

# Sky Coyote's Resume

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## Strengths:

- Custom software solutions for Unix, Macintosh, iOS, Android, and other devices, from start to finish.
- Native development using GCC/Make, ObjectiveC/XCode, or Java/Eclipse for all platforms and devices.
- Fluency with HTML5, Javascript, server programming in PHP, C, and Python, and other web technologies.
- Educational games, multi-layer animation, custom controls, and immersive non-standard user interfaces.
- Asynchronous networking and communication with remote servers, and server programming.
- Scientific and technical data analysis and visualization.
- Strong background and experience (academic and commercial) in math and science.
- Excellent verbal, written, organizational, and presentation skills.

## Programming languages, operating systems, etc...:

I work primarily in C, Javascript, PHP, and Python on Linux, and ObjectiveC/C/C++ and Java on the Macintosh, and in HTML5 for Firefox and Chrome. In the past I have used:

- Java for Android and C++ for Nokia (Symbian).
- Unix (SV, BSD, RTU, Mach), MS Windows 95-XP, Be, DOS, VMS, CMS, OS/MVT.
- Pascal, Lisp, Smalltalk, APL, Fortran, Hypertalk, Basic, Assembler.
- X-Windows, Swing, OpenGL, Qt, Wx, Win32, Tk, Motif, Phigs.
- IBM PC, Silicon Graphics, Sun, Masscomp, Tektronix, VAX, Alliant, HP, Atari, IBM 370.

## Education:

- B.A. from Cornell University in Mathematics and Biology, 1984. GPA: 3.5.
- Courses in vector calculus and analysis, differential and integral equations, linear algebra, real, complex, and functional analysis, logic, mechanics, electricity and magnetism, astrophysics, information theory, organic and physical chemistry, biochemistry, ecology, evolution, drawing, philosophy of science, and film-making.

## Professional experience (science, more below):

*June 2014--present:*

- I am currently working on a scientific project in Quantum Optical Computation. I have my own multi-year research grant. This project involves writing scientific software in C, Javascript, PHP, and Python for performing 1 and 2-bit quantum operations. Experiments are performed using laser optics, diffraction, and interference. The goal is to create a table-top device for performing general 1 and 2-bit computation using Quantum Mechanics.

## Professional experience (mobile and web):

*August 2012--August 2014: Knowledge Quest LLC, Portland, OR.*

- Developed web applications in Javascript for MapStudio and MapStudio Pro online map creation. An automated process was developed for converting Adobe Illustrator files (exported as SVG) to pure Javascript source code via several C programs. These Javascript files (on the server) can then be dynamically imported into another Javascript mapping framework (on the client) which manages the creation, drawing, and editing of lines, polylines, paths, rects, circles, text, and other interactive graphical elements within an HTML Canvas. Maps can be scrolled and zoomed, and different features (water, land masses, countries, cities, various geographic elements, etc...) can be displayed or hidden. Edited in-memory Javascript objects can then be extracted as PNG files and up/down-loaded to/from the remote server as image files and saved on the user's local machine.
- Developed an iPad timeline construction app for teachers and students: 'TimelineBuilder', now for sale at the iTunes store. The app allows you to create a linear timeline anywhere from 1 billion BC to 1 billion AD, containing events that span one or more days within the timeline. Each event can have a range of dates, an imported image, and a text description that appears in a content pop-up view. Thumbnail images of events are shown attached to the timeline, and can be moved or resized by dragging, while the timeline can be zoomed and scrolled to show detail. Images can be imported from the image library or the pasteboard, and large images can be resized on import. The timeline can be exported as a series of tiled images at the current zoom factor, plus the text and images for each event, either to the image library, as email attachments, or to folders for sharing via iTunes. Also

developed versions 2 and 3 of this app with additional enhanced features.

*March--December 2012: Colorado Card LLC, Louisville, CO.*

- Developed an iPhone app for a group of local businesses that is similar to a never-ending discount coupon book, and a remote (web-based) content-management system for automatically adding, editing, and removing content (text and images) from all apps that contact an update server at regular intervals. The app has information about several businesses compiled in at deployment time, but can extend and modify that content indefinitely by syncing with the server (via HTTP). Information on the server can be curated by the client in an easy and secure way from an HTML/Javascript administration page that makes extensive use of XMLHttpRequest (i.e. Ajax) to contact PHP programs on the server in the background. I wrote all app code in ObjectiveC, all HTML/Javascript code for the web interface, and all PHP code for the servers. Currently at iTunes.

