





# Apoorv Srivastava

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## Education

### Stanford University

PhD Candidate in Mechanical Engineering, Minor in Computational Math (ICME)

Sep 2021 – Dec 2025 (Expected)

GPA: 4.02/4.00

Master of Science (MS) in Mechanical Engineering, specialization in Automatic Controls

- Mentored by Prof. Daniel Tartakovsky and Prof. Eric Darve, TA (Numerical Methods), Mentor (PhD Mentorship Program)

### Indian Institute of Technology Bombay

Bachelor of Technology (with Honours) in Civil Engineering

Jul 2016 – May 2020

Class rank: 1st | GPA: 9.51/10

- Honors & Awards: Institute Silver Medal, Undergraduate Research Award, and Foundation for Excellence Scholarship

## Technical Skills and Coursework

**Coursework:** Deep Generative Models, Machine Learning, Convex Optimization, Statistics Theory, Parallel Programming, Stochastic Differential Equations, Fourier Transformation, Optimal & Learning-based Control, Robot Autonomy

**Languages/Parallel Computing:** Python, C/C++ , MATLAB, Julia, CUDA, MPI, OpenMP

**Frameworks & Tools:** PyTorch, Scikit-Learn, Keras, SciPy, Pandas, CVXPY, Gurobi, Git,  $\LaTeX$ , ROS2

## Experience

### Graduate Research Assistant – Stanford University, Stanford, CA

Sep 2021 – Present

#### • High-Dimensional Bayesian Estimation using Deep Probabilistic Models

- Developed deep probabilistic models to enhance Bayesian estimation in high-dimensional systems using particle filters.
- Enhanced efficiency of state estimation using particle filters by 3x in high-dimensional systems with noisy observations.

#### • Information Worth and Assimilation of Binary Data

- Formulated metrics to quantify identifiability in systems observed through binary data, improving system analysis accuracy.
- Designed optimization algorithms for state estimation using binary data, enabling predictions in non-linear systems.

#### • Denoising Diffusion Models for Learned Optimizers ([Project Report](#), [Git Repository](#))

- Implemented conditional Denoising Diffusion models to solve ill-conditioned inverse problems with many-to-one mapping.
- Developed a transformers-based model architecture to capture multiple possible 3D human pose from 2D key points.

### Graduate Student Researcher – Los Alamos National Lab, Los Alamos, NM

Jul 2023 – Sep 2023

- Investigated limitations of Bayesian filtering in systems of stiff differential equations, revealing critical failure points.
- Implemented adjoint model-based optimization techniques for efficient and accurate parameter estimation in stiff systems.

### Undergraduate Student Researcher – IMAC, EPFL, Lausanne, Switzerland

May 2019 – Jul 2019

- Designed iterative optimization schemes for real-time control of non-linear systems, enabling fast and accurate response.
- Validated the results against analytical solutions using the Karush-Kuhn-Tucker (KKT) optimality criterion.

## Relevant Projects

### Estimating Metabolite Dynamics in the Brain using in-situ Observations

Jan 2023 - Present

- Engineered a Bayesian framework for neural activity, enabling parameter estimation from in-situ experimental data.

### Feature-Informed Data Assimilation ([Research Paper](#), [Git Repository](#))

Apr 2022 - Jan 2023

- Innovated framework for state estimation with set-valued observations, enabling data assimilation using feature information.

### Optimal Control for Grid Balancing ([Project Report](#), [Git Repository](#))

Mar 2023 - Jun 2023

- Designed Model Predictive Control strategy for residential energy storage, improving grid stability with energy intermittency.

### Kinetic Defect for Hyperbolic Conservation Laws (Submitted)

Jan 2023 - Aug 2023

- Developed an algorithm to identify the Kinetic Entropy Defect measure, enabling shock position based data assimilation.

## Selected Publications

- A Srivastava, DM Tartakovsky, “Computable Kinetic Defect Measure for Hyperbolic Conservation Laws”, *Submitted*.
- A Srivastava, W Kang, DM Tartakovsky, “Feature-Informed Data Assimilation”, *Journal of Computational Physics*, 2023.
- RB Muhammad, A Srivastava, et al., “High-Precision Geosteering via Reinforcement Learning and Particle Filters”, *Submitted*.
- AP Reksowardojo, G Senatore, A Srivastava, et al., “Design and control of a prototype structure that adapts to loading through large shape changes”, *International Federation of Automatic Controls (IFAC)*, 2020.