

# AKSHAY AJAGEKAR

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## EDUCATION

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### Cornell University

January 2020 - Present

- PhD in Systems Engineering
- Project areas: Quantum computing, Reinforcement learning, Deep learning, Optimization

### Cornell University

August 2018 - January 2020

- Master of Science (MS) in Chemical Engineering: **GPA - 3.93/4.00**
- Thesis: Quantum computing for process systems optimization and data analytics

### Indian Institute of Technology (IIT), Patna

July 2014 - May 2018

- Bachelor of Technology (B.Tech) in Chemical Science and Technology
- Cumulative **GPA - 9.24/10** with Department rank 1
- Thesis: Studying the rotational transitions of gas-phase species using a chirped pulse fourier transform microwave spectrometer

## EXPERIENCE

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### PEESE lab at Cornell University

2018 - Present

*Graduate Researcher*

*Ithaca, NY*

### JPMorgan Chase

2021

*Research Associate*

*New York, NY*

### Nanyang Technological University

2018

*Research Assistant*

*Singapore*

## AWARDS & SKILLS

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### Bronze medal - National Math Olympiad

2011

*Indian Institute for Studies in Mathematics*

*India*

### Director's gold medal

2018

*Indian Institute of Technology (IIT)*

*Patna, India*

### Innovation challenge winner

2022

*Avangrid Inc.*

*Orange, Connecticut*

### Computer languages

Python, C++, R, Matlab, Bash

### Quantum computing tools

Qiskit, Cirq, PennyLane, Amazon Braket, Azure Quantum

### Machine learning

Algorithms, Deep Learning, Deep Reinforcement Learning

### ML and data libraries

PyTorch, Tensorflow, JAX, Scikit-Learn, XGBoost, Pandas

### Optimization

Cvxpy, GurobiPy, GAMS, Pyomo

### Other

Linux, Git, AWS, Azure, GCP

## PATENTS

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### US20230298101A1

JPMorgan Chase

**Akshay Ajagekar**, Pierre Minssen, Romina Yalovetzky, Marco Pistoia. *Systems and Methods for Quantum Computing-Assisted Portfolio Selection*

US20220414518A1

Cornell University

Fengqi You and Akshay Ajagekar, *Quantum computing based hybrid solution strategies for large-scale discrete-continuous optimization problems*

US20230094389A1

Cornell University

Fengqi You and Akshay Ajagekar, *Quantum computing based deep learning for detection, diagnosis, and other applications*

## PROGRAMMING PROJECTS

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### Algorithmic trading of cryptocurrency

- Harnessed deep learning to generate plausible market scenarios and stochastic optimization for risk management to develop a sophisticated algorithmic trading system for cryptocurrencies.
- Comprehensive backtesting was performed to assess the profitability of the trading system developed with Python under various market conditions.

### FOAM-RL : Framework Agnostic Modular Reinforcement Learning Library

- Developed a Python library for solving reinforcement learning problems that is user-friendly and modular.
- Designed to be framework agnostic and compatible with major deep learning frameworks, Pytorch, Tensorflow, and JAX. The library also includes support for cloud-based logging with open-source code hosted on a Github repository.

## PUBLICATIONS

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### Exhaustive list available on Google Scholar

1. **Ajagekar, A.**, You, F., (2023). Deep reinforcement learning based unit commitment scheduling under load and wind power uncertainty. *IEEE Transactions on Sustainable Energy*, 14, p.803-812.
2. **Ajagekar, A.**, You, F., (2023). Molecular design with automated quantum computing-based deep learning and optimization. *Nature Computational Materials*.
3. Xie, J., **Ajagekar, A.**, You, F., (2023). Multi-agent attention-based deep reinforcement learning for demand response in grid-responsive buildings. *Applied Energy*, 342, p.121162.
4. **Ajagekar, A.**, Decardi-Nelson, B., You, F. (2024). Energy management for demand response in networked greenhouses with multi-agent deep reinforcement learning. *Applied Energy*, 355, 122349.
5. **Ajagekar, A.**, Mattson, N.S. and You, F., (2023). Energy-efficient AI-based control of semi-closed greenhouses leveraging robust optimization in deep reinforcement learning. *Advances in Applied Energy*, 9, p.100119.
6. **Ajagekar, A.**, Hamoud, K.A., You, F. (2022). Hybrid classical-quantum optimization techniques for solving mixed-integer programming problems in production scheduling, *IEEE Transactions on Quantum Engineering*, 3, p.1-16.
7. **Ajagekar, A.**, You, F. (2022). Quantum computing and quantum artificial intelligence for renewable and sustainable energy: A emerging prospect towards climate neutrality, *Renewable and Sustainable Energy Reviews*, 165, p.112493.
8. **Ajagekar, A.**, You, F. (2021). Quantum computing based hybrid deep learning for fault diagnosis in electrical power systems, *Applied Energy*, 303, p.117628.
9. **Ajagekar, A.**, Humble, T., You, F. (2020). Quantum computing based hybrid solution strategies for large-scale discrete-continuous optimization problems. *Computers & Chemical Engineering*, 132, p.106630.

10. **Ajagekar, A.**, You, F. (2020). Quantum computing assisted deep learning for fault detection and diagnosis in industrial process systems. *Computers & Chemical Engineering*, 143, p.107119.
11. **Ajagekar, A.**, You, F. (2019). Quantum Computing for Energy Systems Optimization: Challenges and Opportunities. *Energy*, 179, p.76-89.
12. Bernal, D., **Ajagekar, A.**, Harwood S., et al. (2021). Perspectives of quantum computing for chemical engineering, *AIChE journal*, 68, p.e17651. ‘
13. **Ajagekar, A.**, You, F. (2022). New frontiers of quantum computing in chemical engineering, *Korean journal of Chemical Engineering*, 39, p.811820.

## CONFERENCE PRESENTATIONS

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**AIChE Annual Meeting (2019)**

**IEEE International Conference On Systems, Man, and Cybernetics (2020)**

**International Conference On Computer-Aided Design (2021)**

**European Symposium on Computer Aided Process Engineering (2021)**

**Symposium on Dynamics and Control of Process Systems (2022)**

**Process Systems Engineering Symposium (2022)**

**IEEE American Control Conference (2022)**

**International Conference on Applied Energy (2022)**

**Applied Energy Symposium: Low Carbon Cities and Urban Energy Systems (2022, 2023)**

**IEEE Conference on Control Technology and Applications (2023)**

## TEACHING

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**SysEn 6800 - Computational Optimization**

*Fall 2022*

*Responsibilities:* Delivered few lectures for a class of graduate students, Held weekly recitations and office hours, Graded assignments and prelims.

**SysEn 6880 - Big Data Analytics and Machine Learning**

*Spring 2020*

*Responsibilities:* Delivered few lectures for a class of graduate students, Held weekly office hours, Graded assignments.

**SysEn 6888 - Deep Learning**

*Summer 2019, Summer 2020*

*Responsibilities:* Delivered few lectures for a class of graduate students, Held weekly office hours, Graded assignments and projects.

**CEE 3040 - Uncertainty Analysis**

*Fall 2019*

*Responsibilities:* Delivered weekly 2 hours lectures for sections of 50 junior and senior level undergraduates, Held weekly office hours, Graded course exams.

**CEE 5970 - Risk Analysis**

*Spring 2019*

*Responsibilities:* Held weekly office hours, Graded assignments and course exams.

**AEP 2640 - Interfacing the Digital Domain with an Analog World**

*Fall 2018*

*Responsibilities:* Guided students through the laboratory experiments and simulations in LabView, Graded lab notebooks.