Randy Westlund, E.I.

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Experience

Awning Tracker **Medford, MA**
Founder and CEO *July 2016–Present*

- Founded a startup company to provide specialized project management software for the awning industry.
- Prototyped and deployed a beta version of Awning Tracker on a MEAN stack.
- Created the final Awning Tracker platform as a client-side web application using web components and the Polymer framework. Implemented the back end with PostgreSQL and Go.
- Managed a large number of Awning Tracker instances across multiple FreeBSD servers and jails, including replicating backups to multiple data centers. Designed the architecture and wrote custom automation and monitoring tools.
- Created advertisements and ran marketing campaigns across various platforms.
- Met with clients and led in-person training seminars. Provided 24/7 support.
- Led business meetings with clients to study paper-driven workflows and discuss areas where technology could improve efficiency and communication.

Experimeta, LLC **Medford, MA**
Co-Founder and CEO *July 2015–Present*

- Designed and implemented a second iteration of the firmware, control software, and communication protocol for an autonomous internet-connected germicidal ultraviolet light device (see SPI Team, below). Implemented the new control software as a web-application with back-end database and bridge to the XBee network. Repaired faulty hardware and made units ready for sale. Traveled to Kansas to demo and install the improved units.

Earth, Atmospheric, and Planetary Sciences Department, MIT **Cambridge, MA**
System Architect, Researcher *April 2014–Present*

- Took the primary role in developing SLOOP, a pattern retrieval engine for animal biometrics. SLOOP helps biologists identify individual members of a species from a collection of photographs to model population over time.
- Redesigned the system from the ground up, implementing a RESTful API using Node.js, and Angular.js for the new mobile-friendly client-side application and management console. Expanded the system to handle new species. Improved reliability by migrating all data from the filesystem to a PostgreSQL database. Packaged the system into a deployable virtual machine.
- Traveled solo to New Zealand to upgrade and relocate the Department of Conservation's existing SLOOP system.

Systems Engineer via E5 Aeronautics *July 2013–Present*

- Designed embedded systems and communication protocols for small unmanned aircraft for civilian use. Explored issues such as mesh networking, low-latency remote control, and redundant sensor systems. Used MAVLink and custom communication protocols.
- Cross compiled and deployed a custom NanoBSD image to embedded boards to provide communications over 900 MHz. Implemented realtime video and telemetry feeds from the aircraft to the ground.
- Modified firmware for Wi-Fi SD cards and Canon cameras with CHDK, wrote custom device drivers for 900 MHz radios, and deployed to an embedded Linux development board. Utilized memory-mapped files to meet near realtime message passing requirements.
- Tested unmanned aerial systems (UAS/UAV) at Popocatépetl, an active volcano in Mexico. Flew aircraft through the volcano's plume to collect environmental data.

Urban Scholars, University of Massachusetts Boston **Boston, MA**
Robotics Instructor *June 2013–Dec 2013*

- Designed and taught evening and summer courses on Beginning Robotics, Advanced Robotics, and Introductory Programming, for students aged 11–16, in line with the Common Core standards. Topics included Lego Mindstorms, Arduinos, gearboxes, LEDs, encryption and internet safely, robotics in the news, ethical considerations, and historical figures in computing.

SPI Team, LLC **Highland, MD**
Co-Founder and Lead Engineer *Feb 2012–June 2013*

- Co-founded with my retired mentor from NASA and organized a team of engineers.
- Led a team that designed and implemented embedded electronics to control robotic arms with inverse kinematics with a team. Personally designed the circuit and wrote the I/O and communications code.
- Collaborated on market research and business strategy with a patent holder for an autonomous internet-connected germicidal ultraviolet light device, and led the prototype design team. Personally wrote the embedded firmware that drives the motors and various human occupancy sensors and designed a communication protocol for the 802.15.4 mesh XBee radios. Deliverables included the prototype device, control software, and engineering documentation.

NASA Goddard Space Flight Center **Greenbelt, MD**
Apprentice/Lead Intern, Robotics Engineering Boot Camp *June 2011–Aug 2011*

- Designed and implemented a software-defined radio (SDR) using a Universal Software Radio Peripheral (USRP) with GNU Radio to receive, demodulate, and decode L-band and S-band satellite communications from NOAA's Polar Operational Environmental Satellites.
- Traveled to the NASA Antarctic Interactive Launch Support system at the NASA Satellite Ground Station in McMurdo, Antarctica and replaced on-site analog equipment with my SDR in December 2011.
- Returned to Antarctica in December 2012 to test system, record satellite data, and package the 28-year-old ground station for return to NASA Goddard.

Charlotte Tent and Awning Co., Inc. **Charlotte, NC**
Bookkeeper/Assistant *June 2005–Sept 2009*

- Managed accounts receivable and accounts payable for company with $2.5 million in revenue.
- Assisted in design, build, and setup of trade show displays for conventions of 20,000–30,000 attendees.

