

ISAAC DAVENPORT PHD

13918 E Mississippi Ave #61238, Aurora CO 80012
303-859-5773 isaac@isaacdavenport.com
<https://www.linkedin.com/pub/isaac-davenport/>
<http://www.isaacdavenport.com>

SKILLS

- Strategy
- Sales
- Communication Protocols
- Software and Firmware Development
- Project Management
- Digital/Analog Design and PCB Layout
- Technical Documentation
- Product Architecture
- Systems Engineering Requirements Mgt.
- Account Management
- Technical Leadership/Development
- Real Time Programming
- Image Processing
- Embedded Systems
- Instrumentation/Test Equipment Design
- User Interface Design
- Experiment Design / Data Analysis
- Medical Device Design

ACADEMIC DEGREES AND ASSOCIATIONS

PhD Electrical Engineering, University of Colorado at Boulder 1998
MS Electrical Engineering, University of Colorado at Boulder 1997
BS Electrical Engineering, Georgia Institute of Technology 1995
Member of the IEEE (Institute of Electrical and Electronic Engineers)

JOB HISTORY

2011 – Present Independent Engineering Consultant
2013 – 2014 VP Engineering, Orbotix Sphero
1998 – 2012 Engineer then President then CTO at Synchroness \ Kinetek
1995 – 1998 Research Assistant, University of Colorado Boulder
1993 – 1995 Ethicon, a Johnson and Johnson Company

My role has been design engineer, technical lead, account manager, reviewer, project manager, and executive. At Kinetek Systems (which was purchased by Synchroness) I held the titles of design engineer through president. As CTO at Synchroness I re-organized the operations/engineering department creating new roles for existing employees to bring clarity to the engineers, project managers, account managers and especially the customers about what would be done by whom on our projects. I provided leadership and direction to managers who in turn provided leadership for thirty engineers between their departments. I have also held two year's worth of weekly training seminars to develop senior technical staff in sales, leadership, communication, technical, and process development skills. At Sphero I traveled extensively to Asia to ensure design transfer and manufacturing success as well as supervising the engineering team responsible for the firmware, electronics, and mechanical design of the Sphero and Ollie robots.

PROJECTS

2015 Calibration System for Current Transformers I developed C# software to control GPIB and serial instrumentation for the measurement of phase and amplitude accuracy of current transformers (CTs) used in energy measurement.

2015 Production Calibration System for Energy Meters I developed C# software and integrated a National Instruments based instrument including DAC, DMM, a relay card, scanner, printer, and MySQL to calibrate energy meter modules. I also had an off the shelf enclosure machined and designed a test fixture board to handle the power supply, device under test connector, relay and analog output board routing, and serial to USB PC interface.

2014 Bluetooth Low Energy Based Dialog Engine Entertainment Prototype I developed firmware and C# software demonstrating how BLE Radios could be used to detect relative proximity between toys and allow players to control randomized dialog generation for their toy characters using dialog models and classified phrases to create new interactions for each character encounter.

2014 Ollie Development and Release Ollie is a BLE (Bluetooth low energy) connected robot. I led the Software Developer Kit, Firmware, Electrical Engineering, and Mechanical Engineering teams through the release of the Ollie robot. In addition to personally managing the transfer of the design to a Chinese contract manufacturer, I also assisted in the integration of the IMU (inertial measurement unit), BLE radio and firmware, antenna design, Cortex M4 processor, motor control, control system, firmware, LiPo batteries, and injection molded parts. I led the ideation team that brought insight from various groups and individuals within the company and turned those insights into a specification for a buildable product.

2013 Sphero 2 Development and Release Sphero is a robotic ball controlled by a smart phone. I led the Software Developer Kit, Firmware, Electrical Engineering, and Mechanical Engineering teams through the release of the Sphero 2 product. In addition to personally managing the transfer of the design to a Chinese contract manufacturer, I also assisted in the integration of the IMU, inertial measurement unit, classic Bluetooth radio and stack, antenna design, Cortex M4 processor, motor control, firmware and injection molded parts.

2012 CRC Reverse Engineering Algorithm Research I wrote a program that used a known change in CRC to recreate a word of missing data to set a catheter system back to factory defaults in an FDA approved catheter refurbishing process.