*February--June 2012: Knowledge Quest LLC, Portland, OR.*

- Developed an iPad history app for parents and children: 'KQ TimeTraveler', which is now for sale at the iTunes store. App required creation of a non-standard user interface from client artwork, including multiple screens, buttons, sliders, custom views, and sound. App makes use of the device camera, photo library, email, Facebook SDK, image alignment and resizing, and on-the-fly image creation. Also developed version 2 of this app for the same client.

*February 2011--January 2012: R&D Innovations LLC, Youngstown, OH.*

- Developed an iPhone app for parents and teachers: 'Kids UpsideDown - Understanding the Introverted Child', which is now for sale at the iTunes store. App required development of a non-standard, completely immersive, set of user interface tools including interactive image buttons, sliders, highlight animations, sounds, and programmable configuration files for hyperlinked content.
- Created an iPad app for a magic game/book: 'TetraMagika', having a non-standard, completely immersive, user interface consisting of multiple layers of custom art, sprite animation, automated and semi-random image and scene construction, and 2d and 3d interactive graphics, plus sounds. All UI elements are automatically re-configured and re-positioned in all 4 pad orientations. Classes for several main and ancillary animations and popup "windows" with custom views were created. Currently at iTunes.

*May 2011--April 2013: Kid Games Interactive LLC, Brooklyn, NY.*

- Re-wrote and combined two existing iPhone game apps for the iPad: 'Pre-School Counting 1-2-3s with Bear and Duck', and 'Pre-School A-B-Cs with Bear and Duck'. Game required development of a new set of modular/object-oriented game, animation, sprite, and control classes which could be used in similar apps. Game could also be extended and altered by the client without additional ObjC development, by the inclusion of additional folders of compatible artwork. Currently for sale at iTunes.
- Created an extensible interactive iPad book app (now at iTunes with first two titles) that can be used as the basis for any number of other titles. Art for each page is provided in numbered folders, and a page configuration file (text) defines the words and their coordinates on each page, as well as any number of small animations triggered by programmed locations in the page. Individual words could be spoken, or the entire page. Several page transition animations were provided (using "on-the-fly" and cached CGImages), including page folding and page curling.

*May 2011: MicroSeconds Consulting, San Diego, CA.*

- Developed iOS classes, and a test iPhone app, for the distortion of images using vector flow fields. Several distortion types were provided, and can be configured by the client to create an unlimited number of variations.

*January 2010--Apr 2011: Notify Technology Corp., Canfield, OH.*

- Developed several fully-functional prototype mobile device management apps for iPhone, iPad, Android, and Nokia (Symbian) devices. Product features included asynchronous network communication, device data and log access, automatic remote synchronization and failure recovery, location services and device tracking, background operation, and data exchange by use of encrypted WBXML. iOS devices were also enabled for remote Apple Push Notification Services.
- Developed a prototype Objective C and web-based (PHP) mobile device management database and control system which allows remote devices to connect and synchronize data, to receive server commands from multiple simultaneous administrators, to send location and device log data, and to receive remote push notifications.

*May--August 2010: Kid Games Interactive LLC, Brooklyn, NY.*

- Developed two iPhone games for toddlers: 'Pre-School Counting 1-2-3s with Bear and Duck', and 'Pre-School A-B-Cs with Bear and Duck', both now for sale at the iTunes store. Games required development of a fairly complicated set of animation tools including multiple layers, sprites, interactive image buttons, sounds, and programmed timed- and cyclical-motion behavior similar to that provided by Adobe Flash (which is prohibited from the iPhone by Apple).

*January--April 2010: KneeBouncers LLC, Sykesville, MD.*

- Developed two iPhone games for toddlers: 'Peek-a-bouncer' and 'Calling-all-bouncers', which are now for sale at the iTunes store. Games required development of a simple application shell including email composition and links to web sites, plus multi-layer animation of many images, coordinate transforms for device orientation changes, custom fonts and controls, and simultaneous playback of several sounds.

### **Professional experience (science):**

*February 2008--December 2009: Dept. of Geosciences, Oregon State University, Corvallis, OR.*

