

# YUYANG QIU | CV

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## EDUCATION

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### Rutgers University

Fall 2020 – Spring 2025 (expected)

Major: Industrial and Systems Engineering

Intended Degree: Ph.D.

Advisor: Dr. Farzad Yousefian

### Northeastern University (Boston)

Sep. 2018 – Aug. 2020

Major: Applied Mathematics

Degree: Master of Science

### Jiangsu University

Sep. 2014 – Jun. 2018

Major: Mathematics and Applied Mathematics

Degree: Bachelor of Science

## EMPLOYMENT HISTORY

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### Givens Associates (Intern)

Summer 2024

*Mathematics and Computer Science Division, Argonne National Laboratory*

- Under supervision of Dr. Charikleia (Hara) Iakovidou. Worked on memory and communication-efficient asynchronous Federated Learning.

### Graduate Research Assistant

Fall 2022 - present

*Dept. of Industrial and Systems Engineering, Rutgers University*

- Under supervision of Dr. Farzad Yousefian. Working on two DOE funded projects: (1) Randomized Federated Learning for Nonsmooth, Nonconvex, and Hierarchical Optimization; (2) Privacy-Preserving Federated Learning for Science: Building Sustainable and Trustworthy Foundation Models.

## RESEARCH

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### Research Interests

- Distributed/Federated Optimization
- Stochastic Optimization
- Nonsmooth Optimization
- Hierarchical Optimization
- Nonconvex/Convex Optimization
- Mathematical Programs with Equilibrium Constraints

### Research Applications

- Training neural networks, hyperparameter tuning, and game theoretical problems.

## PUBLICATIONS

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### Conference Proceedings

1. Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian. *Zeroth-order methods for nondifferentiable, nonconvex, and hierarchical federated optimization*. Thirty-seventh Conference on Neural Information Processing Systems (**NeurIPS 2023**).

Paper: <https://arxiv.org/abs/2309.13024>

Poster: <https://nips.cc/media/PosterPDFs/NeurIPS%202023/72874.png?t=1699387657.060764>

Video presentation (5 mins): <https://neurips.cc/virtual/2023/poster/72874>

## Journal Articles

0. Yuyang Qiu, Uday V. Shanbhag, Farzad Yousefian. *Zeroth-order federated methods for stochastic MPECs and nondifferentiable nonconvex hierarchical optimization*. **Mathematics of Operations Research** (under first revision).
1. Lijuan Qian, Raghda Attia, Yuyang Qiu, Dianchen Lu, Mostafa Khater. *The shock peakon wave solutions of the general Degasperis-Procesi equation*. **International Journal of Modern Physics B**, 33. 1950351, 2019. doi: 10.1142/S021797921950351X.
2. Mostafa Khater, Dianchen Lu, Raghda Attia, Li Juan, Yuyang Qiu. *On Breather and Cuspon waves solutions for the generalized higher-order nonlinear Schrodinger equation with light-wave promulgation in an optical fiber*. **Numerical and Computational Methods in Sciences & Engineering**, 1, pp.101-110, 2019. doi: 10.18576/ncmse/010205.
3. Jing Li, Yuyang Qiu, Dianchen Lu, Raghda Attia, Mostafa Khater. *Study on the solitary wave solutions of the ionic currents on microtubules equation by using the modified Khater method*. **Thermal Science**, 23. 370-370, 2019. doi: 10.2298/TSCI190722370L.

## Manuscripts in Preparation

1. Yuyang Qiu, Brian Zhang, Farzad Yousefian. *Iteratively regularized gradient tracking methods for optimal equilibrium selection problem*. **In preparation for submission to IEEE Transactions on Control of Network Systems** (currently finalizing the first draft).
2. Mohammadjavad Ebrahimi, Yuyang Qiu, Farzad Yousefian. *Federated simple bilevel optimization: a universal regularized scheme with guarantees*. **In preparation for journal submission** (currently revising the first draft).

