Keith Wiley

Contact

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Skills

- C, C++, Obj-C, Java, Perl, Javascript, Matlab, HTML, CSS
- Eclipse, Xcode, Subversion, CodeWarrior, Doxygen, Hadoop, CPPUnit
- Image (FFT, wavelet) and Acoustic signal processing
- Mobile development on Android platform

Education

Ph.D. Computer Science	University of New Mexico, Albuquerque	Jul 2006
M.S. Computer Science	University of New Mexico, Albuquerque	Dec 2003
B.A. Psychology	University of Maryland, College Park	Dec 1997

Work

University of Washington, Astronomy Dept, Jan 2010 - present
Research Scientist IV - Work in the LSST group (under Andrew Connolly) on the development of massively parallel image processing routines using *Hadoop*. Work has focused on *image coaddition*, wherein multiple partially overlapping images are registered, stacked, and mosaiced into a single uniform result. Our test dataset is the SDSSDB, approximately thirty terabytes comprising millions of images. LSST will require processing equivalent data per night nonstop for many years.

University of Washington, Applied Physics Lab, May 2007 - Jan 2010
Software Engineer IV - Development on the *Sonar Simulation Toolkit* (headed by Robert Goddard) which uses eigenrays to approximate underwater acoustic transmission. Work included incorporation of new external libraries, large-scale OO design and development of new features, optimization and redesign for performance, refactorization, CPPUnit testing. Development of a real-time data acquisition and FFT processing system with low data-loss tolerances, a need for rapid throughput, and preparation for future parallelism.

University of New Mexico, Jan 2007 - May 2007
Course Instructor - CS241, Data structures/algorithms, taught in C.

University of New Mexico, Jan 2001 - May 2006
Graduate Research Assistantships - see Research

University of New Mexico, Sep 1999 - May 2003 (six semesters total)
Graduate Teaching Assistant - Intermediate (200-level) and Advanced (300-level) C++

The Institute for Genomic Research, Sep 1997 - Aug 1999
C++ Software Developer - Bioinformatics software development for DNA sequencing and closure analysis.

Projects

Many computer programs, some listed below. See my website for a longer listing and detailed descriptions.

Android

- ***WildSpectra Mobile*** (2009) shows real-time scrolling spectrograms on *Android* cellphones. Recording and post-processing tools are also provided.

- ***Shead Spreet*** (2009) is a spread sheet for *Android* cellphones with 50,000 installs and 1200 commercial purchases.

HCI/Vector-Drawing

- ***Druid*** (2003-2006) (PhD thesis) is a vector drawing program (like *Adobe Illustrator*) which enables interwoven surfaces (Celtic knots, Olympic rings, etc.) and which provides an isomorphic efficient interface.

Image/Acoustic Signal Processing

- ***Keith's Image Stacker*** (2002-2008) is used widely in the amateur astrophotography community. It

provides image stacking, Laplacian sharpening, wavelet denoising, etc. It has received widespread positive review online and in the magazines *Astronomy* and *Sky & Telescope*.

• ***Keith's iPod Photo Reader*** (2005-2008) is a tool that reads the .ithmb image file format used by iPods. I reverse engineered the undocumented image format from scratch and then wrapped the result in a GUI-oriented tool for extracting photos from an iPod to a computer.

• ***WildSpectra*** (2000-2005) is a collaborative effort with Dr. R. Haven Wiley (Biology dept, UNC-CH). *WildSpectra* is a real-time spectrogram analyzer for the Mac that offers time- and frequency-section analysis. *WildSpectra* is used in Dr. Wiley's research lab and by researchers throughout the acoustic-biology community. Please note the mobile *Android* adaptation listed above as well.

Distributed Computing
• ***Distributed Mandelbrot Set*** (2001) generates fractal images by farming job-segments to multiple computers over a network. Automatic load-balancing ensures optimal performance.

ALife
• Numerous projects (1995-2006) in evolutionary algorithms, robotics, and flocking (see my website).

Web Sites: http://keithwiley.com, http://music.keithwiley.com, http://moviehurl.keithwiley.com

Awards

Sky & Telescope magazine. Software review: *Keith's Image Stacker* and *Keith's Astroimager*, Aug 2004.

First place in the *International Online ALife Contest*, *Cyberbotics Webots*, khepera robot sim., Jul 1999.

Cover design for the *Computer Science at UNM Student Conference* proceedings, 2006.

Proceedings chair for the *Computer Science at UNM Student Conference* committee, 2006.

Cover design for the *Workshop Proceedings of the Seventh International Conference on Artificial Life*, 2000.

Research

Winter 2003-Summer 2006, Ph.D. thesis, UNM, C.S. Dept
Design and implementation of *Druid*, a novel computer-assisted drawing program which permits easy construction of scenes of interwoven surfaces.

Summer 2003-Winter 2003, Ontology and Semantic Languages, UNM C.S. Dept/Sandia National Labs
Background research into the field of ontology and specific languages such as DAML+OIL and OWL.

Spring 2001-Spring 2002, Autonomous Robotic Glider, UNM C.S. Dept/Sandia National Labs
Use of genetic programming trees to evolve behavioral routines for autonomous robotic unpowered gliders. These gliders must find and use various forms of rising air to say aloft for extended periods of time.

Summer 1997, Auditory Neuroethology Lab, UMCP Psyc Dept
Study of bat echolocation and training via positive reinforcement.

Publications

Peer Reviewed
Wiley, K. B., and L. R. Williams. Representation of Interwoven Surfaces in 2 1/2 Drawing. *IEEE Computer Graphics and Applications*, 2006.

Wiley, K. B., and L. R. Williams. Representation of Interwoven Surfaces in 2 1/2 Drawing. *Proc. of CHI, Conference on Human Factors in Computing Systems*, Montréal, Canada, 2006.

Invited
Wiley, K. B., and S. Chambers. Long Exposure Webcams and Image Stacking Techniques. *The Art and Science of CCD Astronomy*, 2nd edition. Ratledge, David, editor, 2005.

Wiley, K. B. Long Exposure Webcams and Image Stacking Techniques for the Budget-Minded Astrophotographer. *Astronomy*. Bakich, Michael, editor, Dec, 2003.

Wiley, K. B. Pattern Evolver, An Evolutionary Algorithm that Solves the Nonintuitive Problem of Black and White Pixel Distribution to Produce Tiled Patterns that Appear Gray. *The Handbook of Genetic Algorithms.* Chambers, Lance D., editor. CRC Press, 1999.