

# Robert S. French

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## Summary

I have a broad set of skills and interests that has allowed me to pursue a variety of careers. I have written more than 1,000,000 lines of code, founded a highly successful startup, published many research papers in peer-reviewed journals, taught dozens of people to fly, and traveled around the world performing on stage. I am experienced and comfortable as an individual contributor, team lead, manager, educator, and public speaker. My goal is to make significant contributions to my fields of endeavor while working on cool projects with intelligent and motivated people.

## Astronomy- Related Professional Experience

**2008 – present**                      **The SETI Institute**    Mountain View, CA

- Co-I of the Ring-Moon Systems node of NASA’s Planetary Data System, which is tasked with archiving and distributing spacecraft mission data related to the outer planets (<https://pds-rings.seti.org>). Leader of the team responsible for developing and maintaining OPUS (Outer Planets Unified Search, <https://opus.pds-rings.seti.org>), a sophisticated web-based search service for researchers and the general public, and for importing mission data as it becomes available from various spacecraft (work performed in Python, JavaScript, and MySQL using jQuery, Bootstrap, and Django). Promoted the use of modern software development concepts, including coding standards, code reviews, AI coding assistance, and automated testing using GitHub Actions; installed and managed self-hosted GitHub runners. Maintained 15 open-source Python packages. Pioneered the use of Google Cloud Platform for hosting public PDS data. Also involved in long-term strategic planning, hiring, and day-to-day Linux and Windows system administration.
- PI for “Precision Pointing Reconstruction and Backplanes in Support of Legacy Outer Planet Missions” and Co-I for “Precision Pointing Reconstruction and Backplanes in Support of Cassini Remote Sensing Science”, multi-year projects to analyze and navigate all images taken by Cassini ISS, Voyager ISS, Galileo SSI, and New Horizons LORRI, and to provide pixel-level metadata and updated SPICE CK kernels to the research community, all archived in PDS4 format. Utilized Amazon Web Services (EC2, S3, SQS, CloudWatch) and Google Cloud Platform (Compute Engine, Cloud Storage) to perform massively parallel computation on more than 500,000 images requiring 15,000 CPU-hours per run.
- Co-I for “The Recent History of Saturn’s Dusty Rings” and “Observations and Dynamics of Ring-Moon Systems” and Collaborator for “The Structure, Composition and History of Saturn’s Faint Rings”. Analyzing the rings and satellites of Jupiter, Saturn, Uranus, and Neptune using data from a variety of spacecraft and telescopes with an emphasis on the recent changes in Saturn’s F ring, the orbital stability of the inner Uranian satellites, and the confinement of Neptune’s ring arcs. Co-discoverer of Hippocamp, a small moon of Neptune.
- Published peer-reviewed papers, gave conference and public talks, and mentored undergraduate interns through NSF’s Research Experience for Undergraduates program.

**2010 – 2011**                                      **West Valley College**    Saratoga, CA

- Adjunct faculty teaching introductory astronomy lab.

Technology-  
Related  
Professional  
Experience

**1996 – 2000**  
**2000 – 2001**

**Silicon Spice, Inc.**  
**Broadcom Corporation**

Mountain View, CA  
Mountain View, CA

- Silicon Spice produced a series of high-performance communications processors based on proprietary reconfigurable processor architectures. The chips were targeted at the carrier-class voice and remote access server market and were capable of delivering hundreds of channels of voice or modem processing in a small, low-power package. Silicon Spice provided a complete system solution: packaged silicon, development tools, reference boards, embedded host software, and voice and modem application stacks.
- As Co-Founder of Silicon Spice, was responsible for all aspects of company development. Raised over \$95M in venture funding in five rounds. Involved in hiring over 60 of the 130 employees, including a world-class CEO and executive staff. Actively participated in customer visits and demos at all levels. Provided vision for the product and the company culture.
- As Director of Software Development, was responsible for building and managing groups including: retargetable compiler, debugger/IDE, chip simulation, embedded real-time OS, embedded host software, voice and modem applications, quality assurance, release engineering, ITS, and technical writing. Provided vision and direction for the software development process, including the extensive use of testing automation using custom software on our own server farm. Personally wrote many of the original software tools and simulators in C and C++. Delivered 18 high-quality software releases.
- Participated in the architectural design of two generations of chips.
- Was issued 18 patents on software and chip architecture.
- Silicon Spice was sold to Broadcom Corporation in October, 2000 for \$1.25 billion.

