

Jeffrey P Blum

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EDUCATION

Carnegie Mellon University, M.S. Robotic Systems Development

Pittsburgh, PA • December 2015

Brown University, B.S. Computer Engineering

Providence, RI • December 2012

SKILLS

Electrical/Electronic Design

- Developing digital and analog circuits for power distribution, sensor data aggregation, audio amplification, motor control, wireless communication, and other applications
- Designing and documenting highly-interconnected wiring harnesses with high-current, communication, motor control, and analog sensor feedback lines
- Creating and interpreting schematics and multilayer high-speed PCB layouts using Eagle, KiCad, and Altium
- Soldering and construction of electronic circuits using through-hole and surface-mount parts
- Diagnosing issues using oscilloscopes, logic analyzers, and spectrum analyzers

Electromagnetic Compatibility

- Identifying and locating sources of electromagnetic noise using a short-range spectrum analyzer
- Mitigating issues using solutions appropriate for narrow-band and wide-band interference

Programming

- Advanced technical proficiency with the Arduino IDE
- Proficiency with C programming of AVR microcontrollers in Atmel Studio
- Familiar with a wide variety of communication protocols including Bluetooth, Ethernet, USB, CANBUS, RS-232, SPI, I2C, and UART
- Working knowledge of Java and Python, including GUI design
- Basic understanding of ROS

Robotics

- Basic understanding of computer vision principles
- Familiar with inverse kinematics

Systems Engineering

- Comfortable creating functional and physical architecture diagrams
- Writing system requirements and creating associated test plans
- Familiar with DFx principles
- Understanding of the FMEA process
- Knowledge of tools such as weighted decision matrices and risk assessment matrices

Other Tools

- Strong understand of SolidWorks
- Proficiency with most hand and power tools
- Basic use of a three-axis mill and lathe
- Microsoft Office core programs (Word, Excel, PowerPoint)
- Adobe Acrobat and Photoshop

CERTIFICATIONS

Altium Designer

Completed March 2017

Essentials

- Proficiency in all basic functions of Altium Designer
- Understanding of Altium's different library structures and how to implement them

Udemy

In Progress

Fundamentals of VHDL and FPGA Development

- Online course covering the basics of VHDL, including simulated projects
- Emphasis on Altera and Xilinx boards

EXPERIENCE

SKA (Robotics Design Firm)

Pittsburgh, PA • August 2018 - present

Independent Contractor

- Constructing wiring harnesses for a robotic manipulation system

Discovery Robotics Corp.

Pittsburgh, PA • April 2016 - July 2018

Lead Electrical Engineer

- Developed a wide range of PCBs in Altium for high-current power distribution, motor control, and sensor feedback to be used in an autonomous industrial floor cleaner
- Designed communication circuits for Ethernet, USB, CANBUS, RS-232, SPI, and UART, often on the same board
- Designed complete electrical systems for manufacturability and international (CE) standards compliance
- Debugged electrical issues using logic analyzers and oscilloscopes
- Analyzed power requirements of the system to ensure that the robot's batteries would provide enough power for a 8-hour-minimum continuous runtime
- Identified noise issues related to EMI and radiated emissions using a spectrum analyzer and developed appropriate solutions, including ferrite chokes, metal enclosures, and cable shielding
- Assisted with wiring layout and developed company-wide standards for wire sizing
- Wrote firmware in embedded C optimized for minimal power consumption

Gecko Robotics, Inc.

Pittsburgh, PA • December 2015 - March 2016

Robotics Engineer

- Designed a combined power distribution and control PCB in KiCad with high-speed Ethernet and multiple UART peripherals for a robot that measures the thickness of coal boiler wall pipes
- Designed and sourced parts for an all-in-one base station that provided power and water to the robot via a 50-foot tether that could be stored within the base station
- Developed and tuned PID motor control feedback loop using the Arduino IDE to precisely control robot position during operation
- Sourced parts for a robust, IP67-rated electrical subassembly
- Attended Y Combinator with the company in early 2016

4moms

Pittsburgh, PA • June 2015 - August 2015

MRSD Intern

- Designed PCBs in Altium for a self-installing car seat
- Designed an I2C I/O expander built around an Atmel AVR microcontroller
- Tested various sensors and analyzed the resulting data to determine the best solution for a particular application
- Programmed AVR microcontroller to minimize power consumption
- Wrote an I2C communication protocol to transmit data between two microcontrollers within a single product

Modern Device

Pawtucket, RI • August 2013 - July 2014

Electronics Technician

- Designed schematics and laid out printed circuit boards using Eagle
- Fulfilled customer orders by soldering surface-mount and through-hole components
- Tested completed boards using test rigs capable of high through-put

ADDITIONAL MAJOR PROJECTS

RemindArm

Carnegie Mellon University • March 2015 - May 2015

- Developed a prototype for a soft robotics armband that squeezes the arm when signaled via Bluetooth
- Designed a small 2-layer PCB package that contained a USB-rechargeable battery power source, ATtiny microcontroller, Bluetooth radio, and micropump controller

PantryBot

Carnegie Mellon University • September 2014 - May 2015

- Collaborated with an interdisciplinary team to design and prototype an assistive robot for the elderly and disabled that moved groceries between a kitchen counter and pantry shelves
- Directed the development of all electrical subsystems and circuit boards
- Reduced noise levels in long-distance analog data lines by adding low-pass RC filters
- Led programming of all firmware using the Arduino IDE
- Coded an intuitive touchscreen GUI using Python's TkInter

DangerWeapon**Brown University • Fall 2012 - Summer 2014**

- Used an Arduino and a Netbook to take physical inputs (switches, keypad, etc.) to output cued sounds and a simulated GUI, ultimately triggering camera flashes and sounds to simulate an explosion
- Advanced the system to version 2 using a Raspberry Pi, more inputs and outputs, and a true GUI
- Developed an LED-based "breathing" light effect through a clear acrylic rod without using a microcontroller
- Machined aluminum and wood into a device enclosure in the style of a Hollywood movie doomsday device

Power Glove**Brown University • Fall 2011 - Spring 2012**

- Constructed a wrist-mounted device prototype as a group project that uses hand motions and finger presses to control a cursor in place of a handheld mouse
- Designed the device's enclosure and helped configure the ZigBee wireless protocol

Emergency Party Button System**Brown University • Spring 2011**

- Installed an IR transceiver to control a stereo and an X10-based system that uses two buttons to activate and deactivate UV lights, EL wire, pinspots, a disco ball, and other effects