Stephen Bannasch

Learn Make Teach Share

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stepheneb.github.io/resume.html (*pdf*)

Overview

Over 30 years of experience working with diverse teams of researchers and teachers developing deeply interactive software and hardware for all kinds of learners. My recent focus has been on developing high-performance web-based computational simulations and visualizations. Helped found the Concord Consortium, an important educational non-profit focused on math and science education. As Director of Technology led the development of re-usable open source architectures/frameworks for education and managed and hired a team of programmers. Am an enthusiastic public speaker and deeply committed to helping teams of people make, teach, and share what matters to them.

Extensive experience with web-based application/visualization technologies (JavaScript, HTML, CSS, SVG, Canvas) and related open source frameworks (D3.js, jQuery, JQueryUI, CoffeeScript, Cherrio, Pixi.js, Underscore, Modernizr, MathJax, ...) as well as back-end server programming in Ruby, Java, and Node.js, and Amazon cloud-based server setup and administration.

Professional Experience

Art & Logic, 2016-2018

Created proprietary web application for managing and facilitating in-person collaborative brainstorming and planning for small private company: Maverick and Boutique. Web application derived from functionality in their legacy Java application.

Technical Elements

- Rails v5.1.6 with Postgresql and Redis backend data stores.
- Extensive use of ActiveCable websocket framework to support interactive real-time visual and textual collaboration among participants.
- Interactive collaborative visualizations using D3.js.
- Administrative, authoring, participant collaboration, and reporting systems.
- Scripted deployment using Capistrano to AWS development, staging, and production AWS servers.
- Integrated with Bootstrap styling and components.

Concord Consortium, Concord MA, 1995-2013 *concord.org*

In 1995 helped Bob Tinker, internationally recognized as a pioneer in developing and adapting

[technology for constructivist education](), create the Concord Consortium, a 501(c)(3) non-profit educational research and development organization focusing on math and science education.

Director of Technology, 1995-2013

Directed technology development for the Concord Consortium, a non-profit educational research and development organization. My responsibilities include hiring, budgeting, technology acquisition and development, proposal development, and management of software and hardware development.

Architect and technical lead for the Lab Framework, 2011-2013 *lab.concord.org*

Code: *github.com/concord-consortium/lab*

In November 2011 the Google Foundation awarded Concord Consortium a grant to develop an HTML5 version of Molecular Workbench, the award-winning Java-based physics simulation. Extended these goals and created a general framework called Lab for integrating both simulations running in multiple modeling engines and data collection from sensors and probes.

Lab Interactives are sharable, embeddable, and authorable components defined in JSON that wrap a model with additional inquiry-oriented user interface components such as buttons, checkboxes, sliders, graphs etc.

Co-Principal Investigator

The Enhancing Engineering Education with Computational Thinking, (DRL-0918449); 2009-2013; focuses on studying how computational thinking, primarily through numerical simulation and computer-aided design tools, can enhance engineering education in high schools (see http://energy.concord.org for more information). Project developed Energy2D: a computational simulation modeling conduction, convection, and radiation and Energy3D: an application for designing buildings using a WYSIWYG 3D user interface.

The GENIQUEST (GENomics Inquiry through QuUantitative Trait Loci Exploration with SAIL Technology): Bringing STEM Data to High School Classrooms (DRL-0733264); 2007-2010; centered on the dragons and related organisms that previously served as genetic models in the previous Concord Consortium projects. Students were further supported in seeking out gene locations through the bioinformatics technique of Quantitative Trait Loci (QTL) analysis. Results demonstrated increased student understanding of concepts such as genetic recombination and inbred strains, and that the software helped.

TERC; Cambridge, MA; 1982-1994 *terc.edu*

Co-Project Director

The Global Laboratory Project. Directed the technical and telecommunication efforts of the project. Responsible for setting technical directions, hiring, budgets, management, and project reports. The project supported 150 middle schools and high schools in 22 countries collaborating on investigations into local and global environmental change, sharing text, data, graphs, instrumentation for measuring and monitoring the environment.

