VITA

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Activity Statement

My professional activities have been involved with the following topics: writing software, virtual reality, research and development of real-time operator-in-the-loop simulations, nonlinear oscillations- secular perturbation theory, III-V semiconductor research, teaching undergraduate physics, carpentry, and heavy equipment research.

Objective: In broad terms, save humanity from the next mass extinction. In specific, I'm not actively seeking a software development or general analyst position where I can use and grow my computer programming, presentation, and leadership skills in a way that leverages my scientific and engineering training and experience. I have many years of C/C++ software development experience on GNU/Linux, other UNIXes, and some experience on MS Windows.

The "Experience" section of this CV devolved into a list of interesting self driven projects, in addition to a chronology of my underemployment. Some of the projects never end and I continue to work on them from time to time. For example: the small software package project called Quickplot which I started in 1998, last worked on in 2017, and will likely work on it in the future.

My hobbies include: running (more like walking fast), hand balancing (I currently have on very little cartilage in my left should, but I can dream about growing new cartilage and doing this once again) road and mountain bike cycling, gardening, wood working, residential construction, and writing free software.

Education

Ph.D., Physics, University of Illinois at Urbana-Champaign (UIUC), 1996 (abstract.html)
M.S., Physics, University of Illinois at Urbana-Champaign, 1989
B.S., Physics, University of Massachusetts (UMass) at Dartmouth, 1986

Experience

Visualization & Virtual Reality Systems Specialist, Virginia Tech

November 2016 - January 2022, Maintain and manage systems in the Visionarium Lab and providing visualization consultation, programming support, and facility tours, as part of the ARC (Advanced Research Computing) group. It's working in the same Lab space as before.

Residential Carpentry working for Self

March 2015 - August 2015 (part time), Stone Retaining Wall on my home.

Software Development working for Self

December 2013 - Janary 2015 (part time), Writing quickscope a free software oscilloscope. This was started some time ago and was found to be infeasible, but looks feasible now.

Residential Carpentry working for Self

May 2013 - July 2014 (part time), Front porch addition on my home. Follow the link for extensive details.

Web Computer Programming working for Self (6 months)

October 2012 - March 2013, A mini Web content management system that provides WYSIWYG html form editing and form submission management. The project is free software. This seems to touch some of the most in demand computer programming skills (JavaScript, PHP, HTML, CSS), and, so what better why to get noticed and trained. Web site: http://tableforms.sourceforge.net/. I hope to have the first release soon, but than again...

Residential Carpentry working for Self (12 weeks part time)

May 2012 - September 2012 , Did a complete remodel of a basement bathroom with all new of the following: plumbing, electric wiring, sewer pipes in poured cement floor, studs and walls with insulation, toilet, claw foot bath tub, sink and vanity, tile on floors and tile on walls, and custom decorative ceiling. It was totally gutted down to the dirt. In the process we found a 2 foot by 10 foot hidden room that was behind a stud framed wall; no dead bodies inside, just a large pile of old bricks which today have value.

Freelance Computer Programmer
make a **Drive Time Calculator** instigated by an old friend (9 weeks)

March 2012 - May 2012, I developed a program, in C, that computes automobile drive times from a given starting or finishing location to all areas surrounding that given location. The program creates a scaler field of minimum drive time as a function of position. The program was required to compute these fields in minutes or seconds, given the current implementation ran in hours. A bench mark case was developed. The program was ported from GNU/Linux to MS Windows Vista. The resulting program exceeded the bench mark expectation computing each field in seconds. See more details with pretty pictures.

Selections of Unpaid Work (2.3 years)

November 2009 - March 2012,

- **Computer Programming:** Wrote Quickscope a Software Oscilloscope: Developed a C/C++ API (application programming interface) and programs that displays real-time data. The data input may come from any source that can be read by the system like for example a pipe, socket, device file, regular file, and/or a real-time computation. The project is ongoing. Here's a link to a preview. (5 months part time)
- **Computer Programming:** Rewrote Quickplot a fast 2-D plotter that is part of Ubuntu and other GNU/Linux distributions. I did a complete rewrite of it in C using the newer GTK+ 3.0. It used to be written in C++. (3 months full time)
- **Residential Carpentry:** Put a new fiberglass asphalt shingle roof, fascia, soffit, and gutters on my house. The house has a 2860 square foot roof. (4 months full time)
- **Residential Carpentry:** Helped Bill Johnson, licensed carpenter, do a basement frame and drywall job. I got paid for this. (4 months part time)
- **Web Computer Programming:** Developed a web service that manages event registration and like services. Wrote a nice little client side JavaScript HTML form editor and the server back-end using PHP. I shelved the project after looking at the cost of wild card public key (SSL) certificates and competing projects. I was thinking that some day I'll merge the project with Word Press of other web content management system as a free software project. (1 year full time)
- **Residential Carpentry:** Built custom cabinets in my house. (2.3 months full time)

Senior Software Engineer, Librato Inc. (3.2 years)

August 2006 - November 2009, Developed software that sits between user applications and the standard C library which provides seamless checkpoint and restart of large and long running Linux cluster applications.

