Siva Viknesh Portfolio Website

Contact Information
Scientific Computing & Imaging Institute,
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Research Interests
Scientific Machine Learning, Computational Methods, Unsteady Aerodynamics, Wildfire Dynamics

Education

University of Utah, Salt Lake City, Utah, USA

Ph.D., Mechanical Engineering, **CPI: 3.88/4** 08/2022 – 05/2026 (Expected)

Advisor: Dr. Amirhossein Arzani

- *Towards Interpretable & Differentiable Machine Learning for Fluid Flows*

Indian Institute of Technology Kanpur, India

M.S., Aerospace Engineering, **CPI: 8.33/10** 01/2018 – 07/2020

Advisor: Dr. Kamal Poddar & Dr. Tapan K. Sengupta

- *Control of Separated Flow on a Symmetric Airfoil by Pitching Oscillation*

Anna University, Chennai, India

B.E., Aeronautical Engineering, **CPI: 8.30/10** 08/2012 – 05/2016

Advisor: Dr. Shanmugaraja M

- *Numerical Simulation of Fluid Flow over a Rectangular Wing – Wingtip Slots*

Work Experience

Graduate Student Researcher 05/2025 – Present

CAI-2 Group, Los Alamos National Laboratory, New Mexico, USA

- **Statistical Shape Modeling** of DEM terrains for Wildfire simulations.

Graduate Research Assistant 08/2022 – Present

SCI Institute, University of Utah, Utah, USA

- Developed a **Differentiable Autoencoding Neural Operator** combining mesh-invariant dimensionality reduction with differentiable PDE solvers.
- Designed a **Statistical Shape Modeling** pipeline for DEM terrain extraction in wildfire simulations.
- Built a **GPU-accelerated 2D Wildfire Transport PDE solver**, leveraging CUDA and finite difference method.
- Proposed **ADAM-SINDy**, a global optimization method for nonlinear dynamical system identification.

Aerodynamics Engineer 09/2021 – 08/2022

The ePlane Company, IIT Madras, Chennai, India

- **CFD URANS simulations** on full-scale 3D electric air vehicles to evaluate aerodynamic performance and static stability.
- Developed **Custom UDF programs** to generate unsteady freestream conditions for calculating **dynamic stability derivatives**.

Senior Research Associate 01/2021 – 08/2021

Department of Aerospace Engineering, IIT Kanpur, India

Associate – Content Development 08/2020 – 01/2021

BYJU'S, Bengaluru, India

Student Research Associate 01/2018 – 07/2020
Department of Aerospace Engineering, IIT Kanpur, India

- Developed a **2D DNS/LES compressible PDE solver** using MPI-Fortran.
- Built a **Data-Driven Unsteady Aerodynamic Model** based on Fourier basis.
- Wrote MATLAB scripts to evaluate the **spectral resolution of numerical derivative schemes**.

CFD Engineer 05/2016 – 11/2017
FlowXplore - CAE Associates, Coimbatore, India

Publications

1. **Differentiable Autoencoding Neural Operator for Interpretable and Integrable Latent Space**, **Siva Viknesh**, Amirhossein Arzani, in preparation
2. **ADAM-SINDy: An Efficient Optimization Framework for Parameterized Nonlinear Dynamical System Identification**, **Siva Viknesh**, Younes Tatari, Amirhossein Arzani, Submitted, 2025.
3. **Role of flow topology in wind-driven wildfire propagation**, **Siva Viknesh**, Ali Tohidi, Fatemeh Afghah, Rob Stoll, Amirhossein Arzani, **Physics of Fluids**, May, 2025.
4. **Active control of separated flow on a symmetric airfoil by pitching oscillation**, **Siva Viknesh** and Kamal Poddar, **Physics of Fluids**, August, 2021.
5. **Grid sensitivity and role of error in computing a lid-driven cavity problem**, V. K. Suman, **Siva Viknesh S.**, Mohit K. Tekriwal, Swagata Bhaumik and Tapan K. Sengupta, **Phys. Rev. E**, Jan 2019.

Technical Skills

- PyTorch
- CuPy
- NumPy
- MPI Fortran
- GPU/CPU solvers
- MATLAB

Teaching Experience

Teaching Assistant Fall 2024
ME EN 2450 – Numerical Methods for Engineering Systems
Instructor: Prof. James Rob Stoll, University of Utah

Teaching Assistant Spring 2020
AE 698A – Intro to Virtual Instrumentation
Instructor: Prof. Kamal Poddar, IIT Kanpur

Teaching Assistant Fall 2019
AE 351A – Experiments in Aerospace Engineering I
Instructor: Prof. Dehobam Das, IIT Kanpur

Teaching Assistant Spring 2019
AE 698A – Intro to Virtual Instrumentation
Instructor: Prof. Kamal Poddar, IIT Kanpur

Activities & Achievements

- Reviewed research papers for the **Physics of Fluids** journal.
- **President & Admin** of Tamil Club at IIT Kanpur (Jan 2019 – Sep 2021).
- Awarded a **Full Scholarship** for pursuing the M.S. program at IIT Kanpur.
- Achieved All India Rank **141** in GATE AE 2017.
- Achieved All India Rank **540** in GATE AE 2016.
- Secured **Undergraduate University Rank 38** in Tamil Nadu state.
- **Inter-department Chess Champion** at Park College of Technology (2013).