- Developed Unix/C software for the simulation of glacier retreat and the resulting debris flow on Mount Rainier, Washington. Wrote programs to process satellite images, project image data to universal transverse Mercator-grids, and to synchronize with high-resolution digital elevation models. Wrote programs and performed simulation experiments to characterize the locations and magnitudes of branched debris flows peripheral to yearly retreating glacial perimeters.
- Developed software in C and Python for the creation of an aplanar RMS surface (roughness) composite mosaic map of Greenland from thousands of satellite images acquired with the Multi-Angle Spectro Radiometer instrument aboard NASA's TERRA spacecraft, using multi-dimensional image space data modeling.
- Wrote all image processing and analysis software for reduction of HDF-EOS datasets using radiance to reflectance conversion, Fourier transform interpolation, Minnaert terrain correction, radiative transfer top-of-atmosphere to surface correction, cloud masking, and multiple-grid equal-area map projections.
- Performed all duties related to a research project predicting a 100 year migration corridor of the Missouri National Recreational River for the National Park Service.
- Wrote software in Python, C++, and C to perform meandering simulations of rivers using the Johannesson-Parker and other fixed and variable width models.
- Wrote graphical user interface in Python for the control and display of multiple meandering simulations.
- Wrote SQL-like database in Python for the analysis of 3000+ simulation results in numerical and graphical form.
- Wrote software in Python to estimate the sediment volume contained in multiple river valleys from LIDAR digital elevation model datasets and the generation of synthetic bedrock bases from valley wall slopes and elevations.

*April 2003--December 2007: Southwest Research Institute/NASA, San Antonio, TX.*

- Developed C, Objective C (Cocoa), and Python (Wx and Qt) code under Macintosh OS X/Unix for creating cloud motion maps of Venus' atmosphere from NASA/IRTF ground-based infrared images.
- Developed "FITSRegister" software for semi-automatic registration of multiple astronomical images.
- Developed "FITSFlow" software for automatic generation of vector field maps of motion from multiple sets of astronomical images.
- Developed "FITSMAP" software for projection mapping of planetary coordinates and vectors to several rectangular systems.
- Developed IDL and C code under Macintosh OS X/Unix for preprocessing and deconvolution of astronomical telescope images.
- Developed an automated image processing pipeline using the PIXON image reconstruction method for use at the NASA Infrared Telescope Facility on Mauna Kea, Hawaii.
- Developed IDL and C code for extraction and optimization of telescope point-spread-functions via genetic algorithms and speckle interferometry.

*March 2007--September 2007: Biomatters Inc., Auckland, New Zealand.*

- Created programs and plugins in Java for "Geneious" bioinformatics software product.
- Programs/plugins performed 3d protein alignment using McLachlan method of conjugate axes.
- Programs/plugins performed 1d protein pre-alignment using DALI method of distance similarity scoring and Monte Carlo evolution.

*October 2003--December 2006: FerMac Inc., Knoxville, TN.*

- Developed all C and Objective C code under Macintosh OS X for “LabMathX” mathematical/scientific data analysis, visualization, and simulation product.
- Product features included infix real and complex vector equation parsing and evaluation, interactive tables, plots, and images embedded in a WYSIWYG graphical user interface.
- Developed LabMathX client software for calculation of complex index of refraction and quantum light scattering from multiple thin films.

*March 2003--April 2003: Pharmix, Inc., Redwood City, CA.*

- Developed mathematical software in C and Java under OS X and Windows XP for the molecular modeling of drug interaction in pharmaceutical discovery research.

*November 2002--March 2003: University of Tennessee Dept. of Physics/Oak Ridge National Laboratory, Knoxville, TN.*

- Created an equation parsing and evaluation module in C++ for a Macintosh scientific analysis program.
- Created complex analysis functions and operations in C++ for a Macintosh mathematical analysis program.
- Created spectral analysis program in C++ for the Macintosh using the continuous wavelet transform.
- Created data acquisition module in C++ on the Macintosh to detect acoustic signal signatures in natural gas lines.
- Created a quantum optical properties module in C++ on the Macintosh for the spectral analysis of metal surfaces.
- Created OS X version (Cocoa) of “MacDAQ” data acquisition and analysis software for the Macintosh.

*October 2001--October 2002: PubGene AS, Oslo, Norway.*

- Created bioinformatics software for the Macintosh and Unix to perform data mining of genomic information from medical and biological literature databases.
- Created software for the Macintosh and Unix for the curation of gene and protein nomenclature databases.
- Created X-Windows software for the multi-dimensional mapping of gene relationships in information space, and for the construction of multiple composited gene atlases.
- Contributed to ongoing cancer research performed at the University of Oslo and the Norwegian Radium Hospital.

*January 1999--May 2002: Intergalactic Reality, Boulder CO.*

- Created the “Scientist’s Component Toolkit”, an interactive component data analysis system for the Macintosh.
- Created “MacDAQ” data acquisition and analysis software for the Macintosh.
- Developed data acquisition electronics for acquiring and analyzing EEG and EKG signals using component science software.

*June 2001--July 2001: The Boulder Art Gallery, Boulder CO.*

- Developed a new website for a high-end fine art gallery. Work included all digital photography, Photoshop editing, HTML development, site hosting, and remote maintenance. Site included ~200 pages and images.

