

# ADHITHIARAM HARIHARAN

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🌐 Portfolio

in LinkedIn

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📍 Ann Arbor, MI

## EDUCATION

University of Michigan, Ann Arbor  
M.S.E in Aerospace Engineering

Aug 2023 – Apr 2025  
CGPA: 3.65/4.0

National Institute of Technology (NIT) Tiruchirappalli, India  
B.Tech in Mechanical Engineering

Jun 2019 – May 2023  
CGPA: 8.59/10

## SKILLS AND COURSEWORK

**CAD:** SOLIDWORKS, CATIA, PTC Creo | **FEA:** Ansys Workbench, Abaqus, COMSOL Multiphysics | **CFD:** Ansys Fluent, OpenFOAM

**Coursework:** Finite Element Method, Structural Dynamics, Strength of Materials, Multidisciplinary design optimization

**Programming Languages and Tools:** Python, C++, MATLAB, Simulink, Linux, LaTeX, Git

## EXPERIENCE

**Graduate Student Research Assistant - Control-Oriented Low Order Modeling of Very Flexible Aircraft** Jan 2024 – Apr 2025  
*Active Aeroelasticity and Structure Research Laboratory (A2SRL) - University of Michigan, Ann Arbor*

- Performed static, trim, modal, and linearization analysis of HALE aircraft using the high-order nonlinear solver UM/NAST.
- Extracted flexible mode shapes, mass and stiffness (FEM) matrices, and aerodynamic and thrust loads at the trimmed condition.
- Reduced full-order strain-based outputs ( $> 100$  states) to a low-order model (4 states) using strain modal decomposition.
- Trained neural networks to predict nonlinear aeroelastic terms with strain states, control effectors, and flight conditions as inputs.
- Integrated flexible aircraft dynamics with 6-DOF rigid-body motion and solved equations of motion for various trajectories.
- Achieved a 40x speed-up in simulation time with a reduced order model compared to the full-order reference simulation.

**Mechanical Engineer - BAJA SAE club of NIT Tiruchirappalli** May 2020 - May 2023

- Supervised a 30-member team in the design and fabrication of four-wheel-drive All-Terrain Vehicle (ATV) within project deadline.
- Designed an ergonomic chassis using PTC Creo and selected lightweight, high-strength material based on hand calculations.
- Performed static structural, explicit dynamics, and modal analysis in Ansys Workbench to assess the structural integrity of chassis.
- Optimized brake rotor design using topology optimization and improved cooling performance through CFD in Ansys Fluent.
- Contributed to CNC machining of components and conducted DFMEA, DVP, and cost analysis for the ATV.

**India Connect Research Fellow - Turbulent River Flow Simulations** May 2022 - Nov 2022  
*Energy Research Institute at NTU - Nanyang Technological University, Singapore*

- Conducted free-surface flow simulations in river confluences and meanders using a VOF-based multiphase solver in OpenFOAM.
- Analyzed secondary flows, velocity profiles, and wall-bounded turbulence using RANS turbulence model.
- Developed a ML-PDE based surrogate model in TensorFlow to predict velocity gradients and reduced computational cost.

**Research Intern - Reduced order model (ROM) of Friction Stir Welding Simulation** Sept 2021 - Jan 2022  
*Friction Stir Welding Laboratory - Indian Institute of Technology, Kharagpur*

- Designed the Friction Stir Welding process in CATIA and performed thermal and structural analysis using Abaqus.
- Used the Coupled Eulerian-Lagrangian meshing technique in Abaqus and performed mesh convergence study.
- Developed a POD-Galerkin-based ROM in MATLAB by reducing the sparse state-space matrices of the finite element model.
- Built a black-box model in Simulink to compute and analyze truncation errors between Abaqus simulations and ROM results.

## UNIVERSITY PROJECTS

**Multidisciplinary Design Optimization** Sept 2024 - Dec 2024

- Developed an Efficient Global Optimization algorithm using two neural nets and validated it against gradient descent algorithms.
- Performed optimization on multi-modal functions by utilizing Latin Hypercube Sampling and differential evolution methods.
- Performed aerodynamic shape optimization of airfoils and wing planforms for high altitude long endurance aircrafts.

**Statistical Inference and Estimation** Jan 2024 - May 2024

- Implemented Stochastic Variational Gaussian Process Regression using inducing points and mini-batch optimization.
- Scaled Gaussian Process models for large datasets, achieving efficient posterior approximation with reduced computational cost.
- Optimized kernel hyperparameters using gradient descent algorithm and maximized the Evidence Lower Bound value.
- Validated the model on a turbulence dataset and analyzed the effect of inducing points on prediction accuracy.