**1992 – 1996**

**Silicon Graphics, Inc.**

Mountain View, CA

- In charge of the global and local optimizers for the MIPSpro 6.0 C/C++ compiler targeting the MIPS R10000 processor. Implemented a wide variety of new optimizations and achieved record-breaking Nullstone benchmark results (work performed in C).

**1991**

**Carnegie Mellon University**

Pittsburgh, PA

- Designed and implemented an optimizing code generator for the Intel/CMU iWarp parallel processing system. The code generator interfaced with the Stanford SUIF compiler system and provided software pipelining and support for efficient inter-processor communication. The compiler significantly outperformed the Intel production compiler (worked performed in C++).

**1990 – 1996**

**Stanford University**

Stanford, CA

- Co-developed the SUIF compiler infrastructure, an open-source research platform used by hundreds of companies and universities. Designed and implemented significant portions of the SUIF library, ANSI C front end, and C back end (work performed in C++). Investigated methods for compilation and fast simulation of hardware description languages, especially Verilog. (<https://suif.stanford.edu/suif/suif1>)

**1989 – 1993**

**ComputerVision**

Cambridge, MA

- Solely responsible for porting *DesignView*, a pioneering graphical constraint-based mechanical engineering design system consisting of more than 340,000 lines of C code, from Windows 3.x to UNIX/X11/Motif.

- 1986 – 1989**                      **MIT Project Athena**                      Cambridge, MA
- Co-developed Zephyr, the world’s first network-based, distributed, fault-tolerant, cryptographically-secure notice multicast system for personal and system messages (today known as instant messaging). Designed the Zephyr protocol and implemented the client library and all client applications. Zephyr is still in use today.
  - Ported GNU Emacs to X11. It was the first fully functional X11 application.
  - Developed a distributed, fault-tolerant database application for homework submission.
  - Implemented or improved various UNIX system applications (such as login and mount) to work in a highly distributed secure processing environment.

- 1979 – 1986**                      **Various Companies**                      Louisville, KY
- Implemented accounting and inventory software for several companies. Managed a small programming department at a mail-order company. Developed a new BASIC interpreter that was sold with the ChromaTRS color graphics board for the TRS-80. Developed dozens of utilities and games for the TRS-80 that were sold commercially. Developed some of the first shareware for the Amiga, including a well-regarded Mandelbrot set exploration system. Tutored students in programming concepts.

Business- Related Professional Experience	<b>2012 – 2014</b>	<b>Flective Imaging Systems</b>	Sunnyvale, CA
	<b>2009 – 2011</b>	<b>HelioCars, LLC</b>	Fremont, CA
	<b>2007 – 2010</b>	<b>Veloxdat, Inc.</b>	Fremont, CA
	<b>2002 – 2006</b>	<b>Stretch, Inc.</b>	Sunnyvale, CA

Technical Advisory Board member. Provided analysis and advice for venture fund-raising, marketing, and silicon and software technology.

Aviation- Related Professional Experience	<b>2010 – 2011</b>	<b>Advanced Flyers</b>	Palo Alto, CA
	<b>2004 – 2011</b>	<b>West Valley Flying Club</b>	Palo Alto, CA
	<b>2003 – 2007</b>	<b>Sundance Flying Club</b>	Palo Alto, CA
	<ul style="list-style-type: none"> <li>▪ Airline Transport Pilot-rated pilot (airplane single- and multi-engine land and sea).</li> <li>▪ FAA Gold Seal Flight Instructor (airplane single- and multi-engine and instrument).</li> <li>▪ FAA Ground Instructor (advanced and instrument).</li> <li>▪ 5,000+ hours total flight time; 3,000 hours flight instruction given; 2,700 hours ground instruction given.</li> <li>▪ Have owned three aircraft (25 years total ownership).</li> <li>▪ Taught 23 students to become private, instrument, or commercial pilots (&gt; 95% first-time pass).</li> <li>▪ Nominated as Flight Instructor of the Year for the San Jose region.</li> </ul>		

