

A substantial career in software engineering (from microcode to AI to web technologies), plus electrical engineering (digital, analog, audio). User interface, product design, data visualization, control system theory, with connections to math, physics, and business. Shipped a career total of about 100 products.

With a diverse background I can bring multiple technologies together to solve complex problems.

Fluent in: Python, JavaScript, Scala, Java, Lisp, C++, HTML5, Node.js, React, Django, CSS, etc.

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**Instrumental, Inc.**

Los Altos, California

Senior Software Engineer, 2018

Startup applying machine vision and cloud-based machine learning to improve manufacturing processes and raise yield by analyzing anomalies and defects. Backend development in Scala, database support, a utility to bundle AWS requests, unit tests, automated summary reporting and interface with SendGrid, machine vision training, proposed a front-end tool with a visualization of the detailed status of the production line.

**Consolidated Fuzz**

Palo Alto, California

Founder, 2014 to 2017

Bootstrapping a startup company. Applying modern user experience concepts to hardware and creating an ergonomic modular platform for professional audio electronics. Developed the business model with multiple mechanisms of exponential growth, spreadsheets for the five-year financial forecast, pitched to investors.

Developed innovative oscillators, filters, and other analog and digital electronics; SPICE simulations, printed circuit board layout, testing. Developed a Python CAD tool for automated mechanical layout, panel design, and printing. Developed and prototyped an initial (minimum viable) product line. Created catalog web pages featuring interactive demos with engaging HTML5 JavaScript visualizations and audio simulations.

Wrote, filed, and was granted US patent 9,800,357: Modular Platform For Creation and Manipulation of Audio and Musical Signals.

**Riverbed Technology**

San Francisco and Sunnyvale, California

Technical Staff, User Interface Architect, 2005-2013

Riverbed Steelhead network appliances accelerate the performance of Wide Area Networks by an order of magnitude. Designed and implemented a powerful full-stack UI framework for multiple product lines. The framework consistently generates widgets from declarations, with input validation, role-based management, retargeting, AJAX-based tables, and mechanisms for presenting complex arrangements of widgets and user interactions.

Implemented the user interfaces for the flagship product lines: the Steelhead WAN optimizer and the Central Management Console. These are substantial web setups, about 80 pages each, and helped grow the company revenue to \$800 million. Led a team of 12 engineers.

**Kazeon Systems** (acquired by EMC Corp.)

Mountain View, California

Senior Member of the Technical Staff, 2004-2005

The Kazeon Information Server is an appliance that crawls, analyzes, indexes, and classifies unstructured corporate data for search, compliance, discovery, and data management. The system runs as a cluster for scalability. Designed and implemented the Search and Audit user interface and the Policy Engine with LDAP persistence.

**Sigaba / Secure Data in Motion** (acquired by Proofpoint)

San Mateo, California

Principal Member of the Technical Staff, 2002-2004

Designed and developed Sigaba Secure Statements (now Proofpoint Email Encryption), a system to deliver important documents such as invoices, financial statements and medical records securely over email with encryption, signing and authentication. Local ActiveX Control or decryption server.

**Marimba** (acquired by BMC Software)

Mountain View, California

Senior Engineer, 1998-2001

Major contributions to the Marimba Castanet Internet Infrastructure Suite, a system to efficiently distribute a software application over standard internet protocols. Ported Castanet to the Macintosh, to Linux, and to the SCO UnixWare platforms.

**Netscape Communications** (acquired by AOL)

Mountain View, California

Senior Software Engineer, 1996-1998

Development of Netscape Visual JavaScript, an Integrated Development Environment for building dynamic web pages with HTML, JavaScript, form elements, Java Beans, Java Applets, and database access tools. The components are dropped onto a semi-WYSIWYG page editor and connected up with JavaScript code.

**Apple**, Advanced Technology Group

Cupertino, California

Consultant, 1993-1996

Software development and system design for SK8, a multimedia object-oriented authoring tool and development environment. Built a Common Lisp interface to Mathematica, and development, benchmarking, and tree-shaking tools.

