# Aneri Muni

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Website: amuni3.github.io


## Education

**University of Montreal (UdeM) / Mila** — May, 2022 - Present
Ph.D. Computer Science
*Advisor:* Dr. Pierre-Luc Bacon

**ETH Zurich (Eidgenössische Technische Hochschule)** — 2018 - 2021
MSc. Robotics, Systems and Control
*Advisor:* Prof. Dr. Andreas Krause
*Thesis:* Safe Learning-based Control in High-dimensional Spaces

**Georgia Institute of Technology** — 2013 - 2018
BSc. Electrical Engineering, Minor in Robotics, Co-op Rotation
Graduated with Highest Honors
*Thesis:* 3D Reconstruction of Live Chickens in Poultry Houses

## Academic Research

**Mila Research Institute** | Advisor: Dr. Pierre-Luc Bacon — Feb. 2021 - August 2021
Visiting Student Researcher

- Proposed algorithms to design synthetic antimicrobial peptides in high-dimensional molecular spaces using Meta Reinforcement Learning and Bayesian Optimization.

**ETH Zurich** | Advisor: Prof. Dr. Andreas Krause — April 2020 - Jan. 2021
*Safe Learning-Based Control in High-dimensional Spaces*

- Implemented safe Bayesian optimization algorithm with Sim2Real approach for position control of quadrotors.
- Employed genetic algorithms to identify controllers that efficiently trade-off safety and performance.

**ETH Zurich** | Advisor: Prof. Dr. Melanie Zeilinger — Sept. 2019 - Jan. 2020
*Safe Model-Based Reinforcement Learning*

- Performed sample efficient learning using Thompson sampling and open-loop Model Predictive Control.
- Augmented model-based Reinforcement Learning with Scenario-based Optimization arguments to obtain safety-certified algorithms.

**Georgia Institute of Technology** | Advisor: Dr. Fumin Zhang — May 2015 - April 2016
*GT-MAB: Miniature Autonomous Blimps*

- Performed system identification and developed PID controllers to control 3D motion of a robotic helium blimp.
- **Nano Blimp:** developed hardware and software for communication protocol for smaller version of blimp.

## Industry Experience

**NNAISENSE, Lugano** — October 2021 - April 2022
Research Intern

- Proposed transfer-learning approach to enable fast and efficient adaptation of Recurrent Neural Network models of dynamical systems.
- Designed Lyapunov-based safety certificates for formal verification of model-based Reinforcement Learning algorithms.

**Georgia Tech Research Institute** — Fall 2015, Spring 2016, Summer 2017
Co-op Intern: Robotics and Image Processing

- Implemented and deployed path-planning algorithms in Python (ROS framework) for an agricultural ground robot to autonomously navigate poultry houses.
- Collaborated with poultry scientist to develop novel obstacle (chicken) avoidance routines using computer vision and 3D point cloud data from XBox Kinect.
- Designed Windows GUIs in C# to run a pedestrian tracking software and identify ideal road-crossing locations for the Georgia Department of Transport.

## Journal Paper

**On the adaptation of recurrent neural networks for system identification.**
*Automatica*, Volume 155, ISSN: 0005-1098. doi.org/10.1016/j.automatica.2023.111092. 2023.
M. Forgione, **A. Muni**, D. Piga, M. Gallieri.

## Conference Papers

**Designing Biological Sequences via Meta-Reinforcement Learning and Bayesian Optimization.**
*NeurIPS Workshop on Machine Learning in Structural Biology.* 2022.
L. Feng, P. Nouri, **A. Muni**, Y. Bengio, P. Bacon.

**Autopilot Design for a class of Miniature Autonomous Blimps.**
*IEEE Conference on Control Technology and Applications. Pages:841-846.* 2017.
S. Cho, V. Mishra, Q. Tao, P. Varnell, M. King-Smith, **A. Muni**, W. Smallwood, F. Zhang.

**Robotics for Poultry House Management.**
*ASABE Annual International Meeting. 1701103.(doi:10.13031/aim.201701103).* 2017.
C. T Usher, W. D Daley, B. P Joffe and **A. Muni**.

**Control Theory – Autonomous Blimp.**
*IEEE Control Systems Society Video Contest. Available Online: YouTube video.* 2015.
Q. Tao, M. King-Smith, **A.D. Muni**, V. Mishra, S. Cho, J.P. Varnell, F. Zhang.

## Talks

**Opening the Black Box: High-dimensional Safe Policy Search via Sim-to-Real.**
$16^{th}$ *Workshop for Women in Machine Learning (WiML), NeurIPS 2021.*
**A. Muni**, M. Turchetta, A. Krause.

**Learning-Based Control for Constrained Systems using Thompson Sampling and Scenario Optimization.**
*Machine Learning Summer School (MLSS), Tübingen. 2020.* Available: YouTube video.
**A. Muni**, K. Wabersich, M. Zeilinger.

**3D Reconstruction of Live Chickens in Poultry Houses.**
$13^{th}$ *Annual Undergraduate Research Spring Symposium, Georgia Tech. 2018.*
**A. Muni** and Colin Usher.

## Honors and Awards

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| Women in AI - Excellence Scholarship, Mila | 2022-2025 |
| Navigation Challenge Winner, Montreal Robotics Summer School | 2022 |
| Kyunghyun Cho Diversity Award, Mila | 2022 |
| UdeM/Mila PhD Tuition Exemption for International Students | 2022 |
| NeurIPS Travel Grant, WiML Workshop | 2021 |
| Best Oral Presentation, $3^{rd}$ position, Undergraduate Research Symposium | Spring 2018 |
| Best Overall Design Award, *MLH MakeHarvard* Hackathon | Spring 2018 |
| 3x President's Undergraduate Research Award | 2018, 2016, 2015 |
| ThinkSwiss Research Scholarship | Summer 2017 |
| James G. and Mary G. Wohlford Co-op Scholarship | Spring 2017 |
| IEEE Control System Society Video Contest, $3^{rd}$ position | Summer 2015 |

## Teaching Experience

**Teaching Assistant for Differential Equations** — Jan. 2016 – May 2016
*Georgia Tech School of Mathematics*

**Peer Tutor for Differential Equation** — Sept. 2014 – Sept. 2015
*Georgia Tech Center for Academic Success*

## Diversity, Equity and Inclusion

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| Co-founder,Women@Mila Meetups | 2023 |
| Organizing team member, Montreal Robotics Summer School | 2023, 2022 |
| Lead mentor and organizing team member, Women in AI & Robotics Hackathon | 2022 |
| Undergraduate Research Ambassador, Georgia Tech | 2017 - 2018 |
| Communications Chair, Women in Electrical & Computer Engineering Club | 2015 - 2018 |

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| Leadership and Service | Reviewer: ICML, Decision Awareness in Reinforcement Learning Workshop | 2022 |
| | Panelist: "Designer Farms", Wharton Agribusiness & Food Security Club, UPenn | 2020 |
| | School of Electrical and Computer Engineering Ambassador, Georgia Tech | 2014 - 2015 |
| | Volunteer tutor for underprivileged students from K-5$^{\text{th}}$ grade in Atlanta | 2013 - 2014 |
| Seminars and Summer Schools | Deep Learning and Reinforcement Learning (DLRL) Summer School, Montreal | July 2023 |
| | Montreal Robotics Summer School, Mila | August 2022 |
| | AGI Safety Fundamentals Program, Effective Altruism Cambridge | Spring 2022 |
| | Machine Learning Summer School (MLSS), Tübingen | July 2020 |
| | ETH Robotics Summer School: "*Real World, Real Environments*" | July 2019 |