2004 - 2012 Technical Account Manager / Engineering Manager At Kinetek and then at Synchroness I played the role of account manager and supervisor for the engineers. As an account manager I was ultimately responsible for customer satisfaction. I wrote proposals, engaged in the early sales dialog, selected project leads, performed resource management between multiple customers, and oversaw customer communication and expectation management. As an engineering manager, I provided technical mentoring as well as project management and leadership mentoring. I assisted in troubleshooting, provided technical answers and identified resources outside of the company for specialty needs.

2011 Pump Manufacturer I worked with the engineering team to update and re-architect a high precision peristaltic pump including a new graphical user interface and more advanced independent channel control.

2011 Encision Electrosurgery I managed a project to redesign an Active Electrode Monitor (AEM) medical instrument to prevent burns from stray energy during laparoscopic procedures in which the surgeon wishes to ablate, coagulate, and cut tissue using RF electromagnetic energy.

2011 Automated Lace Tensioning System I worked with the mechanical team on mechanism design, developed the architecture for, supervised the execution of the development of the motor control electronics and firmware, RF interface, and assisted with debug and review.

2011 Surface Plasmon Resonance based Instrument I worked with the mechanical and software portions of the team to develop the microfluidics, laser, detector, and reagent mountings as well as the user interface for the instrument which is used in medical and life sciences research to characterize interactions between, proteins, antibodies, DNA, and other biological molecules.

2010 Electric Car Charging Station I assisted with requirements development, system architecture development, vendor qualification and management, ideation, firmware specifications, debugging, and prototype development.

2010 Pipeline Cleanout Launching Station I assisted with system architecture development, vendor qualification and management, electronics and wiring schema and ladder logic.

2010 Web Based Mass Management Software I assisted in GUI design, early stage mockup coding, database schema design and testing, of this Java based enterprise application.

2010 Design of a Novel Electric Motor I managed a cross disciplinary team to take a novel bench top motor design and package it for beta prototypes.

2009 Cell Flow Cytometer I managed staff responsible for developing the packaging, mounting, thermal management, and wiring harness of an ultrasonic microfluidics chamber for cell flow measurement in the life sciences and medical research markets. The ultrasonic transducer would align the cells for better counting and characterization as they passed the dual laser (488nm and 637nm) sources. My team was responsible for disposables management, mechanical packaging, wiring harnesses, industrial design, housing and mountings.

2009 Debug, Updates, and Re-qualification of Automated Defibrillator I managed staff responsible for developing and qualifying a fix for a circuit shortcoming on this medical device. Later I assisted with customer expectation management and requirements management for GUI updates to the product.

2009 SPL Meter Network Appliance I managed the electronics and firmware design for this TCP/IP based sound pressure level meter.

2009 Power Adapter for Apple Products I managed the electronics and firmware design, performed vendor management, and assisted in development of initial prototypes for this miniature power converter.

2008 Portable Blood Filter I managed the GUI development and electronics integration for a prototype portable blood filtration device to be used as a proof of concept to attract a sponsor from the medical device industry. The filter system used peristaltic pumps and multiple levels of interlocks and control for mobile therapy.

2008 Air Quality Monitor I managed the electronics and firmware design for a pilot production product that packaged a new sensor technology for use in military applications.

2008 SandCherry I assisted in the architecture, project management, and debugging of a USB controlled mute interface between a Motorola hand held voice radio to PBX Interface.

2008 Wireless Bridge Monitoring Product I managed the electronics, firmware design, and manufacturing launch from concept to pilot production for an 802.11 based data acquisition system for testing bridges.

2008 CAN Bus Based Home Automation System I managed the electronics and firmware design for this modular home automation system.

2007 High Pulse Energy Ablation System I worked with the high energy scientists and mechanical design team on the power supply and drill head for an aqueous ablation based drill system using pico second kilojoule pulses at tens of Hz rates to fracture rock.

2007 RV Awning Controller I worked with a small team to design a next generation, lower cost, higher performance version of controller and motor system for an automated awning retraction system for recreational vehicles.

2007 Radiometer Web Based GUI I architected and assisted in reviewing and debugging code for this Ruby on Rails based data visualization and instrument control software.

2007 Background RF Measurement I managed the development of firmware for a linux based airplane mounted computer to collect blackbody signals in flight for terrestrial, atmospheric and oceanic scientific data collection. The system utilized custom FPGA based designs tightly integrated with the FPGA modules provided by the front end card provider. The system would measure blackbody radiation of the target and remove anthropomorphic noise sources in real time.

2007 Electronic Business Card I assisted with parts selection and architecture as well as firmware and software design for a hand held mini-power point card which was cost engineered to be a high end give away.