Software and Hardware Designer

Adapted instrumentation for measuring various environmental characteristics including total-column-ozone, ground-level ozone, soil moisture, air flow, relative humidity, temperature, and visible light. Developed stand-alone data-logging systems probeware interfaces, and may types of specific probes.

Publications

Bannasch, S. (2010). Innovator interview: Stephen Bannasch. @Concord, 14(2). The Concord Consortium.

Staudt C., & Bannasch S., Using sensors and models to answer discovery questions. (2006). @Concord, 10 (2). The Concord Consortium.

Tinker R., Bannasch S., Future technology in unexpected places. (2005). @Concord, 9(1). The Concord Consortium.

Bannasch, S. (2002). Probing the unseen world: Advanced probe captures subtle changes in temperature. @Concord, 6(2). The Concord Consortium.

Bannasch, S., & Tinker, R. (2002). Probeware takes a seat in the classroom:Educational impact of probes improves with time and innovation.@Concord, 6(1). The Concord Consortium.

Bannasch, S. (2001). Wireless Computers and Probeware Support a New Science Curriculum: Using iPAQ Pocket PCs to study science fundamentals . @Concord, 5(1). The Concord Consortium.

Bannasch S. (2001). Educational Innovations in Portable Technology. In Tinker R., & Krajcik, J. (eds.), Portable Technologies: Science Learning in Context (121-141). Kluwer Academic/Plenum Publishers

Bannasch, S. (2000). Beam me up, Scottie! Handheld computers extend the range of wireless communication in schools. @Concord, 4(3). The Concord Consortium.

Bannasch, S. (1999). The electronic curator: Using a handheld computer at the Exploratorium. @Concord, 3(3). The Concord Consortium.

Bannasch, S. (1998). Making smarter probes. @Concord, 2(2). The Concord Consortium.

Bannasch S., & Berenfeld B. (1996). Global Lab: From Classroom Labs to Real-World Research Labs. In Tinker B., Microcomputer-based Labs Educational Research and Standards (247-258). Springer-Verlag New York, Inc.

Software Technical Skills

Ruby, JRuby, Rails, RubyGems

- Extensive work with Ruby, JRuby, Ruby Gems, and Rails. Developed several large Rails applications (see: github.com/concord-consortium/rigse).
- Author of Jnlp Ruby Gem: rubygems.org/gems/jnlp; contributed commits to over 30 external Ruby Gems.
- Regular use of RVM, Bundler, HAML, Capistrano, Rake, Compass, Sass, Devise, and behavior-driven development and testing with Capaybara, Cucumber, RSpec.

JavaScript

- JavaScript: extensive experience in high-performance scientific computation, visualization, and the D3.js framework. See: lab.concord.org/ and the code: github.com/concord-consortium/lab: a large JavaScript codebase and using RequireJS for module and dependency management.
- Used Node.js, CoffeeScript, jQuery, JQueryUI, Cherrio, Pixi.js, Underscore, Modernizr MathJax, and a number of other JavaScript tools and frameworks.

HTML, CSS, Canvas, and SVG

- HTML and CSS developer including creating dynamic visualizations using HTML5 Canvas and SVG.

Cross-browser performance and functional web application testing

- The Lab framework was designed to run on all HTML5-compatible browsers and as such created a framework for performance testing the simulations that separately measured the performance of JavaScript computation, JavaScript graphics, and browser rendering.
- Developed an integration of Mocha and PhantomJS to enable basic functional testing of the Lab framework on a developers computer as well as further tests that ran in multiple virtual OS/browser setups on the saucelabs.com service.

WebGL

- 3-D visualization for learning about seasons: stepheneb.github.io/seasons/index.html
- Benchmarking speed of different WebGL-enabled JavaScript matrix libraries stepheneb.github.io/webgl-matrix-benchmarks/matrix_benchmark.html
- Used Node.js, CoffeeScript, jQuery, JQueryUI, Cherrio, Pixi.js, Underscore, Modernizr MathJax, and a number of other JavaScript tools and frameworks.

