

Aneri Muni

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EDUCATION

ETH Zurich (Eidgenössische Technische Hochschule)

Zurich, Switzerland

MSc. Robotics, Systems and Control

August 2021

- *Thesis:* Safe learning-based control in high-dimensional spaces
- Machine Learning Summer School (MLSS), Tübingen
- Robotics Summer School: 'Real World, Real Environments'

July 2020

July 2019

Georgia Institute of Technology

Atlanta, Georgia

BSc. Electrical Engineering, Minor in Robotics

May 2018

- *Thesis:* 3D Reconstruction of Live Chickens in Poultry Houses
- Graduated with Highest Honors

RESEARCH EXPERIENCE

Safe Learning-Based Control in High-dimensional Spaces

April 2020 – Jan. 2021

Advisor: Prof. Dr. Andreas Krause

ETH Zurich

- Implemented safe Bayesian optimization algorithm with sim-to-real approach for position control of quadrotors.
- Employed genetic algorithms to identify controllers that efficiently trade-off safety and performance.
- Proposed novel approach to generate new controllers to achieve desired performance and robustness properties.

Safe Model-Based Reinforcement Learning

Sept. 2019 – Jan. 2020

Advisor: Prof. Dr. Melanie Zeilinger

ETH Zurich

- Performed sample efficient learning based on Thompson sampling with open-loop Model Predictive Control.
- Augmented Model-based RL with Scenario-based Optimization arguments to obtain safety-certified algorithms.

Planning under Uncertainty

Sept. 2018 – Nov. 2018

Advisor: Dr. Andrea Censi

ETH Zurich

- Worked under *Duckietown* project with Duckiebot, a robotics outreach and educational platform.
- Implemented a path planner and velocity profiler while taking into account various sources of uncertainty.
- Ensured safety by incorporating a probabilistic model that anticipates obstacles in unobserved regions.

GT-MAB: Miniature Autonomous Blimps

May 2015 – April 2016

Advisor: Dr. Fumin Zhang

Georgia Tech

- Performed system identification and developed PID controllers to control 3D motion of a robotic helium blimp.
- Acquired light intensity data to map air current flow patterns.
- **Nano Blimp:** developed hardware and software for communication protocol for smaller version of blimp.

WORK EXPERIENCE

Research Intern

October 2021 – Present

NNAISENSE

Lugano

- Formal verification of model-based reinforcement learning algorithms.
- Desinging safety filters using Lyapunov functions and Barrier certificates.

Visiting Student Researcher

Feb. 2021 – August 2021

MILA AI Institute, Quebec, Advisor: Dr. Pierre-Luc Bacon

University of Montreal

- Synthesizing antimicrobial peptides in high-dimensional chemical spaces using meta and reinforcement learning.

Teaching Assistant for Differential Equations

Jan. 2016 – May 2016

School of Mathematics

Georgia Tech

- Tutored a class of 30 students by holding recitations twice a week.
- Held office hours, solved difficulties, and graded exams and homework.

Co-op intern: Robotics and Image Processing

August 2015 – May 2017

Georgia Tech Research Institute, Advisor: Colin Usher

Georgia Tech

- Implemented path-planning algorithms for an agricultural ground robot to autonomously navigate poultry houses.
- Worked with poultry scientist to develop novel obstacle (chicken) avoidance routine using point cloud data.
- Developed 3D reconstruction methods to estimate weight distribution in farms based on volume of chicken scans.
- Designed user friendly Windows GUIs in C# to run a pedestrian tracking software.
- Processed data and accessed results for Georgia Department of Transport using MySQL.