2007 Capacitive Touch Garage Door Opener Prototype I assisted with parts selection and architecture and managed the prototype build process for this "James Bond" style touchless remote entry concept.

2007 Wireless Sprinkler Control System I provided management and review services to this program to re-vamp a wireless sprinkler controller system.

2007 SandCherry I assisted in the architecture, project management, and debugging of an Auto Gain Control for a Motorola hand held voice radio to PBX Interface.

2006 Heated Coffee Mug I managed the engineers and oversaw the manufacturing launch of this cost engineered, battery powered heated coffee mug. I also assisted in troubleshooting the electronics and firmware which were designed in conjunction with a Chinese contract manufacturer.

2006 Hopscotch I managed the electronics and firmware development for this television time limiting device. This device was designed for high volume production, a low cost of goods sold and a high consumer “WOW” factor.

2006 Votepad I managed the electronics development for this optical vote detection device. I assisted in selection of major components, debugging the electronics and working with the contract manufacturer on early production issues.

2006 Actall I updated the PIC assembly firmware for this wireless man down unit to allow use of a new 900 MHz transmitter module. I supervised testing and assisted with production of the device.

2006 Sakura I managed the firmware and electronics development for this medical instrumentation. The sample slicing microtome is used in the histology market. I assisted in creating the architecture for the system and debugging the firmware and electronics.

2006 Bridge Diagnostics I managed the firmware and electronics development of this wireless strain gage based bridge diagnosis device. I assisted in creating the architecture for the system and debugging the firmware and electronics.

2005 Cardio Optics I created documentation for the quality system. I debugged C, Java, and JNI code in a linux environment to get the customer from beta product to release product. I helped debug the control interface to the IR laser and the camera to make the laser operate more reliably to get a better quality video through the fiber bundle in the catheter. I supervised internal and contract staff to meet release milestones. I attended and technically supported animal trials of next generation research versions of the product. I worked with the research team on a transparent catheter tip for doing ablation during imaging.

2005 Remote Control Weapon Turret I developed firmware, assisted in the architecture and helped debug the FPGA design while managing the program to develop a reticule overlay and azimuth elevation controller for gun turret. The system allows a remote operator to target the enemy using a variety of camera inputs and fire when ready. The system uses NTSC inputs and the FPGA overlays text and graphics by clamping to a low or high voltage corresponding to black or white. The azimuth and elevation motors were controlled using joystick input from the operator.

2004 FIT I assisted in the hardware and firmware design of a home use sensor system for monitoring shower temperature. The device has a 4 button 7 segment LCD user interface. The device is battery powered and water proof with programmable alarm points and display units.

2004 PHT I led the hardware and firmware design for the Core:Tx wireless USB device. The device uses a coriolis effect accelerometer to track user motion and report it to a PC application. The device is battery powered and uses a single LED-single button interface to allow wireless network binding. More information on this product is available at www.performancehealth.com.

2004 TX91 I led the redesign team for the TX90 tension meter. The existing text based display became obsolete and was upgraded to a graphical display. In addition to redesigning the user interface to take advantage of the graphic capability, I also cost engineered the circuitry to reduce the cost of goods sold by 20%. More information on this product is available at www.tensitron.com.

2004 EEE I designed the circuitry for a power system monitoring and control system. I also was involved in designing the firmware for the user interface. Tasks involved controlling several high current sources and loads. The device was controllable through a menu driven, four button, LCD based front panel interface or through an RS232 connection, a modem connection, or a network connection. The device would monitor several voltages currents and frequencies in real time and allowed for programmable load switching set points for parameters that were out of specification.

2004 Schlumberger Down Hole Instrumentation I provided a design review of the circuit and performed the circuit layout for a high reliability, high temperature, high vibration tolerance, high part density, remote sensor probe board with data transmitter for oil field applications.

2003 B&C I designed circuitry and wrote C++ code for a linux based car wash controller interface. The tasks involved were: controlling several peripheral items on various data communication networks such as EIA232, EIA485, MDB and cctalk, performing schematic design and capture, layout and design for manufacture, evaluation

and integration of a Quarter Video Graphics Adapter 240x320 screen, monitoring remote site performance for bugs over the Kiosk's internet connection.

2003 Rubadue Wire I provided an overall architecture and implementation details so that the customer's technician could create a tension controlled wire coating process. The system used a 1/16 DIN PID controller to control let out and uptake motors using a tension based input sensor.

