

DILIP KALAGOTLA

Aerospace Engineering and Engineering Mechanics, University of Cincinnati, Cincinnati, OH
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EDUCATION

Ph.D., Aerospace Engineering	Expected 2025
University of Cincinnati (UC), College of Engineering and Applied Science (CEAS), Ohio	3.87/4.00
Focus: Aerodynamics, Multiphase analysis, Numerical Analysis, PIV, CFD, Parallel Programming, Scientific Machine Learning, Data Structures, Algorithms, Deep Learning, Optimization, Reduced Order Modeling (ROM)	
Master of Science, Aerospace Engineering	2018
University of Cincinnati (UC), College of Engineering and Applied Science (CEAS), Ohio	3.89/4.00
Thesis: Quantification of tracer dynamics in PIV for shock boundary layer interaction study – A Numerical Analysis	
Bachelor of Technology, Mechanical Engineering	2015
Indian Institute of Technology (ISM), Dhanbad, India	8.18/10.00

RESEARCH EXPERIENCE

- **project-arrakis**: Developed an MPI-based Lagrangian Particle Tracking Code to validate CFD and PIV data. Utilized Python data structures to build an O(N) algorithm, improving file IO speed by 50 times compared to Fortran. Implemented a unique shock-cell-based interpolation technique for enhanced accuracy. Automated processes for simulation of flow construction from non-intrusive flow velocimetry experiments.
- **syPIV**: Create a Synthetic Particle Image Velocimetry Module using Python for computational replication of the PIV imaging process. Employed Dask and MPI programming for parallelization, achieving balanced CPU/RAM usage. Demonstrated 6% error due to particle dynamics history (PDH) in a converging shock case.
- **PIVnet**: A bilateral convolutional neural network (CNN) based package to reduce uncertainty due to particle inertia in PIV. It currently features a custom architecture to capture particle motion in PIV images without losing gradients. It has demonstrated a minimum of 50% improvement in uncertainty surrounding shocks.
- **umPIV**: Quantified tracer particle uncertainty in the University of Michigan SBLI wind tunnel data using a set of codes to obtain particle paths from CFD data. Local accuracy was improved by 10-15% in strong compression and recirculation zones. Later, the code capability was expanded to track particles in a turbomachinery flow field to draw strong correlations between Laser Doppler Velocimetry (LDV) and RANS data.

PROFESSIONAL EXPERIENCE

Teaching Assistant, UC, CEAS	2021 – Current
• Aerodynamic sims: Taught Python for numerical analysis, DNNs with Pytorch, and assisted with StarCCM+.	
• Biostatistics: Helped deliver high-quality lectures on various statistical concepts.	
Graduate Assistant, UC, CEAS	2021 – 2022
• Assisted engineering staff and faculty with IT issues and hardware/software installations.	
• Performed data analysis to provide quarterly reports and saved thousands of dollars on equipment/software.	
Research Assistant, UC, CEAS	2017 – 2020
• Led multiple projects from ideation to deployment using data-driven modeling and numerical techniques.	
• Mentored and collaborated with several graduate students to develop data manipulation and visualization API.	
Research Assistant, P&G Sim Center, Cincinnati, OH	2016 – 2017
• Performed preliminary design and analysis for a new production line in baby care using ABAQUS.	
• Implemented FORTRAN routines to automate the simulation for several angles of attack.	

TECHNICAL SKILLS

Computational Tools: Python (Numpy, Scipy, Pandas, matplotlib, seaborn, scikit-learn, PyTorch, TensorFlow, mpi4py), Fortran, R, C++, Bash, TeX, Matlab, Simulink, Git, Version Control, CUDA, High Performance Computing
CFD Tools: Tecplot, Paraview, OpenFOAM, NASA – OVERFLOW, Pointwise, StarCCM+, ANSYS Fluent, NUMECA FINE, Solidworks
Certifications: Machine Learning, ML workflow with Scikit-Learn, DNNs with PyTorch, Deep Learning Specialization (TensorFlow), Accelerated Computing - CUDA C/C++, ABAQUS, Ansys Mechanical APDL, CATIA V5

ACHIEVEMENTS AND LEADERSHIP

- Graduate Student of the Month, CEAS, UC, Cincinnati **2023**
- Founder and President, UC Piloting Club, UC, Cincinnati **2018 – 2022**
- Secretary, Aerospace Graduate Student Association, UC, Cincinnati **2015 – 2017**