

Matthew R. Overlin

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Interests:

Embedded Systems, Energy Systems, Power Systems Simulation, Distributed Generation, Real-Time Systems, Physical Systems Modeling, Data Science

Education:

- **Massachusetts Institute of Technology**, Cambridge, MA
PhD in Electrical Engineering and Computer Science (Sep. 2021)
Thesis: "Methods for Parameter Estimation with Devices in Microgrids"
- **Massachusetts Institute of Technology**, Cambridge, MA
M.Eng. in Electrical Engineering and Computer Science (Sep. 2017)
Thesis: "A Modular Real-Time Hardware-in-the-Loop Simulation Environment for Microgrids"
- **Massachusetts Institute of Technology**, Cambridge, MA
S. B. in Electrical Science and Engineering (June 2013)
Minor in Physics

Relevant Coursework:

Electric Machines, Introduction to Numerical Simulation, Power Electronics Laboratory, Microcomputer Project Laboratory, Signal Processing, Computational Science and Engineering, CMOS Analog and Mixed-Signal Circuit Design, Power Electronics, Microelectronic Devices and Circuits, Electromagnetics Applications, Solid-State Circuits, Integrated Microelectronic Devices

Skills:

- Programming Languages: Python, C++/C, MATLAB, Verilog, Julia
- Analog/Digital Circuit Design & Modeling, Power systems design
- PCB Layout, Design, Bring-Up (Eagle, Cadence, Altium)
- Laboratory Experience: Soldering, Oscilloscopes, electronic test equipment, power tools

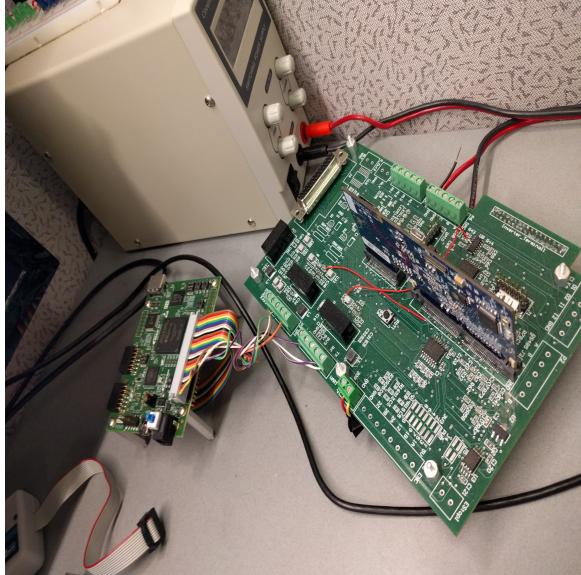
Work Experience:

- **Autonomous Systems Scientist (Data Sciences Division)**– Aug. 2021-present. Martin Defense Group. Portland, ME
- **Research Assistant (Energy Systems Group)**– Fall 2017-Aug. 2021. MIT. Cambridge, MA
Developed and executed simulations for power systems operation, stability, and control (dynamic and static scenarios). This work includes synchronous machine modeling, induction motor modeling, load flow, inverter-based systems modeling. Also performed system identification exercises for developing experimentally verified simulation models of constant power loads, diesel gensets, and active power filters. Performed parameter sensitivity analysis in a simulation of a grid-connected household with solar production, non-linear loads, and active power filters.
- **Teaching Assistant (Signals and Systems, 6.003)**– Fall 2016, Spring 2017. MIT. Cambridge, MA
Teaching Assistant for an undergraduate foundation subject in signal processing (Fourier Transforms, LTI system analysis, basic control theory). Taught weekly meetings "tutorials" with small groups of students. Held office hours. Graded exams. Helped write materials for classes.
- **Hardware Engineer**, Mark L. Watson. Oracle Corporation. Burlington, MA (Jul. 2013 - Jul. 2016) Designed, and test hardware for an archival storage product. PCB Design : Schematic Creation/Simulation/Verification (OrCAD Capture, Cadence). Signal Integrity Verification/Simulation (SIGRITY, Cadence). Signal processing (MATLAB). Embedded Systems Programming : C, Verilog.

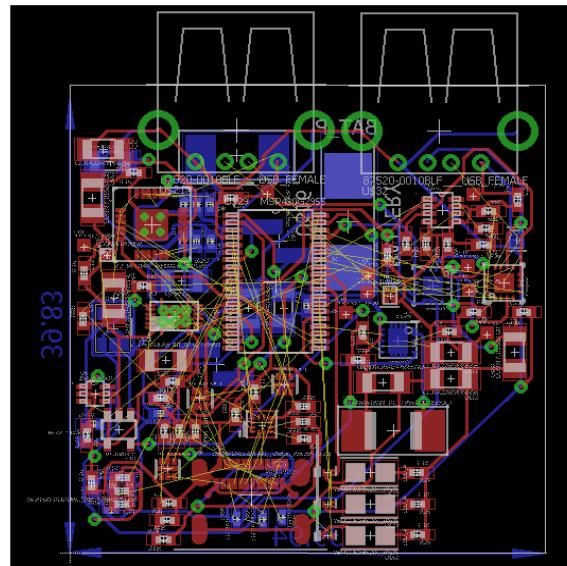
Publications (peer-reviewed):