Square Dance- Related Professional Experience	<b>1992 – present</b>	<b>Challenge-Level Square Dance Caller</b>	Various locations
	<ul style="list-style-type: none"> <li>▪ One of only eight national-level C4 callers in the United States.</li> <li>▪ Called hundreds of square dance weekends throughout the United States, Canada, Sweden, Germany, and Japan.</li> <li>▪ Taught many full-length (6-9 month) and accelerated (2-3 week) square dance classes at all levels from beginners through C3A.</li> <li>▪ Co-author of the book <i>Mental Image Mechanics</i>, a treatise on set theory applied to square dance calls.</li> </ul>		

- Education      **2008 – 2010**      **Swinburne University of Technology**      Melbourne, Australia  
M.S. in Astronomy
- Honor Roll for highest grade in 11 classes.
  - Australian Sky & Telescope award for “most outstanding final year student”.
- 1990 – 1996**      **Stanford University**      Stanford, CA  
Ph.D. candidate in Computer Science; advisor: Monica Lam (M.S. earned)
- Teaching assistant for *Topics in Parallelizing Compilers, Advanced Compiling Techniques, and Programming Languages*.
  - Awarded Intel Foundation Graduate Fellowship, 1995-1996.
- 1986 – 1990**      **MIT**      Cambridge, MA  
B.S. in Computer Science
- Course emphasis on computer architecture, compiler and programming language theory, and VLSI design. Thesis examined the use of simulated annealing in the optimization of programs on fine-grained parallel computers.

Publications  
and  
Conference  
Proceedings

**Planetary Science and Astronomy**

- R. S. French, et al.** 2024, *Saturn's F Ring During 13 Years of Cassini ISS Observations*. PDS Meeting #56, #204.03.
- J. C. Smith, et al. 2023, *A Self-Supervised Learning-Based Recommender System for NASA's Planetary Data System*. 6<sup>th</sup> Planetary Data Workshop.
- R. S. French, et al.** 2023, *Enabling Multi-Mission/Multi-Instrument Search: The PDS Ring-Moon Systems Node Software Ecosystem*. 6<sup>th</sup> Planetary Data Workshop.
- M. J.-T. Mace, et al. 2023, *The Outer Planets Unified Search (OPUS) Tool - Current Status*. PV2023.
- M. S. Tiscareno, et al. 2023, *Engaging with the Problem of Metadata Heterogeneity*. PV2023.
- J. C. Smith, et al. 2022, *A Self-Supervised Learning-Based Recommender System for NASA's PDS*. AGU Fall Meeting.
- M. Lessard, et al. 2022, *Photometry of Saturn's F Ring During the Cassini Mission: An Update*. DPS Meeting #54, #317.01.
- M. Čuk, et al. 2022, *Cupid is not Doomed Yet: On the Stability of the Inner Moons of Uranus*. AJ, 164.
- R. S. French, et al.** 2021, *The Outer Planets Unified Search (OPUS) Tool — Current Status and Future Plans*. 5<sup>th</sup> Planetary Data Workshop.
- M. Čuk, et al. 2020, *Are the Inner Satellites of Uranus Stable?* DDA Meeting #52, #205.03.