## PRESENTATIONS

### 2024 INFORMS Annual Meeting

1:03 PM - 1:21 PM, Oct. 22, 2024

Session: Federated Learning and Optimization: I

Location: Regency - 709

- Presentation title: Zeroth-Order Federated Methods for Stochastic MPECs and Nondifferentiable Nonconvex Hierarchical Optimization

### 25th International Symposium on Mathematical Programming (ISMP 2024)

Jul. 2024

Session: Nonconvexity, stochasticity and hierarchy in optimization problems

- Presentation: Zeroth-Order Federated Methods for Stochastic MPECs and Nondifferentiable Nonconvex Hierarchical Optimization

### 37th Annual Conference on Neural Information Processing Systems (NeurIPS 2023)

Dec. 2023

Poster Session 1

- Poster presentation: Zeroth-Order Methods for Nondifferentiable, Nonconvex, and Hierarchical Federated Optimization
- Poster link: <https://nips.cc/media/PosterPDFs/NeurIPS%202023/72874.png?t=1699387657.060764>

### 2023 INFORMS Annual Meeting

Oct. 2023

Session: On Hierarchical and Federated Optimization

- Presentation title: Randomized Zeroth-Order Federated Methods for Nonsmooth Nonconvex and Hierarchical Optimization

### SIAM Conference on Optimization (OP23)

Jun. 2023

Session: On Addressing Nonsmoothness, Hierarchy, and Uncertainty in Optimization and Games

- Presentation title: Randomized Methods for Nonsmooth and Nonconvex Federated Optimization
- Abstract: [https://meetings.siam.org/sess/dsp\\_talk.cfm?p=128796](https://meetings.siam.org/sess/dsp_talk.cfm?p=128796)

## UNDERGRADUATE ADVISING

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**Anuraag Sarkar** (*Freshman, Mathematics & Computer Science Major at Rutgers*) Summer 2023  
*Project: Numerical Validation of Randomized Zeroth-Order Methods for Nonsmooth Federated Learning*

- In collaboration with Aresty Research Center
  - Taught the student the basics of optimization theory and algorithms, such as convexity and gradient-based methods. Also taught the student how to code algorithms in Python
  - Introduced the idea of zeroth-order methods and federated learning to the student, helped student code federated algorithms such as Federated Averaging and its zeroth-order variant
  - Student successfully completed the project and made a poster presentation at the 2023 Summer Research Symposium
- Poster link: <https://drive.google.com/file/d/1CX5jonsM-7VR2j9SVDN2bfzxGv0CWGvd/view>

**Krishaan Chaudhary** (*Junior, Mathematics & Computer Science Major at Rutgers*) Fall 2024 - present  
*Research topic (tentative): Federated Learning Under Heterogeneous Settings*

- In collaboration with Aresty Research Center
- Currently at early stage of the research topic

## SERVICE

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### Reviewer

- Institute of Industrial and Systems Engineers (IISE) Transactions Journal

## INTERNSHIP

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**Yi Jia He Technology Co., Ltd** Jun. 2018 –Aug. 2018  
*Intern in the department of software development* Nanjing, China

- Learned how the power transformer substation inspection robot works
- Learned to use robot recognition and image processing skills

**NARI Group Corporation/State Grid Electric Power Research Institute** Dec. 2017 –Feb. 2018  
*Intern in the department of software development* Nanjing, China

- Learned the working principle and working method of substation inspection robot

## EXTRACURRICULAR ACTIVITIES

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**INFORMS Rutgers Student Chapter** Sep. 2022- present  
*Serving as treasurer of the chapter* Chapter Advisor: Prof. Ahmed Aziz Ezzat

- Organized and participated in Research Panel for undergraduate and graduate students
- Organized and participated in weekly Q & A sessions with the department seminar speakers
- Organized and participated in a social gathering for the graduate students in the ISE department
- Organized and participated in an online Zoom event aimed to boost LinkedIn page
- Offered advices on coursework to first-year graduate students Chapter LinkedIn:

**College Student Union Public Relations Department** Sep. 2014- Jun. 2015

- Participated in planning and negotiated with sponsors

## TECHNICAL STRENGTH

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### Optimization Solvers

- Gurobi

- CVX, CVXPY

### **Python**

- Familiar with Python libraries such as NumPy, Pandas, Scikit-learn, TensorFlow and PyTorch
- Good at implementing new algorithms that are not built-in with Jupyter Notebook, use coding as a way to understand the idea of algorithms

### **Matlab & R**

- Familiar with toolboxes, data analysis

## **PROFESSIONAL AFFILIATIONS**

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- Institute for Operations Research and the Management Sciences (INFORMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Mathematical Optimization Society (MOS)