*November 1997--December 2000: Southwest Research Institute/NASA, San Antonio, TX.*

- Created a new technology called “Client-Side CGI” which allows a web browser to directly interact with stand-alone programs on a local computer, without the use of an Internet connection or web server. Created CSCGI software for Macintosh, Linux, and Windows.
- Developed a CD image database browser in Java and C++ for NASA Planetary Data System spacecraft images.
- Developed a regular expression parsing (e.g. “greplike”) CD-ROM search program for the Macintosh.
- Gave invited talks and demos about CSCGI at the 1999 and 2000 NASA Applied Information Systems conferences.
- Developed scientific software components for reading, displaying, and processing NASA PDS images.

*April 1999--September 2000: IBVA Technologies, Inc., Darien, CT.*

- Developed a prototype of the “Interactive Brainwave Visual Analyzer” for Windows. This software acquires 2 channels of EEG data via wireless (radio) electronics, creates plots of raw data, performs FFT analysis of data, displays histograms of spectral averages, and creates scrolling 3d OpenGL surface plots of resulting FFT records.

*July 1998--April 1999: Anne Stone Images, Boulder, CO.*

- Developed a new website for an on-line fine art gallery. Work included all photography, Photoshop editing of digital images, HTML development, site hosting, and remote maintenance.

*February 1998--March 1999: Oak Ridge National Laboratory, Oak Ridge, TN.*

- Created biophysical research software for the analysis, display, and animation of 3-dimensional EEG potential fields, for Power Macintosh computers. The software supports EGI Netstation 128 channel data import, 1d traces embedded in the 3d display, spectral (FFT) amplitude and phase analysis, multiple independent 1, 2, and 3d plot windows, and Neuroscan data import.

*April 1998--December 1998: John Wiley & Sons, Inc., New York, New York.*

- Created a series of Java Calculus applets for a website associated with the latest edition of their *Calculus* textbook. Several applets included the development of a Java infix equation parser and evaluator, numerical integration, root-finding, and curve-fitting.

*August 1997--April 1998: Institute of Higher Sciences, Palo Alto CA.*

- Developed a prototype of an EEG analysis and imaging system in Java. This system provided 1, 2, and 3-d display and analysis of raw EEG data.

*May 1997--September 1997: Synergy Software, Inc., Reading PA.*

- Created a prototype of a 3-d graphing library in C for use in "KaleidaGraph" data plotting and analysis product for Macintosh computers.

*October 1996--September 1997: Lucidity Institute, Inc., Palo Alto CA.*

- Was developer of C++ "SuperNova" product for Macintosh and Windows. This product is a software interface and data acquisition system for interacting with the stand-alone "NovaDreamer" REM-sleep monitoring and cueing hardware product.

*October 1995--January 1997: Institute for Decision Systems Research, Los Altos CA.*

- Developed a suite of Unix/C routines and programs for performing pseudo-random and quasi-random sample generation and analysis for use in statistical modeling and decision applications.
- Performed basic research and analysis of pseudo-random and quasi-random sample generation methods and their derived functions and metrics.

*September 1995--January 1997: Lumina Decision Systems, Los Altos CA.*

- Developed an AppleEvent interface for data and graphics exchange between "DeltaGraph Pro" and "Analytica" modeling and decision applications for the Macintosh.
- Developed an extensible, user-defined, plugin capability for "Analytica" decision analysis software product.

*June 1995--June 1996: Science and Engineering Network Newsletter, Worcester MA.*

- Was contributing editor for feature articles about modeling and simulation, and about WWW site construction, HTML authoring, and CGI programming.

*October 1993--May 1996: Intergalactic Reality, Palo Alto CA.*

- Was lead architect and developer for "MacWavelets" software product, a 1 and 2-d wavelet analysis, compression, and signal reconstruction program for Macintosh computers, written in C++.
- Was lead architect and developer for "Galactomatic-1000" software product, a modular, object-oriented scientific data analysis, visualization, and modeling environment for Macintosh computers, written in C++.
- Demonstrated "Galactomatic-1000" product and several scientific data and image processing examples as part of a scientific software seminar at the 1994 Boston MacWorld Exposition, at the 1995 San Francisco MacWorld Exposition, and at the 1995 San Francisco Scientific and Engineering Applications of the Macintosh Conference.

*July 1995--December 1995: Macintosh Scientific Technical Users' Association, Worcester MA.*

- Was developer and maintainer of MST WWW site, including on-line text and graphics, HTML forms pages, and CGI programs for form mailing. Also created an interactive site for a consultant database, including form entry, entry editing, and password validation.

