

# Eric Silk

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## CURRENT EMPLOYER

### Schweitzer Engineering Labs, Inc. Pullman, WA, USA

- Research Engineer, Government Services, Infrastructure Defense Division Apr 2018 – Present
  - Extensive AWS experience, including EC2, S3, Lambda, and IoT
  - Large Scale Data Cleaning/Analysis (>10TB) on Synchrophasors for the Department of Energy, including massively parallel analytics, data cleaning, event detection, etc.
  - Synthetic schematic generation for ML dataset bootstrapping/transfer learning
  - Docker development for encapsulation of legacy software, standardized computing environments, and robust parallelism
  - Genetic Algorithms, Optimization, Machine Learning as applied to varied topics in Power Systems
  - Mentoring in coding practices, Linux, signal processing, etc.
  - Compression of Power System Signals; patent applied for (17/172,447)
  - Demonstrated ability to handle sensitive information
- Associate Software Engineer, Precise Time and Communications Dec 2016 – Apr 2018
  - Developing product code for applications including GNSS receivers, a PTP library, and modular software defined switch module synchronization.
  - Software test implementation/execution experience, including unit testing (relying heavily on Google Test and Google Mock), functional testing, and integration testing at an inter-product level.
  - Occasional external assistance with signal processing and filtering concepts, outside the scope of my primary role. Topics included PID controller tuning and non-linear filters.

## EDUCATION

### University of Washington, Seattle, Washington, USA

- Masters Student in Applied Mathematics Jan 2019 – Dec 2021
  - Relevant Coursework: High-Performance Scientific Computing, Computational Methods for Data Analysis, Independent Research with Dr. Andrew Lumsdaine (multiple quarters), Fundamentals of Optimization, Inferring Structure of Complex Systems,
  - Cumulative GPA: 3.81 / 4.0

### University of Idaho, Moscow, Idaho, USA

- Bachelors of Science in Electrical Engineering Aug 2012 – Dec 2016
  - Area of Emphasis: Controls and Signal Processing
  - Cumulative GPA: 3.16 / 4.0

## RESEARCH EXPERIENCE

### AMATH 600 Independent Research/Study,

The University of Washington and Pacific Northwest National Laboratory

- Second Order Methods for Scalable Optimization Jan 2021 – Present
  - Matrix-Free methods for Hessian approximation; optimizers utilizing these techniques
  - Homotopy Continuation as applied to Deep Neural Networks
  - Significant experience with PyTorch and Slurm
- Power Systems Simulation and Graph Theory Jun 2020 – Sep 2020
  - Introduction to load-flow simulation, PETSc, and Graph Theory
  - Exposure to Modern C++ techniques for graph representation and algorithms
  - CUDA/Thrust implementations of Matrix Factorizations

### Autonomous Underwater Vehicle, University of Idaho

- Undergraduate Research Assistant Sep 2015 – Dec 2016
  - Project: Development of acoustics datalogger, electric field sensors, and inter-microcontroller communications
  - Research areas: Electric fields in water, embedded software

## PATENTS

- Compression of Power System Signals, Schweitzer Engineering Laboratories Feb 2021
  - Applied for in February 2021, application number 17/172,447
  - Compression of Power System Signals through the use of Linear Predictive Coding and Golomb Rice codes
  - Initially intended to lower the transmission bandwidth and storage requirements of the data archival of the SEL T400L to enable high fidelity, high bandwidth, long term analytics
  - Compression ratio of 5.7-7.4x compared to prior, naive implementation, supporting >1 year of data on a 3.5" drive

## ACADEMIC AWARDS

- Dean's List, Spring and Fall 2016, University of Idaho 2016  
For attaining a semester GPA of at least 3.5.