NOTABLE ACHIEVEMENTS

- Best Oral Presentation, 3rd position, Undergraduate Research Symposium Spring 2018
- Best Overall Design Award, *MLH MakeHarvard* Hackathon Spring 2018
- President's Undergraduate Research Award Spring 2018, Spring 2016, Summer 2015
- ThinkSwiss Research Scholarship Summer 2017
- James G. and Mary G. Wohlford Co-op Scholarship Spring 2017
- IEEE Control System Society Video Contest, 3rd position Summer 2015
- Faculty Honors, Dean's List (all semesters) Spring 2018, Fall 2017, Summer 2015
- National Academy of Fine Arts, Government of India, Young Artist Exhibit Grant 2019 - 2020
- Center for Cultural Resources and Training, India, Cultural Talent in Painting Scholarship 2005 - 2011

POSTER/PRESENTATIONS

- **A. Muni**, M. Turchetta, A. Krause, *Opening the Black Box: High-dimensional Safe Policy Search via Sim-to-Real*. 16th Workshop for Women in Machine Learning (WiML), NeurIPS 2021.
- **A. Muni**, K. Wabersich, M. Zeilinger, *Learning-Based Control for Constrained Systems using Thompson Sampling and Scenario Optimization*. 2020 Machine Learning Summer School (MLSS), Tübingen. Available: [YouTube video](#).
- **A. Muni** and Colin Usher, *3D Reconstruction of Live Chickens in Poultry Houses*. 13th Annual Undergraduate Research Spring Symposium, 2018. Georgia Institute of Technology. Awarded: 3rd Best Oral Presentation.

PUBLICATIONS

- M. Forgione, **A. Muni**, D. Piga, M. Gallieri. *On the adaptation of recurrent neural networks for system identification*. 2022. arXiv:2201.08660. *Under Review*: Automatica. (Available at: <https://arxiv.org/abs/2201.08660>).
- L. Feng, P. Nouri, **A. Muni**, Y. Bengio, P. Bacon. *Designing Biological Sequences via Meta-Reinforcement Learning and Bayesian Optimization* 2022. *Under Review*: 39th International Conference on Machine Learning (ICML).
- S. Cho, V. Mishra, Q. Tao, P. Varnell, M. King-Smith, **A. Muni**, W. Smallwood, F. Zhang. *Autopilot Design for a Class of Miniature Autonomous Blimps*. 2017 IEEE Conference on Control Technology and Applications. Pages:841-846.
- C. T Usher, W. D Daley, B. P Joffe and **A. Muni**. Robotics for Poultry House Management. 2017 ASABE Annual International Meeting. 1701103.(doi:10.13031/aim.201701103).
- Q. Tao, M. King-Smith, **A.D. Muni**, V. Mishra, S. Cho, J.P. Varnell, F. Zhang, *Control Theory – Autonomous Blimp*. 2015 [Online]. Available: [YouTube video](#).

SELECTED PROJECTS

- Project Hydra** | *Underwater Robotic Swarm* Nov. 2017 – May 2018
 - Designed hardware and software for 3 AUVs and implemented decentralized consensus algorithm for the swarm.
 - Each 'HydraBot' has 2D motion capability, transmits and receives data through infrared communication.
 - Given specific colors, each agent uses neighbouring bots to calibrate its location.
 - Presented this project during Senior Design Expo at Georgia Tech.
- BlindEyes** | *MLH MakeHarvard Hack-a-thon Project* Feb 2018
 - Designed a navigational tool for the visually impaired that provides haptic feedback to avoid obstacles.
 - Auditory feedback describing the scene around the user using Google Vision.
 - In 24 hours integrated sonars, lidars, haptic feedback motors, EMIC2 with Embed and a Raspberry Pi 3 camera.
 - Awarded the Best Overall Prize at hardware hackathon, among 37 teams, for our innovative design.

LEADERSHIP

- Undergraduate Research Ambassador August 2017 – August 2018
- Women in ECE Club (Electrical and Computer Engineering) Jan. 2015 – August 2018
 - Newsletter Chair, Publicity Chair
- School of Electrical and Computer Engineering Ambassador August 2014 – May 2015
- Peer Tutor for Differential Equation, Georgia Tech Center for Academic Success August 2014 – May 2015
- Volunteered as a tutor for underprivileged students from K-5th grade in Atlanta August 2013 – May 2014