

Varshini Subhash

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EDUCATION

Harvard University

M.E in Computational Science and Engineering, GPA: 4.0/4.0

Cambridge, Massachusetts

2021 - 2023 (Expected)

Manipal Institute of Technology

B.Tech in Mechanical Engineering, CGPA: 9.09/10.0

Manipal, India

Aug 2014 - July 2018

RESEARCH PUBLICATIONS

- **Varshini Subhash**, Karan Pandey, Vijay Natarajan, “GPU Parallel Computation of Morse-Smale Complexes”, *Short Paper Proceedings, IEEE VIS Conference 2020*. [IEEE Xplore]
(Full-length journal paper provisionally accepted to *IEEE Transactions on Visualization and Computer Graphics*)
- Abhijath Ande, **Varshini Subhash**, Vijay Natarajan, “Scalable Computation of Extremum Graphs”, (*In Preparation*)

RELEVANT COURSEWORK AND SKILLS

- **Courses:** Introduction to Data Science (AC 209a), Advanced Scientific Computing: Numerical Methods (AM 205), Systems Development for Computational Science (AC 207), Ethics for Engineers - AI Track (MIT 6.9041).
- **Skills/Packages:** C++, Python, Parallel Computing, CUDA, cuSPARSE, Thrust, OpenMP, OpenCL, Data Structures and Algorithms, Data Science, Visualization, Machine Learning.

RESEARCH EXPERIENCE

Indian Institute of Science

Research Assistant

Advisor: Prof. Vijay Natarajan

Bangalore, India

June 2019 - August 2021

GPU Parallel Computation of Morse-Smale Complexes | [Project Page](#) | [Code](#)

- Designed the **first** fully GPU parallel algorithm for Morse-Smale complex computation on 3D scalar fields; improved upon state-of-the-art by up to **8.6x**. Devised novel graph traversal algorithms for saddle reachability and path counting, with speedups up to **577.7x** and **5.4x** each.
- Accepted for **publication** and **presentation** at the IEEE VIS 2020 Conference. Presented at Women in High Performance Computing Lightning Talks 2021, ACM ARCS Symposium 2021 & Bangalore VIS Workshop 2020.

Indian Institute of Science

Research Assistant & Research Intern

Advisor: Prof. Ramsharan Rangarajan

Bangalore, India

Jan 2018 - February 2019

Parallel Performance in Mesh Optimization | [Project Page](#)

- Improved the performance and scalability of a parallel mesh optimization algorithm DVR – reduced mesh optimization time by **47.4%**, enabled **100%** scalability with a **40x** speedup for mesh sizes as large as **14 million**.

Adaptive Mesh Refinement Using Quadrees | [Project Page](#) | [Code](#)

- Implemented the paper ‘Provably Good Mesh Generation’ by Bern et al. – developed open-source software for adaptive mesh refinement using quadrees. Improved obstacle problem accuracy by an **order of magnitude**.

Indian Institute of Technology

Research Intern

Advisor: Prof. Arindrajit Chowdhury

Mumbai, India

May 2017 - June 2017

Spray Ignition Setup for Combustion of Hypergolic Propellants | [Project Page](#)

- Developed a spray ignition setup for hypergolic propellant combustion in rocket propulsion – modeled and structurally analysed the combustion chamber using SolidWorks & ANSYS. Designed and validated a theoretical injector system.

WORK EXPERIENCE

Deloitte

Business Analyst

Led cloud deployment of Windchill configurations on client servers, performance tuning and part classification.

Automated previously manual part creation in Windchill which optimized manufacturing in HVAC. Recognized as a **top performer** among **100+** analysts during Deloitte’s Annual Talent Review.

Bangalore, India

Aug 2018 - June 2019

AWARDS & HONORS

- Recipient of the **Adobe Research Women-In-Technology Scholarship 2022** – awarded a cash prize of \$10000 for accomplishments in academics and research in Computer Science. 2022
- Accepted to a 3-month program as a **Google CS Research Mentorship Program Scholar** where students are matched with Google mentors and peers to support pursuit of Computer Science research pathways. 2021
- Recognized as a **top performer** among **100+** analysts during Deloitte's Annual Talent Review. 2019
- Ranked in the top **3%** among **270** students during junior year of Bachelor's. 2016–17
- Qualified for the quarter-finals of the All-India Tata Power Energy Q-Quiz. 2009

PROJECTS

- **Homelessness in the United States**
Predicted homelessness trends in the US by comparing multi-linear, polynomial & Lasso-linear regression, random forests and boosting models. Performed time-series forecasting to detect trends across all 50 states and compared top features & mean-squared errors. Obtained best predictive performance across 33 states from random forests and boosting.
- **Algorithmic Bias in Recidivism Risk-Assessment for Criminal Justice**
Predicted risk of recidivism in criminal justice using Lasso-regularized logistic regression on the COMPAS dataset. Detected biased predictions by computing false-positive rates for two models with and without race as a predictor. Determined classification thresholds for fairness using a tradeoff between false-positives, false-negatives and model accuracy.
- **End Gender-Based Violence** | *Project Page* | *BTB Feature* | *Podcast*
Detected a sharp rise in domestic violence in the US due to COVID-19 using interactive visualizations.
- **Fourier Transforms** | *Code* | *Project Page*
Computed and visualized Fourier Transforms (3Blue1Brown) for input signals and extracted constituent pure signals.

TEACHING EXPERIENCE

- **Teaching Fellow**, CS50 - Introduction to Computer Science (Fall 2021), by David Malan.

INVITED TALKS

- Women in High Performance Computing (WHPC) Lightning Talk at the Supercomputing Conference 2021.
- STEM Career Spotlight Speaker at Summit K2 High School, via SENDforC - UC Berkeley, 2021.
- ‘GPU Parallel Computation of Morse-Smale Complexes’, ACM ARCS Symposium 2021. [Slides] [Poster]
- Panelist, STEM For Her Fundraiser, Superposition Chapter - San Ramon, California, 2020. [YouTube]
- ‘GPU Parallel Computation of Morse-Smale Complexes’, IEEE VIS 2020 Conference. [Talk] [Preview]
- ‘GPU Parallel Computation of Morse-Smale Complexes’, Bangalore VIS Workshop 2020.

SOCIAL IMPACT

- **Vizathon 2021** | *Organizer* | [Webpage] | Visualization hackathon with ~400 registrations. May 2021
- **Humans of AI Podcast** | *Volunteer* | [Webpage] Jan 2021 - Sept 2021
- **She Belongs Podcast** | *Co-Founder & Co-Host* | [YouTube] [Spotify] [Medium] Sept 2020 - Present
Discusses gender inequity and why women belong at the table. Over 2.4k views on YouTube.
- **Coronavirus Visualization Team, Harvard University** | [Webpage] May 2020 - Aug 2021
Project Planning Co-Director | *Project Co-Lead* | *Community Manager*
- **Testbook** | *Educator* | Designed 500+ mock test questions for underprivileged students. Mar - Sept 2018