Curriculum Vitae for **Joshua Comden**

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Summary

I am a Postdoctoral Researcher at the National Renewable Energy Laboratory with a research focus on utilizing uncertain predictions to make real-time decisions in energy systems. I have the ability to think from both a theoretical perspective and a practical perspective since my educational background comes from both Applied Math and Engineering. Additionally, I received extra training in decision support with a fellowship during graduate school to learn how to communicate scientific ideas effectively to decision makers.

Education

PhD – Stony Brook University – Stony Brook, NY   Dec 2019
Applied Mathematics and Statistics
Operations Research track
Thesis: Algorithms for Online and Distributed Optimization and their Applications
Advisor: Zhenhua Liu

GCert – Stony Brook University – Stony Brook, NY   Aug 2019
Science Training & Research to Inform Decisions (STRIDE)
Translate complex data-enabled research into informed decisions and sound policies

MS – Stony Brook University – Stony Brook, NY   May 2015
Applied Mathematics and Statistics
Operations Research track

BE – University of Delaware – Newark, DE   May 2009
Chemical Engineering
Minors: Mathematics, Economics

Research Experience

Postdoctoral Researcher   Jan 2020 – Present
National Renewable Energy Laboratory – Golden, CO
 – Distributed Control: Work with a utility to disaggregate Distributed Energy Resource (DER) control so that each DER can be controlled independently while satisfying global power grid constraints.

Research Assistant   Aug 2015 – May 2019, Sep 2019 – Dec 2019
Stony Brook University – Stony Brook, NY
 Led collaborative research projects that developed into publications in the following domains:
 – Distributed Control: Designed control laws with provable stability for a geographically distributed network of data centers to participate in primary frequency control
 – Online Optimization: Designed algorithms with theoretical performance guarantees that make real-time decisions and utilize noisy predictions for power grid and cloud computing applications
 – Demand Response: Incorporated uncertainty into customer load behavior models and designed a contract for an electric utility company to change customer loads that lowers cost

Graduate Intern   May 2019 – Aug 2019

National Renewable Energy Laboratory – Golden, CO
  – <u>Power System State Estimation</u>: Incorporated power flow equations into standard Matrix Completion techniques to provably reduce the number of needed measurements

Undergraduate Research Intern   Jun 2007 – Aug 2007
Department of Chemical Engineering, University of Delaware – Newark, DE
  – Studied self-assembling silica nanostructures in supersaturated aqueous solutions under various physiological conditions to determine regression features for nanostructure size

Industry Experience

Process Safety Intern   Jun 2008 – Aug 2008
Rohm and Haas – Croydon, PA
  – Performed an audit for normal and emergency venting in emulsions plants to see if they matched ISO standards

CAD Technician   Jun 2006 – Aug 2006
CRB Consulting Engineers – Plymouth Meeting, PA
  – Set up plant designs off of base files in AutoCAD and Fixed engineering mark-ups in Plant 4D

Teaching Experience

Teaching Assistant   Aug 2013 – Jul 2015
Department of Applied Mathematics and Statistics, Stony Brook University – Stony Brook, NY
  – **AMS 301 – Finite Mathematical Structures** (Undergraduate): Instructed an upper level math course for undergraduate students during two Summer Sessions. Graded homework/tests and gave office hours during two semesters.
  – **AMS 540 – Linear Programming** (Graduate): Graded homework and gave office hours during one semester.
  – **AMS 545 – Computational Geometry** (Graduate): Graded homework and gave office hours during one semester.
  – **AMS 546 – Network Flows** (Graduate): Graded homework and gave office hours during one semester.

Private Tutor   Sep 2011 – Jul 2013
Pittsburgh, PA
  – Held one-on-one sessions in mathematics, statistics, physics, and chemistry

ESL Teacher   Jul 2009 – Aug 2011
Escola Fisk – Monte Mor, SP, Brazil
  – Taught adolescent and adult students from all levels grammar and conversational English

Leadership Experience

Group Leader   Aug 2017 – May 2019
PhD Career Ladder Program, Stony Brook University – Stony Brook, NY
  – Led fellow graduate students to explore and prepare for careers inside and outside of academia with monthly meetings and events.
  – Participated in monthly meetings for group leaders to discuss leadership strategies for main meetings.

Advising Experience

Jessica Maghakian, PhD Student   Apr 2018 – Dec 2019
Stony Brook University – Stony Brook, NY
- Jessica joined our lab's research group early in her PhD career during my last two years as a PhD student. Since leading academic research was new to her, I helped her through the process of writing her first paper. Over time, I gave her both technical research advice and soft-skills advice such as time management and leading research collaboration meetings.

