VINEET PASUMARTI
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EDUCATION

Bachelor of Science in Mechanical Engineering - University of Wisconsin- Madison, *Madison, WI*
GPA: 3.671/4.0
SEPTEMBER 2019 - MAY 2023

PUBLICATIONS

[1] Pasumarti, V., Dave, M., & Franck, J. A. (2022). Simulation of two cross-flow turbines under
confinement. *AIAA AVIATION 2022 Forum*. https://doi.org/10.2514/6.2022-4103

[2] Pasumarti, V., Dave, M., & Franck, J. A. (2022). Simulation of dual cross-flow turbines under
confinement. *American Physical Society, 75th Annual Meeting of the Division of Fluid Dynamics.*

SCHOLARSHIPS
- 2022 Faustin Prinz Undergraduate Research Fellowship
  - 1 of 2 students to be awarded
  - $5000 in tuition credit, $2000 towards research funding

AWARDS and HONORS
- 2020 NASA Academy Award Recipient
  - 1 of 3 students in the state of Wisconsin to be awarded
  - Received $7300 from Wisconsin Space Grant Consortium (WSGC)
- Graduated with Honors in Research
- Dean's Honor List for 5 semesters

WORK EXPERIENCE

Loads and Dynamics Engineer II — *Boeing Research and Technology, Huntington Beach, CA*
JULY 2023 - PRESENT
- Flight-testing the T7 Red Hawk trainer fighter jet at Edwards Air Force Base.
- Conducting novel hypersonics research to best represent the constituent material properties of carbon-matrix-ceramics (CMCs) using alternative simulation methods.
- Calibrating linear and nonlinear response of novel carbon-matrix-ceramics (CMC) for hypersonics using new modeling methods and validating against experimental results.
- Designed components for a hypersonic vehicle and validated via load analysis.
- Performed loads analysis on a composite tank for satellite propulsion.
- Investigated composite wing stringer co-bond configurations with wrinkles compared to Puck failure criteria via finite element models for Boeing 777X commercial airliner.
- Supported development of composite Mars habitat by redesigning parts in CATIA for reduced mass.

Thermofluid Engineer Co-op — *INNIO Waukesha Gas Engines, Waukesha, WI*
NOVEMBER 2021 - DECEMBER 2022
- Conducted thermal analysis via CFD simulations of cylinders in V-12 natural gas engines to determine limiting factors in maximizing operation time.
- Led project to reduce exhaust valve temperature by 30 Kelvin by investigating heat transfer capabilities of various materials and valve designs.
- Successfully led investigation to determine optimal mesh resolution and temporal resolution of CFD simulations to match experimental data, allowing for accurate and time-effective solutions.
- Successfully determined solutions to bypass motion-related heat transfer numerical errors in CFD simulations.

Aerospace Engineering Intern — *NASA Langley Research Center, Hampton, VA*
JUNE 2021 - AUGUST 2021
- Atmospheric Flight and Entry Systems Branch
- Conceived and developed drag systems for heat shield capsules/thermal protection systems (TPS) that deploy upon re-entry of the atmosphere to support sample-return missions
- Validated performance of various drag systems via comprehensive simulations of loads experienced on heat shield capsules at varying Mach numbers.
- Used ANSYS to conduct CFD simulations of heat shield designs
- Worked extensively with Solidworks and Autodesk Inventor for design, assembly, modification, and animation of drag system designs

Mechanical Engineering Intern — *NASA Langley Research Center, Hampton, VA*
JUNE 2020 - AUGUST 2020
- Vehicle Analysis Branch.
- Collaborated in a team of 4 to develop a collapsible lunar crane concept for the manipulation and offloading of large payloads to establish a permanent human presence and outpost on the lunar surface.
- Personally conceived the winning extendable crane boom design, allowing for trolley movement without interference due to hinges.
- Personally led design and analysis of crane trolley to produce a structure of minimal mass and volume capable of withstanding extreme loads.
- Regularly used ANSYS to run Finite Element Analysis and perform static structural simulations for various projects.
- Worked extensively with Solidworks and Autodesk Inventor for design, assembly, modification, and animation of lunar cargo manipulation mechanisms.
- Wrote MATLAB code to determine optimal payload rigging configuration based on mass and volume parameters.
- Created documentation to organize payload specifications detailed in the NASA Surface Architecture and Reference Document.

Undergraduate Teaching Assistant — *University of Wisconsin- Madison, Madison, WI*
AUGUST 2020 - DECEMBER 2020
- Teaching Assistant for ME 201, Introduction to Mechanical Engineering, under Prof. Kristofer Dressler.
- Taught students circuit design, Arduino code, EES (Engineering Equation Solver) programming language, elementary mechanics of materials, measurement using oscilloscopes, and wind tunnel design and operation.
- Held office hours, held labs, graded assignments, graded exams.
- Received a 4.8/5.0 rating by student vote.