Instructor, Virginia Tech, Department of Physics (1.4 years)

January 2005 - May 2006 Developed and taught physics classes, part time. Taught classical mechanics for juniors/seniors, and E/M for sophomore engineering majors.

Supervising Analyst, AMA Inc. (5 months)

July 2003 - November 2003, As the computer programmer part of a team that did contracted worked for NASA Langley researcher Ruth M. Amundsen and that automated portions of the thermal analysis of the Hyper-X aircraft, I wrote interface code using Microsoft VBA for Excel, contributed to the development of MSC/PATRAN thermal FORTRAN user code, and wrote and modified other supporting scripts using CYGWIN.

Research Assistant Professor, Virginia Tech (3.8 years)

July 2001 - March 2003, Department of Computer Science, Virtual Reality Programming at the Virginia Tech CAVE™. Continued the design and development of the general VR simulation software called DIVERSE.

May 1999 - July 2001, Department of Engineering Science and Mechanics, Virtual Reality Programming at the Virginia Tech CAVE, built a Crane Ship Simulator and general virtual prototyping system by incorporating a MOOG 6 degree-of-freedom motion base into a Fakespace CAVE (now Mechdyne) in support of the MURI (Multi-Disciplinary University Research Initiative) program, and designed and developed general VR simulation software like DIVERSE. Images from working at the VT CAVE

Research Programmer NCSA (3 years)

at the National Center for Supercomputing Applications (NCSA) at UIUC

April 1997 - May 1999, Visualization Programmer, Worked with Caterpillar engineers on virtual prototyping projects, explored the latest VR software and hardware technologies, and developed software for virtual prototyping.

May 1996 - April 1997, Specializing as an Industrial Consultant for Caterpillar Inc., provided primary contact between Caterpillar engineers and NCSA.

Visiting Lecturer UIUC (4 months)

Febuary 1996 - May 1996, UIUC Department of Physics, Working under the direction of Prof. Alan Nathan, developed physics homework problem sets to be administered to students on the World Wide Web using CyberProf.

Teaching/Research Assistant UIUC (5 years)

March 1991 - Janary 1996, UIUC Department of Physics, Conducted research in conjunction with Prof. Alfred Hubler at the Center for Complex Systems Research at the Beckman Institute to prepare a PhD thesis in Nonlinear Dynamics. Wrote C, Mathematica and FORTRAN programs; helped maintain heterogeneous UNIX and Macintosh network; performed simulations of ordinary differential equations; taught introductory undergraduate physics classes; served as one of the three original developers of the CyberProf web based teaching project of the UIUC Physics Department.

September 1990 - March 1991, Teaching Assistant, UIUC Department of Physics. Taught introductory undergraduate physics classes.

Stuff (9 years)

Worked as roofer, residential framing carpenter, short order cook; worked my way through undergraduate school at UMass Dartmouth with BS in physics, in five years, spent one additional year at UMass Dartmouth in physics graduate school.

USMC (3 years)

July 1978 - June 1981, Military occupational specially 1341, Heavy Equipment Mechanic, highest rank was lance corporal.

Skills

- **Fifteen years experience in programming in C**
- **Nine years experience in programming in C++**
- **Experienced in programming on GNU/Linux, IRIX (SGI), HPUX (HP), and MS Windows**

- **Experienced in developing Web services using *GNU/Linux, Apache, PHP, JavaScript, HTML 4.01* and *HTML 5*. Used virtual servers to run the service customizing the GNU/Linux OS.**
- **Experienced in programming with scripting languages *bash, JavaScript, sh, tcl/tk, PHP, VBA, Ruby* and *make***
- **Eight years of university teaching experience**
- **Skilled in carpentry, electronics, and mechanics, from building residential dwellings to real-time interactive simulators**
- **Experienced in using the Standard Template Library (STL), GNU Autotools, GNU Debugger (GDB), Git, Subversion and CVS version control systems, FLTK API, GTKmm API, GTK+ API, QT API, Sockets API, CAVELibs API, OpenGL Performer API, MultiGen Creator, WorldToolkit API, Emacs, vim, CScope, MS PowerPoint, Latex, MS Word, VC++ IDE.**

Honors

- **Excellence in Teaching Award, UIUC Department of Physics, Spring Semester 1994**
- **Member, Sigma Pi Sigma, The National Physics Honor Society**

Free Software Developed

The following is a list of software packages that are usable by the general public and are distributed as free software.