**Lucid, Inc.** (Stanford AI Lab startup, acquired by LispWorks.)

Menlo Park, California

Computer Scientist, 1989-1992

Ported the Lucid Common Lisp compiler and development environment to Sun SPARCStation, DEC VAX and DECstations, 386/486 PCs, and Hewlett-Packard Precision Architecture. Taught Lisp courses, presented at the 1989 X-Windows conference.

Consulted for **Intel's** AI group, designing and implementing an expert system to schedule a semiconductor manufacturing facility, maximizing throughput with roughly 20 products, 200 hundred steps in the manufacturing process, 300 machines, and thousands of lots of wafers. Built the factory model, model editor, strategy and tactics editor, interface with manufacturing floor databases, and optimization algorithms.

**Symbolics Lisp Machines**

Cambridge, Massachusetts and Chatsworth, California  
Senior Member of the Technical Staff, 1983-1988

Symbolics was founded by researchers from the MIT Artificial Intelligence Lab to commercialize and deliver the most advanced Lisp Machines and development environment. A Lisp Machine is a high performance computer that runs the language Lisp as its native instruction set.

Designed the disk controller for the 3640 Lisp Machine. Designed the Front End Processor / IO Board for the 3620 Lisp Machine (processor, disk and tape controller, Ethernet, serial ports, bus interface logic). Software maintenance, support, programmable logic compilers, simulation software, disk performance tools, diagnostics, microcode, CAD utilities.

**Digital Equipment Corporation** (acquired by Hewlett-Packard)

Maynard, Massachusetts  
Electrical Engineer, 1983

Electrical design of the modem for the VT220 video terminal. DSP analysis for a DSP-based modem.

**Texas Instruments**

Houston, Texas  
Design Engineer, 1981-1983

Electrical design of the video section of the TI931 video terminal. Designed two ICs used in the TI OPTI 940 video terminal and the TI Professional Computer.

**University of Wisconsin**, Space Science and Engineering Center

Madison, Wisconsin  
Technician, 1980

Electronic work on ground support equipment for the Hubble Space Telescope.

**I. W. Turner, Inc.**

Port Washington, New York  
Electrical Engineer, 1974-1976

Designed the Sequencer, Ring Modulator, and several Waveform Generator products for this small electronic music company. Designed the phase shifter guitar pedal branded as the Ampeg *Phazzer*.

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**University of Wisconsin**

Madison, Wisconsin  
1980, Graduate study, Electrical and Computer Engineering  
1977-1979, B.S., Electrical and Computer Engineering  
Specializing in communications, digital signal processing, computer aided design.

**Rensselaer Polytechnic Institute**

Troy, New York  
1975-1976  
Electrical Engineering

## Patent

US patent 9,800,357: Modular Platform For Creation and Manipulation of Audio and Musical Signals

## Articles

The Mechanics of Moore's Law  
38 Startup Company Ideas  
Intelligent Traffic Signals  
A New Business Model for the Music Industry

## Articles with Interactive JavaScript Demos

Root Locus Demo of Real Poles with Feedback  
Marvin Minsky's Triadex Muse in JavaScript  
Don Lancaster's Psych Tone in JavaScript  
Guitar Pickup Response Demonstration

A standalone version of my JavaScript simulation of Marvin Minsky's Triadex Muse is featured in the "AI - More than Human" exhibit at the Barbican Centre, London (May to August 2019), and then to the Groninger Forum, The Netherlands. Visitors can view a physical Muse, and then operate the simulation running on a tablet beside it.

## Audio and Electronic Music Articles

A Palette of Static Audio Waveforms  
Square Wave Variations  
Quadrature Trapezoid Voltage Controlled Oscillator  
(The Doepfer A-110-6 Oscillator is based on the circuit in this article.)  
Voltage Controlled Duty Cycle Sawtooth Circuit  
An Interpolating Scanner Circuit  
Moog Synthesizer Patent Reviews  
ARP Synthesizer Patent Reviews  
Mellotron Patent Reviews  
Response Effects of Guitar Pickup Position and Width  
Response Effects of Guitar Pickup Mixing  
(These two referenced by the Journal of the Audio Engineering Society.)  
A Discrete FET Guitar Preamp  
An FET Preamp Cable  
ARP Instruments entry, Grove Dictionary of Musical Instruments, Oxford Univ. Press (2nd ed, 2014)