

Kirk Nangreaves

Honors BS in Electrical Engineering

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SKILLS

Hardware Design Experience

- Broad circuit design experience: analog, digital & power
- Extensive experience in high-speed digital communications, signal integrity, TDR and eye-pattern testing
- Extensive experience in motor control and power conversion, thermal management
- Strong understanding of PCB fabrication/assembly, material selection
- Successful track record of high-speed controlled-impedance layout and stack-up design
- Solid understanding of EMI theory, good design practice, compliance testing and mitigations
- Experience in DFM and DFT practices and successful production roll-out
- Experience with FPGA, microcontroller & real-time DSP design, fine-bitch BGA layout
- Experience with design verification & validation testing and design of automated functional testing
- Extensive debug/bring-up experience: oscilloscope, logic analyzer, prototyping and intricate soldering

Software Tools and Coding

- Extensive schematic capture experience with OrCad and Mentor
- Some Verilog RTL design, simulation, synthesis with Xilinx ISE
- Circuit simulation experience with Spice, control system modeling with Matlab
- Embedded programming in C++ and assembly. Also web programming in HTML and PHP

Project Management Experience

- Experience with resource allocation, project scheduling, risk identification and management
- Ability to create a multi-disciplinary plan and lead a project from concept through to production

Personality

- Detail-oriented, take pride in foreseeing obstacles and creating successful first-spin designs
- Work very well in a team environment, able to lead or follow as the situation requires
- Strong problem solver: enjoy innovating new ideas and finding the elegant solution
- Enjoy mentoring and knowledge sharing, always looking to learn from others

WORK EXPERIENCE

Intuitive Surgical
Electrical Engineer

Sunnyvale, CA
Aug 2009 – present

- Involved in the design of the da Vinci surgical robot, with 4 instruments (7 degrees of freedom each) for precise, minimally invasive robotic surgery
- Personally designed several PCAs, responsible for motor/brake control and drivers, monitoring of current/voltage/position feedback, DSPs for converting surgeon inputs into motor position commands, power conversion and distribution
- Performed meticulous worst-case analysis to ensure consistent & reliable designs
- Worked closely with mechanical engineers to fit the PCAs in tight cavities defined by moving robotic arms as well as to provide sufficient heat sinking
- Worked closely with PCA layout designers to layout complex PCAs containing both high-current motor lines and fine-pitch BGAs communicating over high-speed digital lines and fiber optic connections
- Designed with multiple levels of redundancy and fail-safe, as required by powerful motors moving instruments inside the human body
- Created comprehensive FMEAs and incorporated the resulting mitigations into the hardware design
- Designed rigorous design validation & verification procedures as well as functional test procedures for approval by the FDA and foreign regulatory agencies



WORK EXPERIENCE (continued)

Continental Automotive
Electrical Engineer

Dearborn, MI
Aug 2005 – Aug 2009



- Lead designer of the system controller PCB for the electric powertrain (inverter and DC-DC modules) of a zero-emission fuel cell vehicle, including analog, digital and high-voltage power circuitry
- Design to stringent requirements for EMC, temperature, vibration and reliability. Extensive experience in design for test and design for manufacture. Close interaction with software and firmware engineers as well as suppliers to ensure overall project success
- Designed an automated test fixture for End-Of-Line testing as well as a Hardware-in-the-Loop fixture for control system optimization.

PATENTS PENDING

- Design of an electric-vehicle power supply design for controller logic and isolated power module gate drivers, optimized for EMI and efficiency. The design is currently in use in powertrains inside Ford and Daimler vehicles.
- Innovative solution to effectively sink heat from a compact motor controller PCA with multiple hot spots in an area where fans and active heatsinks are not possible, and electrical isolation to the enclosure is required. The design is currently being used in our prototype builds and is headed for production.

EDUCATION

University of Waterloo
Honors BS in Electrical Engineering

Waterloo, ON
June 2005



- Midnight Sun Solar Car Team Manager: As team manager, I was responsible for running the largest student project at U of W. I was also involved in building many of the car's electronic systems
- Design project: Completed hardware and software design of a smart energy meter: mixed-signal PCB with embedded PIC software

ACTIVITIES

- Volunteered at the Vancouver 2010 Winter Olympics: working in the athlete's village, I was responsible for assisting the visiting athletes with directions, tourist attractions, public transportation and anything else I could do to help.
- Have bicycled across Canada and continue to ride actively
- Was referee-in chief for college hockey at the University of Waterloo. Refereeing builds teamwork, leadership and communication skills while requiring split-second decisions in a high-energy environment.
- I keep myself informed of the latest news and technologies in electrical engineering as a member of the IEEE.

AWARDS AND CERTIFICATIONS

- Champlain College Student Life Prize: For the graduating student most involved in improving student life on campus while maintaining excellent academic performance
- Bilingual: English/French
- Certified in first aid, CPR and AED

INTERNSHIPS

Honeywell Aerospace
Electrical Engineer Intern

Mississauga, ON
Jan 2004 – Dec 2004



- Involved in the design of a motor/generator controller and high-power inverter for the Boeing 787 main engines.
- Redesigned the climate control PCB of the Boeing C-17 to reduce cost, size and weight while improving performance.
- Experience with design and documentation to full military specifications.

Nuvation Engineering
Electrical Engineer Intern

San Jose, CA
May 2002 – April 2003



- Took a complex, mixed-signal project through a full design cycle: concept, schematic, prototype, test, PCB layout and fabrication, bring-up and integration. Completed ahead of schedule and within budget.
- Assisted in the design of a fiber-optic polarization dispersion controller for 40Gbps optical networks.
- Received the highest possible performance evaluation: Outstanding.

MDS Sciex
Electrical Engineer Intern

Concord, ON
Jan 2001 – Dec 2001



- Prepared schematics and documentation to ISO 9001 standards.
- Designed digital boards and cable assemblies for mass spectrometers.
- Presented, discussed and justified designs at design review meetings.