James Phillips

Email : james@technesolutionsllc.com

Mobile : +1-720-598-5869

EXPERIENCE

- **Techne Solutions LLC** — Boulder, CO
  Principal, Owner, Electrical Engineering Consultant — *September 2019 - Present*
  - **Industrial Internet of Things Hardware Platform**: Custom circuit board implementing a Nordic nRF9160 SiP with GPS and LTE capabilities, a u-Blox BMD-345 module, Ethernet, CAN bus, RS485/232, and analog/digital input and outputs controlled through SPI and I2C busses. The board can be powered by a primary battery, or a DC input voltage with a rechargeable secondary battery.
  - **Low Power, Bluetooth Embedded Platform for Machine Learning Inference**: Contracted by a customer to design a hardware prototype in a form factor the size of a wristwatch with an Ambiq Apollo 3 Blue as the central system-on-chip providing Bluetooth connectivity, a Cortex-M4 processor, and a PCM/PDM peripheral to interface with MEMS microphones. Currently developing software to run machine learning inference on the Cortex-M4 on audio data using TensorFlow Lite, manage power consumption for battery powered applications, and communicate with smartphone app over Bluetooth.
  - **Small Business Innovation and Research Grants**: Authored SBIR proposal for the U.S. Army proposing a hardware cybersecurity product to zeroize programmable logic in FPGA/system-on-chip upon detection of tampering through software or hardware to protect sensitive data and intellectual property. On behalf of a customer, authored a RAPID SBIR proposal for the National Science Foundation, in response to the COVID-19 pandemic, proposing to prototype a medical sensing device using high frequency radar and computer vision to measure human vital signs without requiring human contact.
  - **Reverse Engineering**: Reverse engineered multiple small circuit boards, identified ICs from package/markings, created schematics. Using an FPGA development board, created a voltage glitching side channel attack tool to attempt bypassing copy protection bits on microcontroller to gather evidence in potential patent infringment case.

- **Ball Aerospace and Technologies** — Westminster, CO
  Electrical Design Engineer — *July 2011 - September 2019*
  - **Embedded Control for Phased Array Antennas**: Designed hardware and firmware for MSP430/MSP432 microcontrollers and Zynq 7000 series FPGAs to control phased array antenna beam steering, telemetry, calibration, and command interface through SPI, I^{2}C, UART, and Ethernet peripherals.
  - **Modular DC/DC Power Supply Hardware**: Developed power supply requirements and hardware to implement DC/DC buck converters to power RF power amplifiers, low noise amplifiers, and digital electronics.
  - **Test and Control App Development in C#**: Developed desktop applications in C# to provide user interface for command, control, and telemetry of embedded systems and control of test equipment, typically a vector network analyzer.
  - **Anechoic Range System Upgrades and Troubleshooting**: Technical lead for upgrading anechoic range data acquisition and control systems and troubleshooting efforts. Upgraded cabling, motor control system, and data acquisition software of multiple anechoic ranges. Led troubleshooting efforts for various electrical, RF, and software related issues on the anechoic ranges.
  - **Cable Design**: Designed cable harnesses for electrical, thermal, and vacuum test and flight applications. Used CIRRIS cable test systems to automate continuity/isolation and high potential validation tests.
  - **RF Measurement System Optimization**: Optimization and troubleshooting of noise floor and dynamic range of PNA-based antenna measurement systems. Measurement of noise floor and saturation points of RF amplifiers.
  - **Anechoic Test Field Probing**: Automated linear and rotary probe fixtures to characterize anechoic chamber test fields. Developed processing scripts to analyze test field characterization metrics, i.e. field taper, magnitude and phase variance, and cross-polarization isolation.
  - **Preparation and Execution of Various Antenna and Radar Tests**: Responsible for the configuration of multiple anechoic ranges' RF and control systems to execute various antenna and radar tests based on frequency range, antenna type, calibration requirements, and post-processing metrics.
  - **Documentation of Antenna Calibration Algorithms**: Reverse engineered antenna calibration algorithms for implementation in better supported programming languages and integration into third party systems.
  - **Automated RF Switch Matrix**: Automated control of electromechanical RF switch matrix using a dsPIC to change RF path of anechoic range measurement system.

Education

- **University of Colorado**   Boulder, CO
  Graduate Coursework   *June -December 2017*
    - **ECEN 5813**: Principles of Embedded Software
    - **ECEN 5863**: Programmable Logic Embedded System Design

- **Purdue University**   West Lafayette, IN
  Bachelor of Science in Electrical Engineering   *Aug. 2006 – May. 2011*

Technical Skills

- **Languages**: C, C#, Assembly, MatLab, VHDL/Verilog, Python

- **Software**: Altium, Orcad, Eagle, Vivado, Quartus, Libero, Git, Eclipse-based IDEs, Windows/Linux OS

- **Lab Experience**: Vector Network Analyzers, RF Power Meters, Oscilloscopes, Logic Analyzers, Signal Generators