. Get more info at <http://spacegrant.colorado.edu>.

## **SPECIAL SKILLS**

**Computer Skills:** PCB layout, L<sup>A</sup>T<sub>E</sub>X, Python, C, C++, javascript, PostgreSQL, Matlab, RISC assembly, ZeroMQ.

**Operating Systems:** Linux, RTLinux, VxWorks, RTEMS

**Computer Architectures:** AVR RISC, 8051, USB/FX2, PPC823, x86, Xilinx Zynq/ARM Cortex A9

**Languages:** English, Afrikaans

## **SELECTED PUBLICATIONS**

**Moon-to-Earth: Eavesdropping on the GRAIL Inter-Spacecraft Time-Transfer Link using a Large Antenna and a Software Receiver:** S. Esterhuizen, NASA/JPL-Caltech; Proceedings of the ION's GNSS 2013 conference.

**An innovative direct measurement of the GRAIL absolute timing of Science Data:** Kamal Oudrhiri, Sami Asmar, Stephan Esterhuizen, Charles Goodhart, Nate Harvey, Daniel Kahan, Gerhard Kruizinga, Meegyeong Paik, Dong Shin, Leslie White, NASA/JPL-Caltech; Proceedings of the IEEE Aerospace 2014 conference.

**Experimental Characterization of Land-Reflected GPS Signals:** S. Esterhuizen, D. Masters, D. Akos, E. Vinande, University of Colorado. Proceedings of the ION's GNSS 2005 conference.

**Analysis of GNSS Signals as Observed Via a High Gain Parabolic Antenna:** M. Pini, Politecnico di Torino, Italy; S. Esterhuizen, D. Akos, University of Colorado. Proceedings of the ION's GNSS 2005 conference.

**Integration of GNSS Bistatic Radar Ranging into an Aircraft Terrain Awareness and Warning System:** D. Masters, P. Axelrad, D. Akos, S. Esterhuizen, University of Colorado. Proceedings of the ION's GNSS 2005 conference.

**The Use of GPS Bistatic Radar Techniques with a Software GPS Receiver for Terrain Elevation Measurements and Ground Object Detection:** E. Vinande, D. Akos, D. Masters, P. Axelrad, S. Esterhuizen, University of Colorado, Boulder. Proceedings of the ION's 61st Annual Meeting, 2005.

**High Gain Antenna Measurements and Signal Characterization of the GPS Satellites:** D.M. Akos, S. Esterhuizen, University of Colorado; A. Mitelman, R.E. Phelts, P. Enge, Stanford

University. Proceedings of the ION's GNSS 2004 conference.