	<ul style="list-style-type: none"> <li>▪ <b>Engineering Scholars Certificate</b>, Engineering Scholars, University of Idaho 2014 For outstanding participation and contributions to the Engineering Scholars Program, including sponsored design projects and specific coursework.</li> </ul>
<b>OTHER AWARDS</b>	<ul style="list-style-type: none"> <li>▪ <b>Eagle Scout</b>, Boy Scouts of America Nov 2010 Completed numerous requirements, ranging from First Aid to Environmental Sciences, and lead a charitable construction project for the city of Hayden Lake.</li> </ul>
<b>VOLUNTEERING</b>	<p><b>FIRST Robotics</b>, Pullman SciBorgs, Team 4061</p> <ul style="list-style-type: none"> <li>▪ Mentor Sep 2016 – Mar 2018 <ul style="list-style-type: none"> <li>• Mentoring High School students for a robot design competition</li> <li>• Programming and computer topics including C++ and Linux</li> </ul> </li> </ul>
<b>OTHER WORK EXPERIENCE</b>	<p><b>University of Idaho</b>, Moscow, Idaho, USA</p> <ul style="list-style-type: none"> <li>▪ Teaching Assistant, Microelectronics Lab Jan 2016 – May 2016 <ul style="list-style-type: none"> <li>• Taught both laboratory sections, covering topics that included diodes, BJT's, MOSFET's, amplifier design, and non-ideal opamp behavior. Used Cadence extensively.</li> <li>• Graded homeworks, tests, and lab reports in a timely and accurate fashion</li> <li>• Received positive feedback from the students and professor for my ability to explain the topics and willingness to meet outside of lab for review and study sessions.</li> </ul> </li> </ul>
<b>SKILLS</b>	<p><b>Programming</b></p> <ul style="list-style-type: none"> <li>▪ Python <ul style="list-style-type: none"> <li>• Daily Development for Work, School, and Personal Projects</li> <li>• Extensive experience with Multiprocessing, PyTorch, NumPy, SciPy, Matplotlib, Pandas, and others</li> <li>• Modern Practices, including Unit Testing, Type Hinting, Abstract Base Classes, Data Classes, etc.</li> <li>• AWS Frameworks, such as the IoT SDK and Lambda</li> </ul> </li> <li>▪ C++ <ul style="list-style-type: none"> <li>• Familiarity with OOP, Inheritance, Polymorphism, Lambda expressions, and Templates</li> <li>• Working knowledge of Make and CMake</li> <li>• Decent experience with GoogleTest and GoogleMock for unit testing</li> <li>• Experience with Eigen for Linear Algebra</li> </ul> </li> <li>▪ MATLAB <ul style="list-style-type: none"> <li>• Working knowledge, typically for conversion to Python or when required by constraints</li> <li>• Use of compiler for interfacing with Python</li> </ul> </li> <li>▪ C <ul style="list-style-type: none"> <li>• PIC32 using MPLabX. Used FreeRTOS, RS-232, I2C, SMBus, EEPROM in various projects.</li> <li>• TI C2000 processors using CodeComposerStudio. Basic IIR filter, datalogging to an SD card using FatFs, serial communication with PC GUI.</li> </ul> </li> <li>▪ SystemVerilog <ul style="list-style-type: none"> <li>• Digital Design Course</li> <li>• Designs including LFSR's, distributed memory, ILA's, debug cores, AXI4-Lite, IP cores, and basic I/O.</li> <li>• Final project utilized an ARM core communicating with an FPGA coprocessor over an AXI4-Lite bus before sending final values out via SPI.</li> </ul> </li> <li>▪ <math>\LaTeX</math> <ul style="list-style-type: none"> <li>• Nearly all written reports/documents since Junior year of College (when permitted), including this resume.</li> </ul> </li> </ul> <p><b>Other Skills</b></p> <ul style="list-style-type: none"> <li>▪ KiCAD</li> <li>▪ Electronics assembly (through-hole and SMD)</li> <li>▪ Electronics diagnostic tools, including: multimeter, oscilloscope, and function generators</li> </ul>
<b>INTERESTS</b>	Guitar, Audio processing, Photography.
<b>REFERENCES</b>	Available upon request

[Resume compiled on 2021-11-29 for Georgia Tech]