2002-2005 Kinetek I installed and administered a 100 Mbit Ethernet network and Cisco T1 voice-data router for internet and VoIP (voice over IP) service to our offices. I also maintain our PBX phone system.

2002 Synergos I provided system architecture documentation, sensor testing protocols, project management and technical supervision for Jr. technical employees in their development of a roll over tire status detection system. Several sensor technologies were evaluated, including, mechanical switches, optical detectors, piezo electric pressure sensors and video based detection.

2002 Boulder Innovation Group I added features to their 3D positioning probe by updating their FPGA design.

2002 Tactilities I rewrote the faulty firmware for the RN+ wireless nurse call unit. I integrated an Inovonics 900 MHz wireless network transmitter into the design and verified range and packet collision avoidance. I assumed responsibility for technical communications with contract manufacturers and provided manufacturability and reliability enhancements for their design. I diagnosed problems with newly manufactured units as well as units returned from the field. I also improved the performance and safety of the internal NiMH battery charger.

2001-2002 CCS I upgraded their Wattnode product to be LonMark compatible by rewriting and re-organizing the firmware written in Neuron C. The Wattnode is a Lonworks network instrument which measures and logs electrical power.

1999-2002 TX90 I designed, did the circuit lay out, wrote code and brought into production a digital tension and speed meter which included the following features: small size (less than 2"x2"), LCD and 4 button Menu driven interface, integrated trickle charger which runs from an external transformer for a NiMH battery pack, analog output, RS232 interface for data collection, internal calibration for many different wires and filaments as well as user editable calibration curves, CE certification for industrial environments, Microchip PIC powered design featuring re-programmable flash memory, low power operation for long battery life. This product is detailed at www.tensitron.com.

2000-2001 dBm Optics I designed a high speed digital synchronization circuit, wrote C x86 measurement code and managed two engineers for FPGA and PIC programming on a multi channel optical laser power meter for telecommunications components with the following features: Flat panel SVGA display and mouse, keyboard, scroll wheel, custom keypad interface instrument, expansion chassis support for more channel racks via 100 Mbit Ethernet, complex data acquisition possible while maintaining strict timing synchronization requirements. Timing was key for synchronizing the sweep patterns of the tunable laser source. This system is detailed at dbmoptics.com.

2000-2001 Scientech I wrote microcontroller firmware, and provided hardware design reviews for an RS485 based, networkable laser power meter with the following features: thermopile based calorimeter for laser energy detection, field programmable calibration constants, factory programmable parameters for characterization of physical components, drift following feedback-control to maximizes A/D input range using a software controlled D/A, RS485 control interface and parser designed to French government specifications. Details on this product may be available at www.scientech-inc.com.

1998-2000 Spiral Designs I wrote firmware and performed hardware design for a multi channel electrical power monitor and control system designed for battery backed up networks of DC rectifiers for cell phone base station power systems. The product has the following features: LCD and button interface, multiple channels of analog and digital IO through versatile stackable IO boards, RS485 network control of multiple 3rd party rectifier banks, packet error and collision avoidance on a Modbus protocol network, programmable alarm matrix allowing mapping of any input onto any alarm or control output, full remote control access through a custom communications board which can support modem, direct RS232 or Ethernet via a thin server, Motorola 68HC11 design supports program in place over internet or modem using an external flash chip and custom bootloader software, field programmable PLD for support of new IO board hardware. Information on the product can be found at www.sdicomtech.com.

1998 World Trade and Marketing I designed, Cost Engineered and did lay out for a water purification control circuit with the following features: extremely small size, the circuit was slightly larger than a quarter so it could be mounted in a standard threaded pipe plug, extremely low cost, could be manufactured in 1000s for less than \$0.70 each, runs from 9V battery power.

1998-2002 Kinetek I installed and maintained the companies 10 Mbit Ethernet network and phone system. I also installed an ISDN 128 kbit internet link and provided support for Qwest technicians for BERT testing when performance would slip due to growing cross talk at our Subscriber Line Interface Card.

1998 Integrated Tire Technology I led a development effort to produce instrumentation involving materials engineering, mechanical engineering, illumination engineering, image processing and systems integration.

INTERNSHIPS

1998-1999 Biostar I developed a machine vision system for quantification of biological analyte which was installed for use in quality assurance.

