SAURABH PATIL

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Education

Carnegie Mellon University — Pittsburgh, PA
Master of Science in Mechanical Engineering; GPA: 3.95/4.0 — *Dec 2022*
Courses: Trustworthy AI Autonomy, Machine Learning, Deep Learning, Computer Vision.

Vellore Institute of Technology — Chennai, India
Bachelor of Technology in Mechanical Engineering; GPA: 9.13/10 — *June 2020*

Publications

- Li Zijie, **Patil, Saurabh**, and Amir Barati Farimani. "Latent Neural PDE Solver for Time-dependent Systems", Accepted at *NeurIPS 2023 AI4Science Workshop*.

- **Patil, Saurabh**, Li Zijie, and Amir Barati Farimani. "Hyena Neural Operator for Partial Differential Equations", *APL Machine Learning*, 2023

- **Patil, Saurabh**, Mollaei Parisa, and Amir Barati Farimani. "Forecasting COVID-19 New Cases Using Transformer Deep Learning Model", under review in *Expert Systems with Applications*, 2023

Work Experience

Mechanical and AI Lab — Pittsburgh, PA
Research Assistant — *January 2023 - January 2024*
- Developed a neural operator architecture to effectively solve partial differential equations, surpassing the performance of the state-of-the-art Fourier neural operator in 2D Navier-Stokes problems.
- Demonstrated significant improvements over the current state-of-the-art, achieving a remarkable 4.82 % enhancement in the most chaotic viscosity settings of Navier-Stokes data.

Mechanical and AI Lab — Pittsburgh, PA
Graduate Research Assistant — *May 2022 - Aug 2022*
- Developed conditional diffusion model to directly generate solutions to steady-state heat conduction solely based on observations, without prior knowledge of the governing equations.
- Demonstrated exceptional accuracy in model predictions, achieving high test accuracy with mean absolute error below 1% .

Raptee Energy — Chennai, India
CAD/CAE Intern — *Sept 2020 – Oct 2020*
- Utilized Solidworks to model a gearbox for an electric motorcycle, ensuring compliance with space constraints and loading conditions on gears.
- Performed structural analysis using ANSYS to validate the gearbox design and ensure its structural integrity.
- Successfully executed topology optimization on the gearbox casing, resulting in a remarkable 13 % reduction in weight, enhancing overall performance and efficiency.

Projects

Forecasting Covid-19 cases using a Transformer — *Sept 2022- Dec 2022*
- Developed a transformer model to forecast new COVID-19 cases in India, Russia, and Brazil, surpassing the performance of baseline models including CNN and LSTM.
- Achieved exceptional accuracy with a test mean absolute error of less than 0.2% for the three worst affected countries, demonstrating the model's robustness and precision in forecasting pandemic trends.

Adversarial Attacks Against Point Clouds — *Feb 2022 - May 2022*
- Successfully implemented adversarial attacks, including the Fast Gradient Sign method and Saliency Map attack, to evaluate the robustness of deep neural network (DNN) models.
- Assessed the performance of PointNet and DGCNN models for 3D object classification using the ModelNet40 dataset.

Tail Robot-AeroDIMA — *Feb 2022 - May 2022*
- Investigated the influence of aerodynamic tail versus inertial tail on the maneuverability of a mobile robot.
- Utilized Solidworks to design a CAD model and performed fluid simulations to develop an aerodynamic tail that maximized drag force, effectively enhancing the robot's stability during high-speed subsonic angular maneuvers.

Technical Skills

Programming Languages: Python, C++
Software: MATLAB, ANSYS, Solidworks
Libraries: Numpy, Pandas, Matplotlib, PyTorch, Tensorflow