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

- Familiarity with LabView
- Strong understanding of SolidWorks
- Proficiency with most hand and power tools
- Competent with three-axis mills, lathes, and 3D printers

CERTIFICATIONS

Altium Designer — **Completed March 2017**

Essentials

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

Udemy — **Estimated Completion September 2021**

Fundamentals of VHDL and FPGA Development

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

EXPERIENCE

Independent Work — **Lexington Park, MD • August 2020 - Present**

General Home Construction

- Renovating the unfinished basement of a house by constructing four rooms and three closets
- Insulating, framing, and drywalling walls and soffits
- Installing drop ceilings and laminate flooring
- Wiring multiple new electrical circuits according to NEC specifications
- Modifying existing circuits to separate outlets from lighting and eliminate use of white wires as “hot” lines

Abiomed Breethe — **Halethorpe, MD • January 2021 - March 2021**

Senior Electrical Engineer

- Designed and constructed fixture for rapid QA testing of incoming components
- Developed a LabView VI to read and log oscilloscope data over an extended period of time for debugging purposes

Mackin Consultancy @ Facebook — **Menlo Park, CA • October 2019 - February 2020**

Electrical Contractor

- Designed and performed validation and characterization testing for an early stage prototype of a future virtual reality product
- Debugged unexpected issues using an oscilloscope

MTD Products — **Valley City, OH • April 2019 - October 2019**

EMC Contractor

- Analyzed multiple battery-powered lawn care machines for EMC compliance
- Consulted on board design and development with the goal of minimizing unintentional electromagnetic radiation
- Performed pre-compliance scans to reduce the number of required visits to an external testing lab

Discovery Robotics Corp. — **Pittsburgh, PA • April 2016 - July 2018**

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 an 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

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 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 • Spring 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

PATENTS

Robotic platform with teach-repeat mode **Issued June 25, 2019**
US10328573B2

Apparatus and methods for providing a reconfigurable robotic platform **Pending**
US20170312916A1, CA3030027A1, EP3484678A1, WO2018013538A1

Operational service plan disruption and return optimization for a service robot **Pending**
US20180333845A1

Digital map utilization in the automatic execution of a service area plan by a service robot **Pending**
US20180339409A1

Sensor-based detection of service event condition within a single defined service area by a service robot **Pending**
US20180339410A1

Robotic platform with following mode **Pending**
US20180361581A1

Robotic platform with area cleaning mode **Pending**
US20180361583A1

Robotic platform with long-term learning **Pending**
US20180361584A1

Robotic platform with multi-function service module **Pending**
US20180361585A1

Robotic platform with mapping facility **Pending**
US20180364045A1