Marco Bornstein

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WORK EXPERIENCE

Applied Machine Learning Scientist | APQX 2022 – PRESENT
Large-Scale Training of Neural-Operator Networks

- Constructing efficient and scalable ML algorithms for physical applications
- Building large-scale distributed training architectures

Professor | Goucher College Prison Education Partnership 2025 – PRESENT
College Math and Statistics Lecturer

- Teaching math to students in Maryland Correctional Institution – Jessup

Graduate Assistant | Huang Research Group 2020 – 2025
Mechanism Design, Federated Learning (FL), Asynchrony, & Compression

- Building mechanisms to regulate AI models, ensure FL agent truthfulness, and incentivize FL participation & performance
- Constructing memory- and computational-efficient distributed algorithms via asynchronous and compression methods

Doctoral Internship | Pacific Northwest National Lab 2022 – 2023
Distributed Algorithms for Micro-grid Applications

- Researched edge-computing algorithms with applications to inverter-based micro-grids with high renewable penetration
- Constructed a model-agnostic distributed algorithm so edge devices can collaboratively train irrespective of cost or memory constraints

TEACHING EXPERIENCE

2025 **Introduction to Statistical Methods**, *Goucher College*
2025 **Introduction to MATLAB**, *University of Maryland*
2019-2020 **Calculus I**, *University of Maryland*
2025-PRESENT **Varsity Tennis Coach**, *Perry Hall High School*

EDUCATION

2019 – 2025 **Doctor of Philosophy**
Applied Mathematics
University of Maryland
GPA: 3.95/4.00

2019 – 2021 **Master of Science**
Applied Mathematics
University of Maryland
GPA: 3.95/4.00

2015 – 2019 **Bachelor of Science**
Mechanical Engineering
Bachelor of Arts
Comp. & Applied Mathematics
Rice University
GPA: 3.77/4.00

AWARDS

2024 **Hauptman Fellowship**
University of Maryland

2019-2020 **Aziz-Osborn Gold Medal in Teaching Excellence**
University of Maryland

2019 **Best Energy-Related Design**
Rice University Design Showcase

2017 **NSF Travel Grant Scholarship**
34th QPRC Conference

2017 **Best Poster and Presentation**
7th Eubank Conference

PROGRAMMING SKILLS

Python, PyTorch, TensorFlow, MATLAB

SELECT PUBLICATIONS

M. Bornstein, A.Bedi, A. Mohamed, & F. Huang. "FACT or Fiction: Can Truthful Mechanisms Eliminate Federated Free Riding?". *Neural Information Processing Systems*, 2024.

M. Bornstein, N. Nazir, J. Drgona, S. Kundu, & V. Adetola. "Finding MIDDLE Ground: Scalable and Secure Distributed Learning". *Conference on Information and Knowledge Management*, 2024.

M. Bornstein, T. Rabbani, E. Wang, A. Bedi, & F. Huang. "SWIFT: Rapid Decentralized Federated Learning via Wait-Free Model Communication". *International Conference on Learning Representations*, 2023.

M. Bornstein*, T. Rabbani*, & F. Huang. "Large-Scale Distributed Learning via Private On-Device LSH". *Neural Information Processing Systems*, 2023.

M. Bornstein, T. Tullius, & Y. Bayazitoglu. "Optimal nanoparticles for heat absorption and cost." *International Journal of Heat and Mass Transfer*, 2019.

`Workshops:`

M. Bornstein*, T. Rabbani*, M. Ding, & F. Huang. "Shrinking the Size of Extreme Multi-Label Classification". *NeurIPS Workshop on Machine Learning and Compression*, 2024.

M. Bornstein, A. Bedi, A. Sahu, & F. Huang. "RealFM: A Realistic Mechanism to Incentivize Data Contribution and Device Participation". *NeurIPS Federated Learning Workshop*, 2023.

`Under Submission:`

M. Bornstein, Z. Che, S. Julapalli, A.Bedi, A. Mohamed, & F. Huang. "Auction-Based Regulation for Artificial Intelligence".