Pratik Rathore

US Citizen | Secret Clearance

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Education

9/2021 – Present **Graduate Student in Electrical Engineering**, *Stanford University*, Stanford, CA.

8/2017 – 5/2021 **B.S. in Electrical Engineering**, *University of Maryland*, College Park, MD, *summa cum laude*.

8/2017 – 5/2021 **B.S. in Mathematics**, *University of Maryland*, College Park, MD, *summa cum laude*.

Research & Industry Experiences

5/2020 – 8/2021 **Electrical Engineering Intern**, *Systems & Technology Research*, Arlington, VA.
Prototype Systems & Technology Group

Project 3 Aided in the development of an object-oriented environment for radar I/Q simulation, and modeled sub-banded adaptive beamforming in phased arrays.

- Created and tested object-oriented models of antennas for radar I/Q simulation in MATLAB
- Developed bistatic radar simulations using object-oriented I/Q simulation
- Simulated and compared sub-banded and non-sub-banded adaptive beamforming in phased arrays

Project 2 Contributed to data generation for a deep learning-based platform that performs automatic target recognition on maritime ISAR images.

- Developed an algorithm that provides a time series of roll and pitch angles given a CAD model of a ship
- Designing algorithms to automatically extract ship features (e.g. dimensions, moments of inertia, damping coefficients) from CAD models
- Continued summer internship project towards developing improved radar image processing algorithms

Project 1 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.

- Implemented Kalman filtering to develop a tracking algorithm for estimating target motion in MATLAB
- Designed a MATLAB simulation using quaternion theory to assess quality of Kalman filter motion estimates
- Developed image processing algorithms in MATLAB to use target motion estimates to form a high-resolution, rotational motion compensated image
- Contributed to project technical report and presented results at group meetings

5/2019 **Electrical Engineering Intern**, *Lockheed Martin Space*, Littleton, CO.
8/2019 *Military Support Programs*

- Led reviews for computational models (frequency sweep generator, solar array controller, attitude determination with Kalman filter) being developed for satellites in MATLAB/Simulink
- Developed, edited, and documented test cases in MATLAB for these models
- Used Simulink to add new functionality and improve upon the existing documentation for these models
- Presented model walkthroughs and review suggestions to colleagues during meetings

5/2018 **Undergraduate Researcher**, *University of Maryland*, College Park, MD.
8/2018 *Department of Mathematics*

- 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

6/2016 **Student Research Intern**, *Uniformed Services University of the Health Sciences*,
8/2016 Bethesda, MD.
Collaborative Health Initiative Research Program

- Analyzed induced pluripotent stem cells (iPSCs) using single-cell transcriptomics technologies
- Attempted to determine optimal parameters for single-cell transcriptomics runs
- Designed code in R to apply k-means clustering, principal component analysis (PCA), and t-distributed stochastic neighbor embedding (t-SNE) to single-cell RNA data

Honors & Awards

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

5/2017 United States of America Mathematical Olympiad (USAMO) Qualifier

3/2016 United States of America Biology Olympiad (USABO) Semifinalist

6/2015 Program in Mathematics for Young Scientists (PROMYS)

Publications

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

Teaching Experiences

1/2021 – 5/2021 **Undergraduate Teaching Fellow**, ENEE150: Intermediate Programming Concepts for Engineers, University of Maryland.

- Presented on programming concepts and class assignments during weekly discussion sections
- Held office hours two times per week to help students with programming assignments
- Graded exams, projects, and homework submitted by students

Relevant Courses

Electrical Engineering Discrete Signal Analysis, Signal & System Theory, Communication Systems, Control Systems (course + lab), Machine Learning, Embedded Software Design, Device Physics, Analog and Digital Electronics (course + lab)

Mathematics Linear Algebra, Real Analysis, Statistics, Probability Theory, Applied Harmonic Analysis, Partial Differential Equations, Abstract Algebra, Numerical Analysis, Combinatorics & Graph Theory, Field Theory, Number Theory

Coursera Machine Learning (Stanford University), Game Theory (Stanford University & The University of British Columbia)

Leadership/Extracurricular Activities

9/2020 – Present Peer Mentor, University Honors, University of Maryland

9/2017 – 9/2020 Puzzle Writer, University of Maryland Puzzle Club

8/2016 – 6/2017 Captain, Montgomery Blair Math Team

12/2015 – 3/2017 Coach, Robert Frost Middle School MathCounts Team

Skills

Programming Languages Java, C, Python, C++, MATLAB, R, Arduino, LaTeX, Verilog

Modeling Envirs. Simulink, Mathematica, Xilinx