Education

The University of North Carolina at Charlotte **Charlotte, NC**
B.S., Computer Engineering *2011*
Minor: Mathematics, Classical Studies
Major GPA: 3.70, Overall GPA: 3.56
Engineer Intern, FE Certificate Number A-26823

Senior Design Project

- Won second place of 50 teams, leading 5 engineers to design and build an autonomous robot with obstacle avoidance and a user-controlled videoconference mode. Cross compiled Linux for an embedded ARM board, and integrated computer vision, ultrasonic, IR, and tactile sensors.

Course Projects

- Wrote a custom implementation of `malloc()/free()` and deployed it on a Renesas microcontroller.
- Implemented a parallelized, pipelined, FPGA version of the Needleman-Wunsch algorithm for global sequence alignment of A-C-G-T protein sequences and benchmarked it against a CPU implementation.
- Implemented 3D graphics rendering algorithms of Lambertian and specular surfaces with the Phong Reflection Model in MATLAB.
- Designed, simulated, and constructed a four-stage 60 dB amplifier with BJTs.
- Worked in teams to design and process RFID antennas on silicon wafers in a clean room.

Core Technical Skills

Programming Languages

- C, C++, C#, Rust, Go, Java, Perl, Python, JavaScript, Octave/MATLAB
- VHDL, SQL, BSD/GNU Make, GDB, Shell Scripting, Regular Expressions, HTML, CSS, LaTeX

Operating Systems

- FreeBSD, TrueOS, NanoBSD, FreeNAS, pfSense, Jails, ZFS, Poudriere
- OpenBSD, PF
- Gentoo Linux, Arch Linux, Ubuntu

System Administration

- Familiarity with server rooms
- RAID, PXE booting

- Apache, Nginx, PostgreSQL, MongoDB

Frameworks

- **Web:** Polymer, Django, Node.js, Angular.js, jQuery
- **Robotics:** Robot Operating System (ROS), MAVLink
- **Version Control:** Git, SVN, CVS

Embedded Systems & Electronics

- Arduino, AVR, BeagleBone, misc embedded ARM boards
- UART, SPI, I^2C/TWI protocols
- Eagle and KiCad EDA software
- Soldering and prototyping, electronics workbench

RF Communications

- Digital Signal Processing (DSP) in GNU Radio and MATLAB
- Universal Software Radio Peripheral (USRP)
- Amateur Radio, General Class, KK4DOP
- Processing from feedpoint to baseband and demodulation

Peripheral Hardware

- Kinect, LIDAR, ultrasonic, IR, PIR
- Servos, DC motors, linear actuators, encoders
- 802.15.4 XBee radios
- Canon cameras and CHDK

Foreign Languages

- Latin: Two years of study
- Ancient (Attic) Greek: One year of study
- Spanish: Two years of study

Miscellaneous

- QuickBooks, GnuCash
- Detailed documentation practices
- Antarctic survival and igloo design

Top Open Source Contributions

FreeBSD **Contributor**
`https://www.FreeBSD.org` *BSD-2-Clause*

- Contributed several patches to the source, ports, and documentation trees.
- Completed the majority of the work to port a new version of the 'top' command.
- Created ports for several applications, and maintainer of several more.

avr-osccal **Author**
`https://github.com/rwestlund/avr-osccal` *BSD-2-Clause*

- Implemented Atmel's OSCCAL algorithm from App Note 053 in C. This enables users to easily calibrate the internal clocks on AVR chips to in-circuit conditions with only the ISP interface.

embedded-digimesh **Author**
`https://github.com/rwestlund/embedded-digimesh` *BSD-2-Clause*

- Created a minimal C library for the core portion of the XBee DigiMesh protocol. It's designed for use in embedded devices.

node-digimesh **Author**
`https://github.com/rwestlund/node-digimesh` *BSD-2-Clause*

- Created a Node.js JavaScript library for the XBee DigiMesh protocol. It's designed for IoT applications.

paladin **Author**
`https://github.com/rwestlund/paladin` *BSD-2-Clause*

- Created a process supervisor in Go. Launches and monitors services from a config file, with dependencies and automatic restarts.

recipes **Author**
`https://github.com/rwestlund/recipes` *BSD-2-Clause*

- Created a mobile-friendly client-side web application for managing recipes with family and friends. Uses the Polymer web framework with Go and PostgreSQL behind a RESTful API. First version used a MEAN stack.

responsive-dialog **Author**
`https://github.com/rwestlund/responsive-dialog` *BSD-2-Clause*
- Created a modal dialog web component following Google's Material Design guidelines. Dynamically adjusts between a desktop dialog pop-up and a mobile full screen menu.

gotex **Author**
`https://github.com/rwestlund/gotex` *BSD-2-Clause*
- Implemented a Go library for rendering arbitrary LaTeX documents.

freesweep **Maintainer**
`https://github.com/rwestlund/gotex` *GPL-2.0*
- Fixed bugs, cleaned up code, and maintained for the community.