RESEARCH EXPERIENCE

Undergraduate Research Assistant — *Computational Flow Physics Modeling Lab, Madison, WI*
Advisor: Dr. Jennifer Franck, Assistant Professor, Engineering Physics
ACADEMIC YEAR (2022-2023, Undergraduate Senior)
- Computationally investigated the role of confinement exploitation in cross-flow turbine arrays to optimize energy harnessing from natural currents in an ARPA-E funded project in collaboration with experimental researchers at the University of Washington.
- Published as first author and presented at the American Physical Society's Division of Fluid Dynamics (APS DFD) 2022 conference.
- Implemented an automated airfoil morphing procedure using a custom OpenFOAM library to reduce simulation time.
- Determining a solution to mimic the blockage of a 3D water tunnel using a 2D CFD simulation to allow for faster results.
- Investigated the effect of airfoil camber in cross-flow turbines and providing experimental researchers with CFD results.

ACADEMIC YEAR (2021-2022, Undergraduate Junior)
- Awarded Faustin Prinz Undergraduate Research Fellowship ($5000 towards tuition credit and $2000 towards supporting project).
- Published as first author and presented at the AIAA Aviation 2022 conference.
- Investigated interactions between two cross-flow turbines in river environments via CFD simulations
- Conducted over twenty 2D RANS CFD simulations of two rotating turbines in an external flow
- Created more than 28 meshes of turbine geometry using Pointwise software
- Post-processed simulation results in MATLAB and Tecplot to generate supporting plots and figures used in paper

ACADEMIC YEAR (2020-2021, Undergraduate Sophomore)
- Continued to perform large-scale mesh generation of complex sea animal geometry
- Completed extensive training in OpenFOAM CFD software by conducting 8 simulations involving both incompressible and compressible flows, and 3 custom transient simulations involving rotating bodies in incompressible flow
- Designed acrylic wind tunnel using Solidworks for engineering fair to demonstrate practical fluid dynamics to kids

ACADEMIC YEAR (2020 Spring, Undergraduate Freshman)
- Supported investigation of the impact of entanglement on the swimming performance of a Southern Right Whale by assisting large-scale RANS CFD simulations
- Performed large-scale mesh generation of complex sea animal geometry using Blender, StarCCM+, and Pointwise software

EXTRACURRICULARS

Testing Lead — *Wisconsin Rocket Lab*
MAY 2022 - JUNE 2023
- Conducted CFD of a bipropellant torch igniter to determine whether coaxial or offset impinging jets result in better mixing between gaseous oxygen and gaseous methane
- Designed a mobile test stand for rocket engines capable of supporting 1500 lbf of thrust
- Designed hybrid rocket igniter plate and validated efficacy by conducting CFD of fuel and oxidizer injection into combustion chamber

Aerodynamics Design Member — *Wisconsin Racing, Formula SAE*
DECEMBER 2019 - FEBRUARY 2022
- Led design and manufacturing of splitter to maximize ability of keel and redirect airflow to reduce lift on underbody of car
- Redesigning side pods of car to maximize airflow into radiator and determine radiator pitch and yaw angle for optimal cooling and lower drag coefficient of side pod
- Verifying design of aerodynamic packages via CFD testing and analysis in StarCCM+
- Prepared full-length monocoque mold for carbon fiber laying
- Assisted sidepod redesign to maximize airflow through radiator by conducting multiple CFD simulations

COMMUNITY SERVICE and DIVERSITY, EQUITY, INCLUSION

Board Member — *Aa Dekhen Zara, Non-Profit*
AUGUST 2021 - MAY 2023
- Raised $22,000 in donations for our philanthropic partner, YUWA, helping impoverished girls from rural Jharkhand, India, permanently break the cycle of poverty through education and athletics.
- Orchestrated the largest on-campus competition at Univ. of Wisconsin, featuring participation from eight national cultural dance teams. Did this two years in a row.

Board Member — *India Student Association at University of Wisconsin - Madison*
SEPTEMBER 2019 - JANUARY 2021
- India Student Association plans at least 5 educational and social events per semester with attendance in the hundreds.
- Hosted social events and professional workshops to connect international students from India with American students of Indian origin, like myself, in order to break social barriers between both groups and help international students take advantage of the opportunities of an American institution that are otherwise difficult to reach due to perceived stigma and stereotypes.
- Re-designed the logo, merch, and social media posts to completely change the branding of the student org— our new image saw a 12% increase in international student attendance compared to previous years.

PERSONAL PROJECTS

Arduino-based PD Reaction Control System (RCS) for Model Rocket
SEPTEMBER 2022 - MAY 2023
- Senior Design project advised by Dr. David Rothamer and Dr. Michael Cheadle.
- Created a PD (proportional derivative) controller to actuate cold gas thrusters via PWM (pulse width modulation) that actively controlled the rocket in the yaw axis
- Determined nozzle geometry by creating a mathematical model in EES to determine sufficient throat and exit area ratios using isentropic flow relations

Open-Circuit Subsonic Wind Tunnel
SEPTEMBER 2019 - JUNE 2020
- Fully designed and fabricated an open-circuit wooden wind tunnel
- Used Force Sensitive Resistors with an Arduino to determine lift on tested airfoils
- Produced smoke streams to visualize airflow using ultrasonic humidifiers