

# Sam Kilduff

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## Education

### University of Illinois Urbana-Champaign

Expected August 2025

Master of Science in Aerospace Engineering

GPA: 3.71

**Thesis:** *Computational Analysis of Plasma Actuation for Control of Shock-Laden Flows in Scramjet Isolators*

Advisor: Dr. Daniel J. Bodony

**Relevant Coursework:** Advanced Gas Dynamics, Molecular Gas Dynamics, Hypersonic Aerothermodynamics, Aerospace Propulsion, Computational Aerodynamics, Finite Element Analysis

### University of California, Davis

June 2023

Bachelor of Science in Mechanical Engineering

GPA: 3.63

## Experience

### Graduate Research Assistant

Urbana, IL

Aeroacoustics and Flow Physics Research Group

Aug 2023 – Present

- Developed a filamentary plasma actuator model in SU2 to evaluate its behavior on shock train behavior in a scramjet isolator
- Implemented a Joule heating source term into SU2's compressible RANS solver to model actuator-induced volumetric heat addition
- Generated structured meshes in Pointwise for the isolator geometry and performed mesh convergence studies to ensure accurate resolution of the shock train and volumetric heating region
- Performed RANS simulations using the SST turbulence model on HPC clusters for various meshes and actuator configurations
- Analyzed results in ParaView to identify configurations that mitigate unstart and reduce shock-induced losses

### Undergraduate Research Assistant

Davis, CA

Computational Flow Physics and Aeroacoustics Laboratory

Dec 2021 – June 2023

- Generated 2D overset meshes in OVERGRID for ice-affected and clean NACA 0012 airfoils to study the impact of various ice formations on dynamic stall
- Conducted URANS simulations using the SA turbulence model in OVERFLOW on HPC clusters to model transient flow behavior around the airfoils
- Evaluated post-processing results using FieldView and MATLAB, revealing an earlier onset of dynamic stall for ice-affected airfoils

### Aerodynamics and Vehicle Dynamics Engineer

Davis, CA

UC Davis Formula SAE Electric

Sept 2020 – Dec 2021

- Collaborated with a multidisciplinary team of approximately 50 undergraduates to design and manufacture a Formula electric vehicle for the annual FSAE Electric competition
- Spearheaded development of a vehicle body slip CFD model in STAR-CCM+ to analyze the effect of body slip angle on vehicle performance
- Developed roll and steer geometry kinematics model in MATLAB that expedited and streamlined the suspension hardpoint selection

## Skills

**Programming Languages:** Python, MATLAB, C++ , Bash

**CFD:** Pointwise, NASA OVERGRID, STAR-CCM+, SU2, NASA OVERFLOW, FieldView, ParaView

**FEA:** ANSYS Mechanical, Abaqus

**CAD:** AutoCAD, SolidWorks

**High-Performance Computing:** Parallel programming, HPC clusters, SLURM, Intel VTune

**Other:** Microsoft Office, Linux, Windows, macOS, Visual Studio IDE, GitHub