1. ***webLauncher* is a node JS based web (HTTP and WebSockets, with or without TLS) service that runs programs on your web server. Think of it as service that lets any number of browsers be a app (application) launcher front end to your computer. You click an app icon and you launch a program on the remote (or local) server computer. It facilitates a fairly generic example of The Web of Things.**
2. ***quickbuild* a non-portable C software build system based on GNU make.**
3. ***quickscope* a software oscilloscope.**
4. ***Quickplot*, a Fast Interactive 2-D Plotter, GPL free software, Copyright 1998-2012. It's a finished product and also ongoing. quickplot is distributed with debian and ubuntu GNU/Linux software distributions.**
5. ***Shared Memory Arena*, a Shared Memory Allocator, LGPL free software, Copyright 2005-2008 (first released Feb. 2008).**
6. **John Kelso, Lance E. Arsenault, and Ron Kriz, *The DIVERSE graphics interface for Performer (DPF)*, C++ application programming interface (API) that provides a framework to implement 3D Virtual Environment (VE) applications , LGPL free software, Copyright 2000-2003.**
7. ***DIVERSE Toolkit*, a server, C++ API and programs for computer I/O, remote shared memory and real-time operator-in-the-loop programming utility, LGPL and GPL free software, Copyright 1999-2005.**

Publications

1. **John Kelso, Lance E. Arsenault, Steve G. Satterfield, and Ronald D. Kriz, *DIVERSE: A Framework for Building Extensible and Reconfigurable Device Independent Virtual Environments and Distributed Asynchronous Simulations*, PRESENCE 12.1, February 2003.**
2. **John Kelso, Lance E. Arsenault, Steve G. Satterfield, and Ronald D. Kriz, *DIVERSE: A Framework for Building Extensible and Reconfigurable Device Independent Virtual Environments*, Proceedings of IEEE VR 2002, Orlando Florida, March 24-28 2002 (PDF).**
3. **Lance Arsenault, John Kelso, Ron Kriz, and Fernando Das Neves, *DIVERSE: A Software Toolkit to Integrate Distributed Simulations with Heterogeneous Virtual Environments*, Proceedings of the Seventh Annual Joint Aerospace Weapons Systems Support, Sensors, and Simulation Symposium & Exhibition, San Diego, CA, July 2001 (PDF,ps.gz).**
4. **Lance E. Arsenault, *Coupled Oscillators Near Resonance*, PhD Thesis, UIUC, Jan. 1996 (ps.gz).**
5. **Lance E. Arsenault and Alfred W. Hubler. Dynamics of damped coupled oscillators near resonance. *Physical Review E*, 51(4):3561--71, April 1995 (PDF).**
6. **K. Kishino, M. S. Unlu, J. I. Chyi, J. Reed, L. Arsenault, and H. Morkoc. Resonant cavity-enhanced (RCE)**

photodetectors. *IEEE Journal of Quantum Electronics*, 27(8):2025--34, August 1991.

7. M.S. Unlu, K. Kishino, J. I. Chyi, J. Reed, L. Arsenault, and H. Morkoc. Wavelength Demultiplexing Heterojunction Phototransistor. *Electronics Letters*, 26(22):1857--58, October 25, 1990.
8. M. S. Unlu, K. Kishino, J. I. Chyi, L. Arsenault, J. Reed, S. Noor Mohammad, and H. Morkoc. Resonant Cavity Enhanced AlGaAs/GaAs Heterojunction Phototransistors with an Intermediate InGaAs Layer in the Collector. *Applied Physics Letters*, 57:750--2, 1990.

Curricula Development

1. *Intermediate Mechanics I*, Classical mechanics. This is the first of a two-semester sequence for upper-level undergraduates. It covered: 1-D oscillations, gravitation, Lagrangian and Hamiltonian formulations of mechanics, central force motion, nonintertial reference frames, and rigid body dynamics, at Virginia Tech.
2. *Intermediate Mechanics II*, Topics covered: small vibrations, waves, Hamilton, nonlinear dynamics, special relativity, and a student seminar.
3. *Foundations of Physics I*, A introductory calculus based physics course covering: waves, electricity, magnetism, optics, at Virginia Tech, 2005, 2006.