Maximilian Du, High School Student   Jun 2018 – Jul 2019
Stony Brook University – Stony Brook, NY
- Helped Max to do independent research over a five week summer period in using neural networks to predict wind power production. Afterwards, he continued his research and I advised him through monthly emails. He was able to publish a paper in IEEE REPE (2019) as a high school student!

Ayyan Zubair, Undergraduate Student   Aug 2016 – Dec 2016
Stony Brook University – Stony Brook, NY
- Helped Ayyan to do independent undergraduate research over a semester in demand response program models.

Programming Skills

Python, Matlab – Evaluated online optimization and control algorithms using real-world trace-based simulations

C – Read and translate web text into quantitative data for further analysis

HTML/CSS – Built a website to teach Brazilians English with TV commercials

Accomplishments and Awards

STRIDE Fellowship   Sep 2017 – Feb 2019
Institute for Advanced Computational Science, Stony Brook University – Stony Brook, NY
- 1.5 year fellowship to obtain the STRIDE Advanced Graduate Certificate

Student Travel Grants – ACM SIGMETRICS (2016, 2017, 2019), ACM e-Energy (2017)

Fundamentals of Engineering Exam – Passed   2009

Eagle Scout   2005

Foreign Language

Brazilian Portuguese - Working proficiency after living and working in Brazil for two years

Refereed Journal and Conference Publications

1. Comden, Joshua, Jessica Maghakian, and Zhenhua Liu. "Online Economic Dispatch with Volatile Renewable Generation and Ramping Costs." *IEEE CNC* (2020).

2. Comden, Joshua, Andrey Bernstein, and Zhenhua Liu. "Sample Complexity of Power System State Estimation using Matrix Completion." *IEEE SmartGridComm* (2019).

3. Comden, Joshua, Tan N. Le, Yue Zhao, Bong Jun Choi, and Zhenhua Liu. "Geographically Coordinated Primary Frequency Control." *IEEE Transactions on Control of Network Systems (TCNS)*, 2019: Vol. 6, No. 3. Long paper. A shorter version appeared in IEEE CDC (2017).

4. Comden, Joshua, Sijie Yao, Niangjun Chen, Haipeng Xing, and Zhenhua Liu. "Online Optimization in Cloud Resource Provisioning: Predictions, Regrets, and Algorithms." *ACM POMACS*, 2019: Vol. 3, No. 1.

5. Maghakian, Jessica, Joshua Comden, and Zhenhua Liu. "Online optimization in the Non-Stationary Cloud: Change Point Detection for Resource Provisioning." *IEEE CISS* (2019). An extension of a paper that appeared in ACM POMACS (2019).

6. Comden, Joshua, Tan N. Le, Yue Zhao, Bong Jun Choi, and Zhenhua Liu. "Geographically coordinated frequency control." *IEEE CDC* (2017).

7. Comden, Joshua, Zhenhua Liu, and Yue Zhao. "Incentivizing reliable demand response with customers' uncertainties and capacity planning." *ACM SIGMETRICS* (2017). Extended Abstract.

8. Comden, Joshua, Zhenhua Liu, and Yue Zhao. "Harnessing flexible and reliable demand response under customer uncertainties." *ACM e-Energy*, (2017). Long Paper. A shorter version appeared in ACM GreenMetrics (2017).

9. Comden, Joshua, Zhenhua Liu, and Yue Zhao. "Distributed algorithm design for probabilistic demand." *ACM GreenMetrics* (2017).

10. Comden, Joshua, Zhenhua Liu, and Yue Zhao. "Optimizing the Level of Commitment in Demand Response." *ACM GreenMetrics* (2016). Finalist for *Best Student Paper Award*.

11. Chen, Niangjun, Joshua Comden, Zhenhua Liu, Anshul Gandhi, and Adam Wierman. "Using predictions in online optimization: Looking forward with an eye on the past." *ACM SIGMETRICS* (2016).

Conference and Invited Talks

– ACM SIGMETRICS. "Online Optimization in Cloud Resource Provisioning: Predictions, Regrets, and Algorithms". June 2019.

– INFORMS Annual Meeting. "Harnessing Flexible and Reliable Demand Response und Customer Uncertainties". October 2017.

– ACM e-Energy. "Harnessing Flexible and Reliable Demand Response und Customer Uncertainties". July 2017.

– ACM GreenMetrics. "Distributed Algorithm Design for Probabilistic Demand Response". June 2017.

– ACM GreenMetrics. "Optimizing the Level of Commitment in Demand Response". June 2016.

Invited Referee for Journals and Conferences

- ACM Performance Evaluation, 2020.
- Elsevier Sustainable Energy, Grids and Networks (SEGAN), 2018.
- ACM ITC 30, 2018.
- IEEE ACC, 2018.