

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

- Capturing EMC emissions data using a spectrum analyzer and a far-field antenna
- Identifying and locating sources of electromagnetic noise using near-field probes
- 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 understanding of SolidWorks
- Proficiency with most hand and power tools
- Basic use of a three-axis mill and lathe
- Microsoft Office programs (Word, Excel, PowerPoint, Access)

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

PATENTS

Robotic platform with teach-repeat mode <i>US10328573B2</i>	Issued June 25, 2019
Apparatus and methods for providing a reconfigurable robotic platform <i>US20170312916A1, CA3030027A1, EP3484678A1, WO2018013538A1</i>	Pending
Operational service plan disruption and return optimization for a service robot <i>US20180333845A1</i>	Pending
Digital map utilization in the automatic execution of a service area plan by a service robot <i>US20180339409A1</i>	Pending
Sensor-based detection of service event condition within a single defined service area by a service robot <i>US20180339410A1</i>	Pending
Robotic platform with following mode <i>US20180361581A1</i>	Pending
Robotic platform with area cleaning mode <i>US20180361583A1</i>	Pending
Robotic platform with long-term learning <i>US20180361584A1</i>	Pending
Robotic platform with multi-function service module <i>US20180361585A1</i>	Pending
Robotic platform with mapping facility <i>US20180364045A1</i>	Pending

EXPERIENCE

Mackin Consultancy @ Facebook <i>Electrical Contractor</i>	Menlo Park, CA • October 2019 - February 2020
<ul style="list-style-type: none">Performed validation and characterization testing for an early stage prototype of a future virtual reality product	
MTD Products <i>EMC Contractor</i>	Valley City, OH • April 2019 - October 2019
<ul style="list-style-type: none">Analyzing multiple battery-powered lawn care machines for EMC complianceConsulting on board design and development with the goal of minimizing unintentional electromagnetic radiationPerforming pre-compliance scans to reduce the number of required visits to an external testing lab	
SKA (Robotics Design Firm) <i>Independent Contractor</i>	Pittsburgh, PA • August 2018 - September 2018
<ul style="list-style-type: none">Constructed wiring harnesses for a robotic manipulation system	
Discovery Robotics Corp. <i>Lead Electrical Engineer</i>	Pittsburgh, PA • April 2016 - July 2018
<ul style="list-style-type: none">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 cleanerDesigned communication circuits for Ethernet, USB, CANBUS, RS-232, SPI, and UART, often on the same boardDesigned complete electrical systems for manufacturability and international (CE) standards complianceDebugged electrical issues using logic analyzers and oscilloscopesAnalyzed power requirements of the system to ensure that the robot's batteries would provide enough power for a 8-hour-minimum continuous runtimeIdentified noise issues related to EMI and radiated emissions using a spectrum analyzer and developed appropriate solutions, including ferrite chokes, metal enclosures, and cable shieldingAssisted with wiring layout and developed company-wide standards for wire sizingWrote firmware in embedded C optimized for minimal power consumption	
Gecko Robotics, Inc. <i>Robotics Engineer</i>	Pittsburgh, PA • December 2015 - March 2016
<ul style="list-style-type: none">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 designed 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