

# Pratik Rathore — US Citizen

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## Education

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<b>Stanford University</b> <i>PhD Candidate in Electrical Engineering</i> <i>Advisor: Madeleine Udell</i>	<b>Stanford, CA</b> 9/2021-Present
<b>University of Maryland</b> <i>B.S. in Electrical Engineering, summa cum laude</i>	<b>College Park, MD</b> 8/2017-5/2021
<b>University of Maryland</b> <i>B.S. in Mathematics, summa cum laude</i>	<b>College Park, MD</b> 8/2017-5/2021

## Research & Industry Experiences

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<b>Stanford University</b> <i>Graduate Researcher</i> <i>Department of Management Science &amp; Engineering</i>	<b>Stanford, CA</b> 7/2022-Present
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- Investigating approaches for improving optimization of physics-informed neural networks
- Developing efficient preconditioned stochastic gradient methods for solving large-scale problems in machine learning

<b>Stanford University</b> <i>Graduate Researcher</i> <i>Autonomous Systems Laboratory</i>	<b>Stanford, CA</b> 9/2021-12/2021, 3/2022-6/2022
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- Developed a quantum computing-based algorithm to solve mixed-integer quadratic programs (MIQPs)
- Applied matrix sketching techniques to improve scalability of semidefinite programming-based neural network verification

<b>STR</b> <i>Electrical Engineering Intern</i> <i>Prototype Systems &amp; Technology Group</i>	<b>Arlington, VA</b> 5/2020-8/2021
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- Aided in the development of an object-oriented environment for radar I/Q simulation, and modeled sub-banded adaptive beamforming in phased arrays
- Contributed to data generation for a deep learning-based platform that performs automatic target recognition on maritime ISAR images
- Worked on a US Department of Defense funded SBIR research project focused on improving Inverse Synthetic Aperture Radar (ISAR) signal processing to enhance ISAR image quality

<b>Lockheed Martin Space</b> <i>Electrical Engineering Intern</i> <i>Military Support Programs</i>	<b>Littleton, CO</b> 5/2019-8/2019
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- Led reviews for computational models (frequency sweep generator, solar array controller, attitude determination with Kalman filter) being developed for satellites in MATLAB/Simulink

- Developed test cases, added new functionality, and improved upon existing documentation in MATLAB/Simulink for these computational models
- Presented model walkthroughs and review suggestions to colleagues during meetings

## University of Maryland

Undergraduate Researcher  
Department of Mathematics

College Park, MD

5/2018-8/2018

- Investigated Descartes numbers, a family of odd spoof perfect numbers
- Proved new results regarding the prime factorizations of Descartes numbers
- Developed and submitted a research manuscript containing the proofs of these results to [arXiv](#)

## Papers

In the pipeline.....

P. Rathore, W. Lei, Z. Frangella, L. Lu, and M. Udell. *Challenges in Training PINNs: A Loss Landscape Perspective* (2024), arxiv:2402.01868, submitted

Z. Frangella\*, **P. Rathore\***, S. Zhao, and M. Udell. *PROMISE: Preconditioned Stochastic Optimization Methods by Incorporating Scalable Curvature Estimates* (2023), arxiv:2309.02014, submitted to JMLR

Z. Frangella, **P. Rathore**, S. Zhao, and M. Udell. *SketchySGD: Reliable Stochastic Optimization via Randomized Curvature Estimates* (2022), arxiv:2211.08597, in revision at SIMODS

Miscellaneous.....

**P. Rathore.** *There are no Cube-free Descartes Numbers with Exactly Seven Distinct Prime Factors* (2018), arxiv:1808.10027

## Honors & Awards

Banneker-Key Scholar – a full merit scholarship awarded to top 1% of undergraduates	2017-2021
Dean's List – A. James Clark School of Engineering	2017-2021
Dean's List – College of Computer, Mathematical, & Natural Sciences	2018-2021
Honors College, University Honors, University of Maryland	2017-2021
University of Maryland Department of Mathematics High Honors Medal	5/2021
NSF GRFP Honorable Mention	3/2021
University of Maryland Department of Electrical and Computer Engineering Chair's Award	3/2021
International Mathematics Competition for University Students, Second Prize	7/2020
Putnam Math Competition, Ranked in Top 5% of 4200+ Participants	2/2020
Member of UMD Putnam Team, 14 <sup>th</sup> place team in the nation	2/2020
University of Maryland Dan Shanks Award for research in number theory	4/2019
Putnam Math Competition, Ranked in Top 3% of 4600+ Participants	3/2019
Member of UMD Putnam Team, 9 <sup>th</sup> place team in the nation	3/2019
Virginia Tech Regional Math Contest, Ranked 15 <sup>th</sup> out of 739 participants	10/2017
United States of America Mathematical Olympiad (USAMO) Qualifier	5/2017

## Skills

### Programming Languages & Frameworks

\* denotes equal contribution.

- *Proficient*: Python, NumPy, MATLAB,  $\LaTeX$
- *Familiar*: PyTorch, C/C++, Julia, Java, R, Simulink

## Teaching Experiences

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<b>CME307: Optimization</b> <i>Course Assistant</i>	<b>Stanford University</b> <i>1/2024-Present</i>
<b>EE364B: Convex Optimization II</b> <i>Course Assistant</i>	<b>Stanford University</b> <i>4/2023-6/2023</i>
<b>ENEE150: Intermediate Programming Concepts for Engineers</b> <i>Undergraduate Teaching Fellow</i>	<b>University of Maryland</b> <i>1/2021-5/2021</i>

## Relevant Courses

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Machine Learning, Machine Learning for Sequence Modeling, Reinforcement Learning, Convex Optimization, Theory of Statistics, Numerical Linear Algebra, Parallel Computing

## Leadership/Extracurricular Activities

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Peer Mentor, University Honors, University of Maryland	<i>9/2020-12/2022</i>
Puzzle Writer, University of Maryland Puzzle Club	<i>9/2017-9/2020</i>
Captain, Montgomery Blair Math Team	<i>8/2016-6/2017</i>
Coach, Robert Frost Middle School MathCounts Team	<i>12/2015-3/2017</i>