- M. Brozović, *et al.* 2020, *Orbits and Resonances of the Regular Moons of Neptune*. Icarus, 338.
- M. K. Gordon, *et al.* 2019, *Data into the Planetary Data System: When Data Systems Collide*. EPSC-DPS Joint Meeting.
- M. Brozović, *et al.* 2019, *Resonant Moons of Neptune*. DPS Meeting #51.
- M. Brozović., *et al.* 2019, *Orbits and Resonances of the Regular Moons of Neptune*. DDA Meeting #50, #102.06.
- R. S. French**, *et al.* 2019, *OPUS 3.0: The New and Improved Outer Planets Unified Search Tool*. 4th Planetary Data Workshop.
- M. R. Showalter, *et al.* 2019, *The seventh inner moon of Neptune*. Nature, 566, pp. 350-353.
- R. S. French**, *et al.* 2018, *Outer Planets Unified Search (OPUS): Status and Future Plans*. DPS Meeting #50, #315.12.
- M. Brozovic, *et al.* 2018, *Orbits of the Inner Satellites of Neptune*. DDA Meeting #49, #402.01.
- M. K. Gordon, *et al.* 2018, *Cassini and the PDS Ring-Moon Systems Node*. Final Cassini Science Symposium.
- M. R. Showalter, *et al.* 2018, *Developments in Geometric Metadata and Tools at the PDS Ring-Moon Systems Node*. Planetary Science Informatics and Data Analytics Conference.
- C. D. Murray & **R. S. French** 2018, *The F Ring of Saturn*. In: Planetary Ring Systems, Tiscareno, M. S. & Murray, C. D. editors (Cambridge University Press).
- M. R. Showalter, *et al.* 2017, *A Three-Body Resonance Confines the Ring-Arcs of Neptune*. DPS Meeting #49, #104.01.
- R. S. French**, *et al.* 2017, *Orbital and Photometric Analysis of the Inner Uranian Satellites from Hubble Images*. DPS Meeting #49, #214.19.
- M. R. Showalter, *et al.* 2017, *Ongoing Dynamics and Evolution of Neptune's Ring-Moon System*. DDA Meeting #48, #302.03.
- R. S. French**, *et al.* 2017, *Precision Pointing Reconstruction and Geometric Metadata Generation for Cassini Images*. 3<sup>rd</sup> Planetary Data Workshop.
- M. K. Gordon, *et al.* 2017, *OPUS: A Comprehensive Search Tool for Remote Sensing Observations of the Outer Planets*. 3<sup>rd</sup> Planetary Data Workshop.
- M. R. Showalter, *et al.* 2017, *Archival Data and Computational Power in Planetary Astronomy: Lessons Learned 1979–2016 and a Vision for 2020–2050*. NASA Planetary Science Vision 2050 Workshop.

**R. S. French, et al.** 2016, *Precision Navigation of Cassini Images Using Rings, Icy Satellites, and Fuzzy Bodies*. DPS Meeting #48, #121.14.

M. R. Showalter, et al. 2016, *Hubble Observations of the Ongoing Evolution of Neptune's Ring-Moon System*. DPS Meeting #48, #203.09.

**R. S. French, et al.** 2015, *Orbital Analysis of the Inner Uranian Satellites from Hubble Images*. DPS Meeting #47, #508.11.

**R. S. French, et al.** 2014, *Precision Pointing Reconstruction and Geometric Metadata Generation for Cassini Images*. DPS Meeting #46, #422.01.

A. C. Quillen & **R. S. French** 2014, *Resonant Chains and Three-body Resonances in the Closely-Packed Inner Uranian Satellite System*. MNRAS, 445, pp. 3959-3986.

**R. S. French, et al.** 2014, *Analysis of Clumps in Saturn's F Ring from Voyager and Cassini*. Icarus, 241, pp. 200-220.

M. R. Showalter, et al. 2013, *The Neptune System Revisited: New Results on Moons and Rings from the Hubble Space Telescope*. DPS Meeting #45, #206.01.

**R. S. French, et al.** 2013, *Analysis of Clumps in Saturn's F Ring from Voyager and Cassini Observations*. DPS Meeting #45, #206.09.

S. K. Hicks, et al. 2013, *Comparing Clumps in Saturn's F Ring from Voyager to Cassini*. AAS Meeting #221, #353.15.

M. R. Showalter, et al. 2013, *New Satellite of Neptune: S/2004 N 1*. CBET 3586.

**R. S. French, et al.** 2012, *Analysis of Longitudinal Variation in Saturn's F Ring Using Wavelets*. DPS Meeting #44, #414.06.

**R. S. French, et al.** 2012, *Cupid is Doomed: An Analysis of the Stability of the Inner Uranian Satellites*. Icarus, 220, pp. 911-921.

**R. S. French, et al.** 2012, *The Brightening of Saturn's F Ring*. Icarus, 219, pp. 181-193.

**R. S. French, et al.** 2012, *Cupid is Still Doomed: Overlapping Power Laws and the Stability of the Inner Uranian Satellites*. DDA Meeting #43, #8.03.

**R. S. French, et al.** 2011, *Cupid is Doomed: An Analysis of the Stability of the Inner Uranian Satellites*. DDA Meeting #42, #6.02.

