

# MARK GLUZMAN

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## RESEARCH INTERESTS

- Resource allocations in large-scale processing networks. Examples of such networked systems include ride-hailing platforms, data centers, fabrication lines, customer contact centers.
- (Deep) reinforcement learning for control and optimization of processing networks.
- Dynamical systems and optimal control theory.

## EDUCATION

2016 -present **Cornell University**  
Ithaca, NY Ph.D. in Applied Mathematics • Advisor: Jim Dai  
2015-2016 **Columbia University**  
New York, NY M.Sc. in Applied Mathematics  
2011-2015 **National Technical University of Ukraine “Kyiv Polytechnic Institute”**  
Kyiv, Ukraine B.Sc. in Systems Analysis (with high honors)

## PUBLICATIONS

Refereed Journals:

- J.G. Dai, M. Gluzman, **Queueing Network Controls via Deep Reinforcement Learning**, *Stochastic Systems*, accepted, 2021.
- J. Feng, M. Gluzman, J.G. Dai, **Scalable Deep Reinforcement Learning for Ride-Hailing**, *IEEE Control Systems Letters*, 5(6), pp. 2060-2065, 2021
- M. Gluzman, J.G. Scott, A. Vladimirov, **Optimizing Adaptive Cancer Therapy: Dynamic Programming and Evolutionary Game Theory**, *Proceedings of the Royal Society B*, 287: 20192454, 2020
- M. Zgurovsky, M. Gluzman, N. Gorban, P. Kasyanov, L. Paliichuk, O. Khomenko, **Uniform Global Attractors for Non-Autonomous Dissipative Dynamical Systems**, *Discrete and Continuous Dynamical Systems B*, 22(5), pp. 2053-2065, 2017
- M. Gluzman, N. Gorban, P. Kasyanov, **Lyapunov Type Functions for Classes of Autonomous Parabolic Feedback Control Problems and Applications**, *Applied Mathematics Letters*, 39, pp. 19-21, 2015
- M. Gluzman, N. V. Gorban, P. O. Kasyanov, **Lyapunov Functions for Weak Solutions of Reaction-Diffusion Equations with Discontinuous Interaction Functions and its Applications**, *Nonautonomous Dynamical Systems*, 2(1), pp. 1-11, 2015

Conference Publications:

- J.G. Dai, M. Gluzman, **Refined Policy Improvement Bounds for MDPs**, *The 38th International Conference on Machine Learning*, Workshop on Reinforcement Learning Theory, 2021

Book Chapters:

- M. Gluzman, N. V. Gorban, P. O. Kasyanov, **Lyapunov Functions for Differential Inclusions and Applications in Physics, Biology, and Climatology**, In: *Continuous and Distributed Systems II. Studies in Systems, Decision and Control*, Springer, 2015

Papers in Preparation:

**Adaptive Policy Improvement in Trust Region Policy Optimization**  
(with J.G. Dai)

## **Proximal Policy Optimization for Routing in Queueing Networks: Inpatient Overflow Management** (with J. Sun, J.G. Dai, P. Shi)

### **PRESENTATIONS**

#### **Queueing Network Controls via Deep Reinforcement Learning**

Oct 2021           INFORMS Annual Meeting, Virtual

Oct 2021           Cornell ORIE Young Researchers Workshop (poster presentation)

Nov 2020           INFORMS Annual Meeting, Virtual

June 2019          Workshop on Data Analytics in Healthcare and Service (poster presenter), Shenzhen, China

#### **Refined Policy Improvement Bounds for MDPs**

July 2021           ICML, Workshop on Reinforcement Learning Theory (poster presenter)

#### **Scalable Deep Reinforcement Learning for Ride-Hailing**

May 2021           American Control Conference, Virtual

#### **Optimizing Adaptive Cancer Therapy: Dynamic Programming and Evolutionary Game Theory**

May 2020           Scientific Computing and Numerics (SCAN) seminar, CSE Cornell, Ithaca, NY

Nov 2017           Dynamical Systems Seminar, Math Cornell, Ithaca, NY

#### **Long-time Behavior of Weak Solutions for Classes of Reaction-Diffusion Equations**

April 2015          The 3rd International Conference on Nonlinear Analysis and Applications, Kyiv, Ukraine

### **INDUSTRY EXPERIENCE**

Summer 2021      **General Motors**, The Chief Data & Analytics Office

Remote            *Research Intern*

Implemented a deep learning model that does price recommendations. The algorithm integrated a discrete choice model simulation, anomaly detection, and artificial neural network learning.

Summer 2017      **Argonne National Lab**, Vehicle & Mobility Systems Group

Lemont, IL        *Research Intern*

Developed a prediction algorithm of vehicle energy consumption based on time series data of the vehicle velocity. The algorithm integrated a time series decomposition method, Fourier transform, and artificial neural network learning.

### **TEACHING EXPERIENCE**

#### **CORNELL UNIVERSITY**

Fall 2021           **TA**, ORIE 4130: *Service Systems Modeling and Design* (21 students)

Graded the assignments and held office hours

Spring 2021       **Head TA**, MATH 2930: *Differential Equations for Engineers* (305 students)

Coordinated TA responsibilities of 5 PhDs, supported professors in course administration

Spring 2020       **TA**, MATH 2930: *Differential Equations for Engineers* (46 students)

Taught weekly discussion sections, designed worksheets and in-class activities

Spring 2018       **Grader**, MATH 4740: *Stochastic Processes* (40 students)

Graded the assignments and held office hours

Fall 2017           **Grader**, ORIE 6590: *Approximate Dynamic Programming* (21 students)

Graded the assignments and held office hours

### **RESEARCH MENTORING FOR UNDERGRADUATES**

- Jingjing Sun, Fall 2020 – present  
Research topic: *Proximal Policy Optimization for Routing in Queueing Networks: Inpatient Overflow Management*; co-advised with Professors J.G. Dai and P. Shi (Jingjing is currently pursuing her Ph.D. degree at CUHK-Shenzhen).
- Archer Luo, Summer 2021  
Research topic: *Processing network controls via DQN methods*; co-advised with Professor Dai.

- Vicki Meng, Summer 2021  
Research topic: *Advantage and value functions estimation*; co-advised with Professor Dai.

## HONORS & AWARDS

### **Best Student Paper Prize Finalist, INFORMS Applied Probability Society, 2021**

- The award recognizes outstanding papers in the field of applied probability written by a PhD student.
- Paper "Queueing Network Controls via Deep Reinforcement Learning" was selected as one of four finalists, out of over 80 submissions. The winner will be defined at the INFORMS meeting on Oct 25, 2021.

### **General Motors Intern Recognition, 2021**

- The award recognizes an intern whose work had a significant impact on business operations.

### **Cornell Graduate School Fellowship, 2016-2017**

- One academic year of funding, awarded to approx. 20% of considered PhD students.

### **Media Attention to Research:**

- *Game theory suggests more efficient cancer therapy* by David Nutt, Cornell Chronicle, 2020.

## PROFESSIONAL SERVICE

Referee: Stochastic Systems, Mathematics of Operations Research

## TECHNICAL SKILLS

**Programming languages:** • Python (advanced) • SQL, C/C++, Java (familiar via coursework).

**Machine Learning:** • TensorFlow, NumPy (advanced) • PyTorch, SciKit-Learn (some project experience).

**Distributed Computing:** • Ray (some project experience) • Spark (little project experience).

**Mathematical Software:** • MATLAB (advanced) • Gurobi (little project experience).

**Technical Workflow:** • LATEX (advanced) • Git, Unix shell (some project experience).