- **Matthew Overlin**, Christopher Smith. "High Performance Computing Techniques with Power Systems Simulations," in *IEEE High Performance and Extreme Computing (HPEC)*. 2018.
- **Matthew Overlin**, Colm O'Rourke, Po-Hsu Huang, James Kirtley Jr., "A Timing Comparison of Different FPGA-Accelerated Load Flow Solvers," *IEEE Innovative Smart Grid Technologies (ISGT) Brazil*. 2019.
- **Matthew Overlin**, Marc Barbar, Krishnan Kant, Christopher Smith, James Kirtley Jr., "An Enhanced Time-Domain Simulator of Transient Stability in Power Systems," *IEEE PowerAfrica Conference*. 2019.

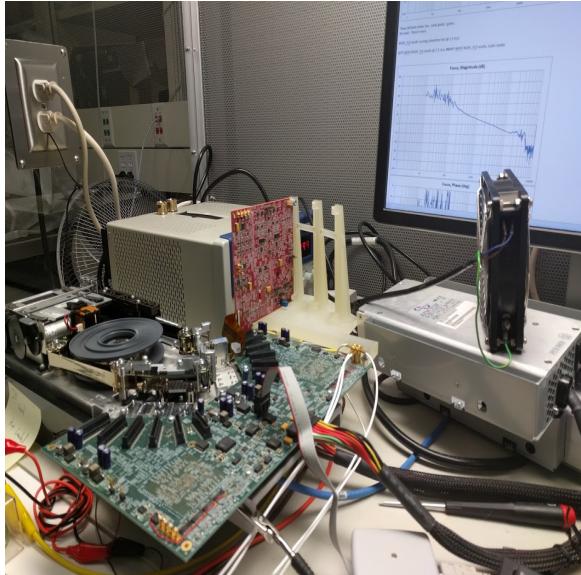
- Colm O'Rourke, Mohammad M. Qasim, **Matthew Overlin**, James Kirtley Jr., "A Geometric Interpretation of Reference Frames and Transformations : dq0, Clarke and Park," *IEEE Transactions on Energy Conversion*. 2019.
- **Matthew Overlin**, Christopher Smith, Marija Ilic, James L. Kirtley Jr. "A Workflow for Non-linear Load Parameter Estimation using a Power-Hardware-in-the-Loop Experimental Testbed," in *Applied Power Electronics Conference (APEC)*. 2020.
- Krishan Kant, **Matthew Overlin**, Lukasz Huchel, Mohammad Qasim, James L. Kirtley Jr.. "Self Synchronizing Controller for a Multifunctional Single Phase AC-DC-AC Converter," in *Applied Power Electronics Conference (APEC)*. 2020.
- Xia Miao, Marija Ilic, Christopher Smith, **Matthew Overlin**, Ryan Wiechens. "Toward Distributed Control for Reconfigurable Robust Microgrids," in *IEEE Energy Conversion Congress and Exposition (ECCE)*. 2020.
- **Matthew Overlin**, Christopher Smith, James L. Kirtley Jr. "A Hybrid Algorithm for Parameter Estimation (HAPE) for Dynamic Constant Power Loads," in *IEEE Transactions on Industrial Electronics*. 2020.
- [In Review] **Matthew Overlin**, James Macomber, Christopher Smith, Luca Daniel, Edward Corbett, James L. Kirtley Jr. "A Hybrid Algorithm for Parameter Estimation (HAPE) for Diesel Generator Sets," in *IEEE Transactions on Energy Conversion*. 2021.



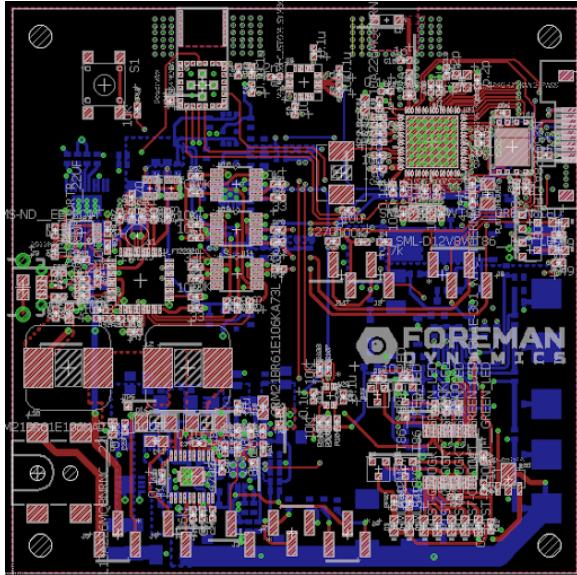
(a) HIL Real-Time Simulation Set-up (M. Eng. Thesis)



(b) Untethered power bank, charging mobile devices



(c) Optical Tape Drive (Oracle Corp., Canceled project)



(d) Battery-powered sensor board (radar and accelerometer)

FIGURE 1 – Gallery of Hardware Projects