M. R. Showalter, et al. 2009, *The Brightening of Saturn's F Ring*. EPSC, p. 317.

M. R. Showalter, et al. 2009, *The Brightening of Saturn's F Ring*. DDA Meeting #40, #3.04.

M. R. Showalter, et al. 2009, *The Brightening of Saturn's F Ring*. DPS Meeting #41, #22.07.

## Computer Science

S. P. Amarasinghe, *et al.* 1996, *Multiprocessors from a Software Perspective*. IEEE Micro, June.

S. P. Amarasinghe, *et al.* 1995, *Breakthroughs in Parallelizing Compilers and Their Architectural Implications*. HOT Chips VII, August.

**R. S. French**, *et al.* 1995, *A General Method for Compiling Event-Driven Simulations*. Proceedings of the 32nd Design Automation Conference. June, pp. 151-156.

R. P. Wilson, *et al.* 1994, *SUIF: An Infrastructure for Research on Parallelizing and Optimizing Compilers*. ACM SIGPLAN Notices, December, pp. 31-37.

M. S. Lam, *et al.* 1994, *SUIF: A Parallelizing & Optimizing Research Compiler*. Stanford Computer Systems Laboratory Technical Report No. CSL-TR-94-620.

N. Williams, *et al.* 1990, *The Educational On-Line System*. European UNIX User's Group Proceedings, pp. 125-131.

**R. S. French** 1989, *A Simple Placement and Routing Algorithm for a Two-Dimensional Computational Origami Architecture*. Papers of the MIT-ACM Undergraduate Computer Science Conference.

C. A. DellaFera, *et al.* 1988, *The Zephyr Notification Service*. Usenix Conference Proceedings, February, pp. 213-219.

### Patents

U.S. Patent #7,809,832, #7,428,593, #6,912,576: *System and method of processing data flow in multi-channel, multi-service environment by dynamically allocating a socket.*

U.S. Patent #7,266,672: *Method and apparatus for retiming in a network of multiple context processing elements.*

U.S. Patent #7,249,351: *System and method for preparing software for execution in a dynamically configurable hardware environment.*

U.S. Patent #7,188,192: *Controlling multiple context processing elements based on transmitted message containing configuration data, address mask, and destination identification.*

U.S. Patent #7,032,103, #6,675,289: *System and method for executing hybridized code on a dynamically configurable hardware environment.*

U.S. Patent #6,990,566: *Multi-channel bi-directional bus network with direction sideband bit for multiple context processing elements.*

U.S. Patent #6,892,324: *Multi-channel, multi-service debug.*

U.S. Patent #6,751,722: *Local control of multiple context processing elements with configuration contexts.*

U.S. Patent #6,745,317: *Three level direct communication connections between neighboring multiple context processing elements.*

U.S. Patent #6,553,479: *Local control of multiple context processing elements with major contexts and minor contexts.*

U.S. Patent #6,526,498, #6,122,719: *Method and apparatus for retiming in a network of multiple context processing elements.*

U.S. Patent #6,457,116: *Method and apparatus for controlling contexts of multiple context processing elements in a network of multiple context processing elements.*

U.S. Patent #6,108,760: *Method and apparatus for position independent reconfiguration in a network of multiple context processing elements.*

U.S. Patent #5,915,123: *Method and apparatus for controlling configuration memory contexts of processing elements in a network of multiple context processing elements.*

Operating  
System and  
Language  
Experience

Operating Systems

- UNIX versions: Linux, Solaris, IRIX, SysV, 4.3 BSD, ULTRIX, HP/UX
- Desktops: Windows 3.0 through 11, MSDOS, AmigaOS, Apple DOS, TRS-DOS, CP/M-80
- Mainframes: MULTICS, VAX/VMS, RSTS/E, RT-11, TOPS-10, TOPS-20

Programming and Scripting Languages

- BASIC, C, C++, CLU, COBOL, FORTH, FORTRAN, IDL, JavaScript, LISP, Mathematica, PASCAL, PERL, PL/I, php, PostScript, Prolog, Python, RPG II, Scheme, SQL, Verilog
- Assembly languages: 8088, 8086, Z-80, 6809, 68000, MIPS R3000 through R10000, SPARC, XTensa, KL10