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ELECTRICAL ENGINEER

Analog and Digital Design: Microprocessor circuitry, analog loops & filters, analog ↔ digital, drives & interfaces.
Logic Design: Logic design, synthesis, and simulation with Verilog and VHDL for FPGAs and CPLDs.
Power Electronics: DC-DC & AC-DC converters, battery chargers, LED drivers, and TEC controllers.
Instrument and System Design: Develop requirements and specs; guide/manage design; simulate and test.
Electro-Optical Design: Circuitry for laser diodes and photodiodes; experimental design and analysis.
Controls: Closed-loop control design for electronic, mechanical and electro-optical systems.
Written and Verbal Skills: Manage projects. Write clear specifications and articles. Strong team player.

Master of Engineering, Electrical Engineering: 3.87/4.00 GPA, December 1991, University of Colorado at Boulder. Project at Nat'l Center for Atmospheric Research involved developing dual-axis servo-motor radar controls.
Bachelor of Science, Electrical Engineering, honors, May 1981, University of Texas at Austin.
Registered Professional Electrical Engineer in Colorado

Principal Electrical Engineer **Redgarden Engineering** Boulder, CO (Oct, 2008-Present)
Provide electronics engineering consulting for projects involving medical devices, scientific instruments, industrial & aerospace controls, and consumer electronics. Project work has included VHDL for an FPGA for the Emirates Mars mission, various boards for unmanned air vehicles, data collection for research on electromagnetic emissions in the environment, communications over power lines, electronics and FPGA code (in Verilog) to drive and control laser-based systems, various industrial controllers (including a part of a drilling rig inspection device), the electronics design for an LED-based billboard sign, and for oximetry and electrosurgical monitors. Also providing technical patent analysis. Own & manage company and projects.

Senior Electrical Engineer **Encision** Boulder, CO (Sept, 2006-Aug, 2008)
1. Proposed and successfully completed research project demonstrating efficacy of a new method of monitoring shielded electrosurgical instruments. The method uses high-speed sampling of electrosurgical parameters along with real-time processing in a Xilinx FPGA. A provisional patent was filed on the method.
2. Used the new monitoring method described above as the basis for a new monitor development project. Brought together divergent ideas from the company management to achieve a consensus on products requirements.
3. Wrote company white paper, *Capacitive Coupling with Unshielded Laparoscopic Electrodes*.

Principal Electrical Engineer **Kestrel Labs** Boulder, CO (2003-Aug, 2006)
1. Developed analog, digital, and opto-electronics for pulse oximetry-based instruments.
2. Designed experiments to investigate and troubleshoot aspects of electronics devices, circuits, & instruments.
3. Assisted in writing successful SBIR grants to funded on-going projects with the National Institutes of Health.

Consultant **Kurt Aronow, PE** Boulder, CO (May-Oct., 2003)
Aztek Engineering: Assisted in design of telecom trunk board with emphasis on MPC8250 µP integration.
Mountain Engineering II: Verilog digital phase-locked loop design in a Xilinx FPGA.

Senior Electrical Engineer **Exabyte Corporation** Boulder, CO (2001-April, 2003)
Electronic and electro-optics design, and CPLD/FPGA/ASIC Verilog design, synthesis, simulation, documentation, troubleshooting, for tape drives. Designs included PowerPC, ARM cores, Virtex-II, SCSI and Fibre Channel.

Senior Electrical Engineer **Aztek Engineering** Boulder, CO (99-2001)
Telecommunications engineering services:
1. Completed a large FPGA design in VHDL for a backplane interface that was converted into an ASIC.
2. Co-developed a board with an MPC850 µP to add and drop telephony traffic into an STM-1 data stream.
3. Led and served on committees that wrote an extensive HDL coding standard and a schematic standard.
4. Designed a circuit board to study signal integrity issues at higher frequencies.

Electrical Engineer **Evergreen Research** Golden, CO (98-99)
Biomedical engineering services included design of high speed digital electronics for adding headers to ultrasound data in real time. Other work included design of a fast analog circuit for RMS-DC conversions & embedded software.

Hardware Engineer **Datex-Ohmeda** Louisville, CO (93-98)
Biomedical device research included successfully moving the technology for a new generation of pulse oximetry into development. Designed and validated analog, digital, and opto-electronic circuitry (including laser diode driver circuits and pre-amps for silicon and germanium detectors). In-vitro and electronic experiments were designed & completed. Development work included interfacing a 68EC030-based microprocessor core and a high-resolution, color monitor.

Electrical Engineer **CGH Medical** (Contract) Lakewood, CO (1992)
Re-designed two 80C188-based digital/analog circuit boards for a continuous dialysis machine. Performed worst-case/failure analysis & C test code. Also oversaw development of a patented ultrasonic air bubble detector.

Circuit Analyst **Martin Marietta** (Contract) Waterton, CO (1990)
Wrote worst case analysis on NASA space station robotics controller board. Calculated thermal dissipation, end of life, radiation effects, timing, etc. Modified circuitry with analysis. Documents: M/S 1553B, 883B, 38510, etc.

Electronics Engineer **Palomar Observatory** Pasadena, CA (88-90)
1. Designed electronics, software, & system to rotate the 200-inch cassegrain ring to 0.01° with an encoder and a micro-stepping motor. Worked with astronomers, foremen, and managers to develop requirements.
2. Defined "next generation" of TV viewing and guiding cameras for 200-Inch and 60-Inch telescopes. Solution involved using a gated, cooled image intensifier synchronized with a re-packaged CCD camera.
3. Re-designed signal conditioning circuitry to resolve longstanding noise and repeatability issues.

Research Engineer **Unocal Science & Technology** Brea, CA (85-88)
Performed "turnkey projects" that involved design, software, control and electrical:
1. Designed a system to select megabytes of data from analog tape containing gigabytes of data.
2. Designed a bridge conditioner with auto-zero and circuitry to auto-scale over five orders of magnitude.
3. Designed an electronic controller using laser feedback and a position sensor detector to drive a motor.
4. Designed a system to control 41 air movers (computer, relays, modem) with hardwired safety features.
5. Troubleshot a large, regenerative dynamometer's windings and electrical control system.
6. Helped oversee a pilot plant's electrical construction. Used NEC and worked with electricians and millwrights.

Analog Design Engineer **Delco Electronics** Santa Barbara, CA (82-83)
Automotive analog electronic design projects included designing current-mode PWM circuits, switching power supplies, digital interfaces, and worst-case analysis. Worked on electronic controller for automobiles. Researched LVDT circuits.

Electrical Engineer **Martin Marietta** Vandenburg AFB, CA (81-82)
Reviewed huge electrical and mechanical systems for space shuttle ground support hypergolic refueling operations.

Research Assistant **Center for Electro-mechanics** University of Texas (78-81)
Performed electrical troubleshooting, assembly, machining, etc., supporting rail-gun & electrical generator projects.

U.S. Patents: Six issued. See: www.RedgardenEngineering.com/Articles.html

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Electronics Articles: See: www.RedgardenEngineering.com/Articles.html

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More-Recent Engineering Software: Orcad, Pads, Altium, ModelSim, Synplicity, Xilinx ISE, Microsemi Designer, Matlab, LT Spice, Verilog, VHDL.

Leadership: Former chair of an Inner City Outings group, a non-profit taking lower-income kids hiking, back-country skiing, etc. As chair, oversaw fundraising, newsletter, volunteer recruitment & training, gear acquisition.

Personal: U.S. Citizen. EMT-B training. Climber & skier. Speak some Spanish. Excellent health. Member IEEE.