Web Video

- Video integrated with digital map: stepheneb.github.io/simple-orange-map.
- Scripted FFmpeg to transcode original video into multiple formats, sizes and bitrates for web delivery.
- Spanish subtitling using WebVTT: http://stepheneb.github.io/detroit-interviews/

PHP, Java, Eclipse, Python

- Moderate experience with PHP, Java, Maven and Eclipse and somewhat less with Python.
- Experience re-writing high-performance Java programs in JavaScript. Example: github.com/concord-consortium/energy2d-js a port of the 2-D Java computational fluid dynamics thermal simulation program Energy2D.
- Built multiple branches of the open-source Java codebase including the MLVM branch that explores extending Java to improve implementation and performance of dynanic languages.

Source Code management

- Experienced git and github user, additional experience with Subversion, Mercurial, and CVS.

Learning Management Platforms

- Setup and administered Moodle servers.
- Setup prototype edX server.
- Experience using both Moodle and Blackboard as a course instructor.

Apache, NGINX, Node, Tomcat

- Setup, configuring, administering, and customizing Apache, NGINX, Node, and Java Tomcat-based web servers including performance testing with HTTPerf.

Linux Server Setup, Security, Monitoring, Administration, and Optimization,

- Setup stand-alone and cloud-based Linux servers.

- Experience with security, database setup, design, and administration.
- Created scripts using Chef and Fog to automate the generation of complete functional cloud-based Amazon servers.

Databases

- Setup and administered MySQL, PostgreSQLand Redis databases.

Hardware Technical Skills

- Digital, analog, and sensor electronic design, prototyping, debugging and manufacturing.
- Arduino and Microchip microcontroller development.

Contributions to External Open Source Projects

Over 200 commits to more than 50 external open source projects. Projects include: JRuby (Java implementation of Ruby), Rails framework and 30 more Ruby gems, 12 JavaScript projects and a number of miscellaneous projects.

For more detail: open-source-contributions.html

Teaching Experience

Leslie College, Cambridge, MA, 1983-1984.

Co-Instructor: Fundamentals of Computer Architecture.

Students were in a masters program focused on using computers in education.

Older Independent Projects

CMDA320: TransMedia Projects: Montclair State University, Spring 2015

Consultant working with professor Beverly Peterson's Transmedia class.

Adapted mapping and video code from Cosmopolis: 49 Waltzes for the World project to create map of Orange NJ with clickable hotspots showing video and audio narratives:
stepheneb.github.io/simple-orange-map.

Cosmopolis: 49 Waltzes for the World, Fall 2013

http://bacnyc.org/performances/performance/cosmopolis

Architect, and Programmer.

Code: github.com/stepheneb/49waltzes-detroit and github.com/stepheneb/detroit-interviews

Architected and implemented the software for NYC-based video artists Roberta Friedman and Daniel Loewenthal's interactive video installation. Roberta and Dan shot short videos at 147 different locations in Detroit. The installation has a map of Detroit displayed on a large touch screen monitor. Tapping the map brings up the closest video in a separate monitor. Visible hotspots on the map representing viewed location slowly fade out over time. Implemented using browser technology and WebVTT for Spanish subtitling.

The Erl King, 1986

Programmer.

Worked with NYC-based video artists Graham Weinbren and Roberta Friedman to complete the design and programming of the editing and run-time software for an interactive video art piece in which viewers explore non-linear narratives by touching areas on the video screen. The run-time software controls the queuing and playing of video and audio from three videodisk players as well as reading viewer input from the touch screen. The editing software was designed to enable the film maker to easily specify the non-linear interactions. The software was written in Pascal and Z80 assembly language. 12/86-2/87 Museum of Contemporary Art, Los Angeles,CA; 4/87-7/87 Whitney Museum of American Art, New York, NY.

Video Write, 1987

Creator/Programmer.

Design and programming of educational software which integrates a prompted editor with a videodisk display system for the Apple//e. Written entirely in 6502 assembly language. Done for and distributed by SERESC Inc., 11 Peabody Rd., Derry, NH 03038.

Education

Hampshire College; BA 1982

Thesis Project: Monitoring and Analysis of an Experimental Passive Solar Envelope House.