Apoorv Srivastava

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Research Interests: Bayesian Estimation, Data Assimilation, Uncertainty Quantification

EDUCATION

Stanford University	*Sep 2021 - Present*
Ph.D. Candidate in Mechanical Engineering (pursuing a minor in CME)	*GPA 4.0/4.0*
Developing Bayesian estimation algorithms for non-linear systems.	

Stanford University	*Sep 2021 - Jun 2023*
Masters in Mechanical Engineering	*GPA 4.0/4.0*
Specialization in Automatic Controls and Optimization	

Indian Institute of Technology Bombay (IIT Bombay)	*Jul 2016 - May 2020*
Bachelor of Technology (with Honours) in Civil Engineering	*GPA 9.51/10*
First among 111 students in the Civil Engineering class	

PUBLICATIONS

1. A Srivastava, W Kang, DM Tartakovskty, "Feature-Informed Data Assimilation", Journal of Computational Physics, 2023. (paper)

2. AP Reksowardojo, G Senatore, A Srivastava, C Carroll, IFC Smith, "Design and testing of a low-energy and -carbon prototype structure that adapts to loading through shape morphing", International Journal of Solids and Structures 2022. (paper)

3. AP Reksowardojo, G Senatore, A Srivastava, IFC Smith, H Unterreiner, C Carroll, "Design and control of a prototype structure that adapts to loading through large shape changes", IFAC-PapersOnLine, 2020. (paper)

WORK EXPERIENCE

Los Alamos National Lab - *Graduate Student Researcher*   *Jul 2023 - Sep 2023*

– Investigation of parameter estimation challenges in stiff systems where conventional Kalman filter-based methods fall short. The study focused on a stiff cyclic Lotka-Volterra system and addressed the issue through optimization-based approaches.

IMAC, EPFL - *Undegraduate Student Researcher* [2, 3]   *May 2019 - Jul 2019*

– Design of control problem for adaptive structures that undergo shape changes in response to loads. Developed an iterative scheme for computing control inputs in real time.

TECHNICAL SKILLS AND COURSEWORK

Programming	Python, MATLAB, C++, Julia
Frameworks & Tools	Git, ROS2, SLURM, LaTeX, PyTorch, Scikit-Learn, Scipy, Numpy, Matplotlib
Courses	Convex Optimization, Statistical Inference, Linear Algebra, Fourier Transform, Numerical Methods, Finite Element Method, Machine Learning, Deep Generative Models, Optimal & learning based Control, Control Design Techniques, Robot Autonomy, Statistical Mechanics, Continuum Mechanics, Structural Dynamics, Economics

SELECTED RESEARCH PROJECTS

Feature-Informed Data Assimilation (FIDA)[1]	*Apr 2022 - Present*

Advisor(s): *Prof. Wei Kang, Prof. Daniel M. Tartakovsky*

– Investigation of state and parameter estimation problem under set-valued feature observations such as level curves, shock positions, and positions of local optima.

Inference of Neuroactivity using Nutrient Concentration *Jan 2023 - Present*
Advisor(s): *Dr. Franck Plouraboué, Prof. Daniel M. Tartakovsky*
 – Identification of parameterized neuroactivity with convection-diffusion-reaction based forward
   model and nutrient concentration as observations using Ensemble Kalman Filter (EnKF).

System Identification under Binary Observations *Oct 2023 - Present*
Advisor(s): *Prof. Wei Kang, Prof. Daniel M. Tartakovsky*
 – Study of system identifiability under binary observations using similarity between trajectories.

Kinetic Defect for Hyperbolic Conservation Laws *Jan 2023 - Present*
Advisor(s): *Prof. Daniel M. Tartakovsky*
 – Identification of the unknown Kinetic Entropy Defect measure present in the kinetic formula-
   tion of hyperbolic conservation laws using associated shock trajectories.

ACADEMIC PROJECTS

Diffusion Model for Learned Optimizers *Oct 2023 - Dec 2023*
Deep Generative Models | Prof. Stefano Ermon
 – Using conditional Denoising Diffusion Probabilistic Models (DDPMs) to study ill-conditioned
   inverse problems with one-to-many mappings.

Optimal Control for Grid Balancing *Mar 2023 - Jun 2023*
Optimal & Learning-based Control | Dr. Daniele Gammelli, Spencer M. Richards
 – Model Predictive Control (MPC) for minimizing demand variability and energy cost in a
   microgrid augmented with energy storage and solar power capturing subsystems.

ADDITIONAL PROJECTS

– Mechanical Metamaterials and Deployable Structures	*Aug 2018 - May 2020*
– Structural Optimization using Genetic Algorithm	*July 2017 - Aug 2018*
– Stress Analysis using Finite Element Method	*Jan 2019 - May 2019*
– Shape of the Strongest Column	*July 2018 - Nov 2018*
– Gaussian Processes for data-driven material modeling	*Sept 2021 - Dec 2021*
– Molecular dynamics-based study of CNT properties	*Jan 2021 - Mar 2021*

SCHOLASTIC ACHIEVEMENTS

– Awarded with Institute Silver Medal for academic excellence.	*IIT Bombay, 2020*
– Received the Undergraduate Research Award.	*IIT Bombay, 2020*
– Recipient of Swiss National Science Foundation (SNSF) scholarship.	*EPFL, 2019*
– Awarded with SC Mehrotra prize for highest GPA in the class.	*IIT Bombay, 2018*
– Recipient of Foundation for Excellence (FFE) Scholarship.	*IIT Bombay, 2018*

EXTRACURRICULAR INVOLVEMENTS

– Served as a reviewer for Computational Geosciences journal.	*2023*
– Mentor for the ME PhD peer mentorship program at Stanford University.	*2022-2023*
– Mentor for department academic mentorship program at IIT Bombay.	*2018-2020*
– Served as subsystems head and design engineer for Team Shunya.	*2017-2020*
– Represented India in Solar Decathlon China 2018 as part of Team Shunya.	*2018*
– Volunteered for Diabetes awareness camp attended by 500+ people.	*2017*