Spencer A. Berglund

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Embedded hardware/firmware engineering addict, avid tinkerer, astrophysics geek, recreational scientist. Seeking full time positions in the Seattle area.

Work Experience

First Mode – Senior Embedded Systems Engineer (Embedded Systems Lead) *Apr '20 - Current*

- Highly involved with design, integration, and test of world's first zero emission, ultra-class haul truck
  - Created custom chip-down embedded system to interface our hydrogen power plant with the 930E-4's existing electrical drive system by emulating interfaces of the diesel engine/alternator with no support from the OEM (required extensive reverse-engineering effort on-site at ZA mine)
  - Designed, built refrigerator-sized HVPDU with integrated contactors, fusing, sensing capabilities
  - Designed, built custom 1500 V, 4 MW, IGBT switched load bank for power plant testing
  - Worked on-site for 3 months in South Africa to install and test power plant before critical deadline, including hardware bring-up activities, high/low voltage harnessing, integration into existing drive system, drive testing, software testing, debugging and fault-finding
- Led Embedded Team designing custom production-intent ECUs for Diesel-Battery Hybrid retrofit kit
  - Designed low-voltage embedded compute, controls and sensing architecture
  - Collaborated closely with Embedded Software Team on MCU selection and board design
- On-site Electrical Engineer supporting hybrid haul-truck testing and customer demos in Centralia
  - Coordinated/performed electrical repairs and maintenance, analyzed vehicle telemetry
  - Led external customers through site tours/product demos and fielded questions
- Developed internal engineering tools, resources, standards, conventions and processes
  - De-facto Altium librarian - managing library databases, document style/good practice conventions
  - Writing many modular STM32 drivers for common embedded hardware peripherals, including support for internally developed Python/YAML autocoding framework
  - Pathfound internal electrical box-build process, helped outfit shop with necessary tooling
- Created highly capable internal development platforms (5000+ part PCBAs) for rapid prototyping
  - High-speed (125 MHz+), 10-layer PCB design with high-current (200 A) power distribution

Bazaarian – Lead Embedded Hardware/Firmware Engineer *Jun '19 - Feb '20*

- Independently designed and programmed PCBAs for solar powered, BLE 5.0 smart water bottle
- Invented novel, multi-sensor fluid measurement method to work within product design constraints
- Worked closely with mobile dev and mech engineer through prototyping and manufacturing phases

Pizzacake Industries – Founder, Director of Engineering *Apr '18 - Present*

- Design and production of specialty, custom products for scientific/research/medical customers

Open Systems International – Embedded Hardware Engineer *Mar '18 - May '19*

- Redesigned legacy RTU product, reducing per-unit cost by >40% while also fixing known design flaws
- Rapidly designed and prototyped hardware and firmware for cost optimized, WiFi IoT product
- Managed production runs of 1000+ units of OSI hardware as primary engineering point of contact

X (formerly Google[x]) – Electrical Hardware Engineering Intern *May '17 - Aug '17*

- Designed, prototyped, and tested 2 revs of a hardware implemented, short-range, wireless CAN Bus bridge to replace subsystem responsible for ~25% of recent field failures of balloons on Project Loon

SpaceX – Full-Stack Web Development Intern *May '15 - Jul '15*

- Maintained and implemented user-requested features for internal QA web application (WarpDrive), working primarily with MSSQL, C#, Entity Framework, Angular, Knockout, CSS3 and HTML5

PTC (ThingWorx) – Software Engineering Intern *Mar '15 - Apr '15*
- Integrated solar vehicle telemetry system with ThingWorx IoT platform, enabling real-time cloud storage, visualization, and analysis of critical vehicle sensor data to improve racing strategy

Benchmark Electronics – Application Development Intern *May '14 - Sep '14*
- Developed C# app to configure, control, visualize data from embedded medical device
- Implemented asset tracking system in SharePoint/C#, improving resource sharing between teams

Academics and Extracurriculars

University of Minnesota Twin Cities – Electrical and Computer Engineering BS *2013 - 2017*
- Emphasis in Robotics/Embedded Systems, Computer Architecture, Digital Systems

UMN Solar Vehicle Project – Electrical and Strategy Team Lead *2013 - 2017*
- Independently designed/built/programmed Driver Interface, Battery Protection, 4.5kW Grid Charger
- Assisted in development of custom 15kW BLDC motor controller, and many other vehicle subsystems
- Developed strategy solver in C# to simulate full race and weather, optimize design and racing speed
- Race Strategy Lead in the 2015, 2017 World Solar Challenge and 2016 American Solar Challenge

Science Fair, FIRST Robotics, Science Olympiad – Competitor *2009 - 2013*
- Highly awarded engineering projects at National and International Science Fairs (ISEF, JSHS, LIYSF)
- Designed and built 4 competitive robots as highly involved member of FIRST Robotics Team 2530

Engineering Skills

- Schematic/PCB design with Altium and KiCad
  - 8+ layer, high speed, high current, mixed signal
  - Designed and brought up 30+ PCBs
- HDL/Verilog on Zynq FPGA SoC
- High power/voltage electrical systems design
- Analog, digital, and power switching circuit design and analysis using LTspice and other design tools
- Diverse Software Experience
  - Expert with C and Python
  - Proficient at C#, SQL, JavaScript
  - Experience with C++, Java, Matlab, Bash, PHP
- Capable of devising creative design solutions to complex engineering/optimization problems

- Skilled at full-stack, in-house rapid prototyping
  - Hand PCB assembly/soldering/rework
  - High quality harnessing
  - CNC and manual machining with mill/lathe
- Eager and willing to mentor and unblock peers
- Experienced in writing clear, detailed, high and low level design documentation
- Thrives in interdisciplinary work environment
  - Work within system-wide design constraints
  - Efficient inter/intra-team communication
- Confident speaker, significant experience writing and presenting technical papers