1996-1998 Samsung Display Devices I designed and performed ergonomics experiments. I managed and coordinated the work of eight engineers from six countries. I designed and managed the development of an Intel 8051 based optical feedback CRT image correction prototype. I developed a PC based video pupillometer instrument for dynamic pupil measurement using unique Matlab and WiT image processing feature extraction algorithms. I led a team of engineers in the optimization of an infra red eye tracking instrument design by improving the circuitry, user interface, and real time software. I supervised exploratory research into real time mechanical feedback for the stabilization of CRT images. I served as network manager for a thin net segment of Win95 and NT machines as well as x-terminals and printers.

1996 Coca Cola I designed and managed the installation of the interface between a PC 104 Linux based control system and the sensors and actuators on an experimental payload launched by NASA.

1995 Georgia Institute of Technology I performed digital editing and recording work for a di-phoneme based speech synthesizer.

1994 Cryolife I assisted in the development of an inexpensive, commercially viable light source for the curing of a biological adhesive, "BioGlue," which has now passed FDA trials. Details on this product can be found at www.cryolife.com.

1993-1995 Ethicon I worked in the MIS department which handled the network and telephony needs of the plant. I managed a mixed Novell - Win 3.11 network with 300 users over Ethernet and Token Ring. I increased the perceived service level of Windows desktop users. I managed contractors and vendors during a period of intense network and PC-systems growth.

1992-1993 Ethicon I provided electrical CAD and PLC programming support. I developed the initial prototype for a machine vision system to perform inspection of sutures and injection molded surgical clips. I managed the technical portions of the design, construction, implementation and site installation of an international packaging system which included a pneumatic label application system, networked international graphics database and inventory control database in an FDA regulated environment. I won the Vice Presidents Award for teamwork. Information on the company can be found at ethiconinc.com.

EXPERT WITNESS ENGAGEMENTS

IBC vs. Crestron, AMX, Control4 2016

Brigs vs. Walsh, case# 2014CV031291, District Court County of El Paso in the state of Colorado. Expert report given 2015.

Schrader Bridgeport vs. Continental Automotive, docket # 6:11CV00014 US District Court Lynchburg VA. Patent No. 7,518,495. Claim construction report given 2012.

Zykronix vs. Coraccess I provided written testimony, expert opinion, and was deposed in a breach of contract case involving electronics manufacturing processes in 2007.

Hewlett-Packard Development Company vs. eMachines Inc. Civil Action Number H-05-0778 in US District Court for the Southern District of Texas Houston Division. Patent No. 6,138,184. Claim construction report given 2006.

Sunrise Telecom Inc. vs. Acterna LLC. Case number 04-01601 FMS in the US District Court in the Northern District of California San Francisco Division. Patent 5,619,489. Expert report and deposition provided in 2004-2005.

BOARD OF ADVISOR ENGAGEMENTS

Synchroness www.synchroness.com performs contract engineering design 2006 - 2012.

Continental Control Systems <http://www.ccontrols.com/> produces energy metering equipment 2010 – Present.

Insight Photonic Solutions www.sweptlaser.com/ produces an akinetic semiconductor swept laser 2012 – Present.

Actall www.actall.net produces wireless security products 2013 – Present.

PATENTS

I worked with Samsung Display Devices and the University of Colorado Boulder to submit a patent application for my idea of an “Electronic Copy Holder.” The application went to the patent office on August 6th 1997.

I came up with the electronic design behind a new pneumatic valve controller and worked with Council and Engineers at Norgren Inc. to file patent 7,723,864 “AC-TO-DC ELECTRICAL SWITCHING CIRCUIT” which issued in 2010.

I worked with the technical team at Sphero on the ideas in the patent application “CAUSING GESTURE RESPONSES ON CONNECTED DEVICES” 2015/0338925.

PUBLICATIONS AND PRESENTATIONS

Ph.D. Thesis “The Effects of Video Display Terminals on Ocular Function and Performance” 1998

Bioelectromagnetics society presentation published in the Transactions of the Eighteenth Annual BEMS Meeting

“The Effects Of Electric Fields on Steric Hindrance at the Cell Membrane” Victoria Canada 1996

Society for Information Display Conference Proceedings, Toronto “Changes in Ocular Performance After Display Usage” 1997

Curricula for Photonics Technical Skills Lab, Front Range Community College 2002

TEACHING ENGAGEMENTS

Math and science lab tutor KIP Denver Collegiate High School 2013

GED preparation volunteer, Boulder County Jail 2004-2010

Algebra Based Physics Front Range Community College 2002

Recitation instructor, Circuits for non-majors University of Colorado at Boulder 1995