Conference Presentations

1. L. Arsenault, A. H. Nayfeh, J. Kelso, D. T. Mook, and R. D. Kriz, *Crane and Ship Simulator*, MURI Nonlinear Active Control of Dynamical Systems, Oct 16, 2000 (PPT).
2. L. Arsenault, A. H. Nayfeh, D. T. Mook, and R. D. Kriz, *Crane and Ship Simulator*, MURI Nonlinear Active Control of Dynamical Systems, March 29, 2000 (PPT).
3. L. Arsenault, A. H. Nayfeh, D. T. Mook, and R. D. Kriz, *Crane and Ship Simulator*, MURI Nonlinear Active Control of Dynamical Systems, October 4-5, 1999 (html).
4. Volodymyr V. Kindratenko, Berthold Kirsch, and Lance E. Arsenault, *Distributed Virtual Reality Technology in Collaborative Product Design* (live demo), Supercomputing'98, Orlando, FL, Nov. 1998.
5. V. Kindratenko, Berthold Kirsch, and Lance E. Arsenault, *Collaborative Product Design Review Using Distributed Virtual Reality* (live demo), Supercomputing'98, Orlando, FL, Nov. 1998.
6. Robert Fenwick, V. Kindratenko, and Lance E. Arsenault, *Collaborative Product Caterpillar/University of Illinois, Virtual Reality* (live demo), INFOtech'98, Peoria, IL, Oct. 1998.
7. Volodymyr V. Kindratenko, Lance E. Arsenault, et al, *Distributed Virtual Reality Technology in Collaborative Product Design* (live demo), Alliance'98, Urbana, IL, Apr. 1998.

Workshop Presentations

1. John Kelso and Lance Arsenault, *Virtual Environments Using DIVERSE*, Virginia Tech, Blacksburg, VA, May 20, 2002.
2. Lance Arsenault and John Kelso, *Visualization and Virtual Environments for Research and Instruction*, *day 2: DIVERSE*, Virginia Tech, Blacksburg, VA, May 16, 2002 (evaluation.html).
3. Lance Arsenault and John Kelso, *Building Virtual Environments that are Reconfigurable, Scalable, and Extensible with DIVERSE*, Virtual Environments Workshop, Virginia Tech, Blacksburg, VA, August 8, 2001 (evaluation.pdf).
4. A. H. Nayfeh and L. Arsenault, *Virtual Environment for Ships and Ship-Mounted Cranes*, ONR Undersea Weapon Simulation Based Design Workshop, University of Maryland, College Park, MD, June 15, 2001 (PPT).
5. L. Arsenault and J. Kelso, *DIVERSE: An open-source VE software API*, Keynote address, ONR Undersea Weapon Simulation Based Design Workshop, University of Maryland, College Park, MD, June 14, 2001.
6. R. Kriz, J. Kelso, and L. Arsenault, *Group and Immersive Visualization for Scientific Research*, Reality on the Move, SGI Silver Spring Facility, Silver Spring, MD, May 24, 2001 (PPT).
7. J. Kelso and L. Arsenault, *DIVERSE: An open-source VE software API*, CAVERNUS Advanced CAVE Workshop, Old Dominion University, Norfolk, VA, Oct. 18, 2000.

Journals Refereed

1. **Proceedings of User Interface Software and Technology (UIST), Montreux, Switzerland, October 15-18, 2006.**
2. **Proceedings of IEEE VR 2003, Los Angeles, California, USA, March 22-26, 2003.**
3. **Proceedings of Eurographics 2002, Saarbrucken, Germany, September 2-6, 2002.**
4. **Proceedings of IEEE VR 2002, Orlando, Florida, USA, March 24-28, 2002.**

Seminar and Colloquium Presentations

1. **J. Kelso and L. Arsenault, *DIVERSE, a framework for implementing device independent virtual environment applications*, Penn State University, Computer Science and Engineering Colloquium, State College, PA, Apr. 26, 2001 (PPT).**
2. **L. Arsenault and J. Kelso, *DIVERSE, a framework for implementing device independent virtual environment applications*, Virginia Tech, Computer Science Department Research Seminar Series, Blacksburg, VA, Apr. 18, 2001 (PPT).**
3. **J. Kelso and L. Arsenault, *DIVERSE*, National Institute of Standards and Technology, Mathematical and Computational Sciences Division, Gaithersburg, MD, Jan. 17, 2001 (PPT).**

Grants Awarded

1. **L. Arsenault and J. Kelso, *Task 2.1b, Command & Control Visualization of ONR*, sub task of *Navy Collaborative Integrated Information Technology Initiative (NavCIITI)*, ONR with Virginia Tech, Apr. 2002, $270,000**
2. **J. Kelso, L. Arsenault, and R. Kriz, *DIVERSE, phase 3*, National Institute of Standards and Technology with Virginia Tech, Aug. 2001, $20,000**
3. **L. Arsenault and J. Kelso, *Task 2.1b, Command & Control Visualization of ONR*, sub task of *Navy Collaborative Integrated Information Technology Initiative (NavCIITI)*, ONR with Virginia Tech, Apr. 2001, $275,226**
4. **L. Arsenault, J. Kelso, and R. Kriz, *DIVERSE, phase 2*, National Institute of Standards and Technology with Virginia Tech, Aug. 2000, $20,000**
5. **L. Arsenault, J. Kelso, and R. Kriz, *DIVERSE, Device Independent Virtual Environments- Reconfigurable, Scalable, Extensible (DIVERSE)*, National Institute of Standards and Technology with Virginia Tech, Aug. 1999, $20,000**

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