*October 1994--April 1995: Greenleaf Medical Systems, Inc., Palo Alto CA.*

- Was developer for "Movement Analysis System" medical software product, a remote and real-time data acquisition, display, analysis, and database application for the measurement of wrist and hand motion, for Macintosh computers, written in C++.

*June 1992--December 1993: Advanced Technology Group, Apple Computer, Inc., Cupertino CA.*

- Was lead architect and developer for "Scientist's Workbench" project, a modular, visual scientific programming and analysis environment for Macintosh computers, written in C++ and Lisp.
- Wrote an autonomous agent image feature recognition system using trainable neural net technology. Presented this system and others as part of scientific seminars at the 1993 and 1994 San Francisco MacWorld Expositions, and at the 1993 San Jose Apple Worldwide Developer Conference.
- Hosted a 3-day Apple workshop on writing dynamically linked, extensible scientific analysis components. Participants included representatives from Wolfram Research, NCSA, NASA, Stanford University, JPL, and Unix workstation scientific software vendors.

*December 1991--June 1992: SciMaTech, Inc., Mountain View CA.*

- Was project leader and lead programmer for development of "Phoenix" real-time data acquisition, analysis, and display product for Macintosh computers.
- Wrote object-oriented application in C++ for multi-channel medium-speed data acquisition from a variety of remote instruments, plus 1 and 2 dimensional color graphs, tables, digital multimeter, oscilloscope, audio analyzer, and other virtual instruments.
- Product features included math functions (algebra and calculus) and equation parsing, data monitoring and event recording, and remote hardware programming.

*March 1991--September 1991: Knowledge Revolution, Inc., San Francisco CA.*

- Was lead programmer for development of "Interactive Physics 2.0" product for Windows. Designed object-oriented application structure and user-interface in C++ for the construction of simulations of Newtonian dynamics from within a GUI environment.

*September 1988--February 1991: High Performance Systems, Inc., Hanover NH.*

- Was Director of Product Development and manager of all software development in C and C++ for "iThink", "Stella II", and "StellaStack" model-building and simulation tools for the Macintosh. Was the principal architect and programmer of these products.
- Product features included discrete and continuous systems, mathematical functions, equation parsing, random distributions and Monte Carlo simulation, multiple graphical, tabular, and animation output, sensitivity and scenario analysis of variables, and automatic generation and integration of differential equations implied by graphical structure. An additional product included a HyperCard interface for real-time control and animation of models from within multimedia applications.

*July 1987--August 1988: Creare Engineering R&D, Inc., Hanover NH.*

- Wrote 64-channel data acquisition, analysis, and display system for cryogenic turbine research performed with the IBM PC, including real-time entropic, enthalpic, and energy calculations.
- Wrote mathematical function and operator library for scalar, vector, and tensor object manipulations in real and complex form as part of NIH "Mlab" product for Unix workstations.
- Added instrument and process-control capability to 256-channel, MHz-rate, "Idars" data acquisition and analysis product for Unix workstations.
- Derived and programmed multi-dimensional vector-space mapping, correlation, and least-squares analysis of acoustic data for real-time speech recognition for deaf people.
- Wrote 3-d serial-section tissue reconstruction package for medical finite element cancer tomography.
- Ported "Fluent" finite element fluid-flow simulation product to IBM PC, VAX DecWindows, Sun, Tektronix, and Silicon

Graphics Unix workstations.

*June 1982--May 1987: Department of Biology, Cornell University, Ithaca NY.*

- Designed and performed microscopic wind-tunnel experiments and stroboscopic photography of the aerodynamics of wind-pollination in plants. Wrote IBM XT programs to perform interactive data entry, vector field analyses, and dynamic simulation of fluid-flow from digitized photographs.
- Wrote programs for the generation and display of 3-d tree branching patterns and leaf-canopy geometries. Performed mechanical and photosynthetic analyses of these structures, and evolutionary and ecological competition between these structures.
- Wrote 2 and 3-dimensional color graphics libraries for IBM PC from board-level up.
- Initial program prototypes were instrumental in acquiring a 3-year \$300,000 NSF grant.
- Research was published in Scientific American, Science, American Scientist, Journal of Mathematical Biology, Paleobiology, American Journal of Botany and other journals.

*June 1981--August 1981: NASA Spacecraft Planetary Imaging Facility, Ithaca NY.*

- Co-managed PDP/VAX-11 computer system for Planetary Astronomy department.
- Wrote programs used for the production of a cloud map of the Martian surface.
- Wrote photographic database for over 250,000 Viking and Mariner spacecraft images.