Ayaaz Yasin

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Cincinnati, OH

Education

PhD in Mechanical Engineering, Fall 2024 - present
University of Cincinnati, Cincinnati, OH

MS in Aerospace Engineering, 2024
University of Cincinnati, Cincinnati, OH
Thesis title: *Computational Modeling of Evaporation Without Tuning Coefficients*

BS in Mechanical Engineering Technology, 2022
Minor in Mathematics
University of Cincinnati, Cincinnati, OH
Senior project: *Aerodynamic Optimization of a Solar Car*

Notable Coursework
- Fluids: numerical methods for aerospace fluid mechanics, computational fluid dynamics, modeling and simulation of multi-physics systems.
- Mathematics: advanced numerical analysis, partial differential equations & Fourier analysis, complex analysis.

Research Experience

Graduate Student, lab of Dr. Kishan Bellur 2022 - present
UC Lab for Interfacial Dynamics,
Department of Mechanical Engineering, University of Cincinnati
- Investigation of phase change driven oscillations in liquid thin films.
- Modeling and simulation of the ISS Flow Boiling and Condensation Experiment.
- Development of a coefficient-free computational model of evaporation.
- Computational investigation of phase change driven surface-flow phenomena in microgravity using data from ISS Constrained Vapor Bubble experiment.

Research Assistant, Simulation Center Fall 2022
Department of Mechanical Engineering, University of Cincinnati
in collaboration with The Procter and Gamble Company (P&G).
- Performed statistical analysis of the accuracy and computational performance of various algorithms used to compute *arbitrarily oriented bounding boxes*.
- Implemented a genetic algorithm to reduce computational time for *arbitrarily oriented bounding box* calculations.

Peer-Reviewed Publications

1. U. Chakrabarti, **A. Yasin**, K. Bellur, and J. Allen, *An investigation of phase change induced Marangoni-dominated flow patterns using the Constrained Vapor Bubble Data from ISS experiments*, Frontiers in Space Technologies - Microgravity. Volume 4 - 2023, doi: 10.3389/frspt.2023.1263496.

Conference Talks

presenters are underlined.

5. **A. Yasin** and K. Bellur, *Modeling of Evaporation in Cryogenic Fuels Without Tuning Coefficients*, 35th NASA Thermal and Fluids Analysis Workshop, 26-30 August 2024, Cleveland, OH.

4. **A. Yasin** and K. Bellur, *Modeling evaporation without tuning coefficients*, 51th Midwestern University Fluid Mechanics Retreat, 12-14 April 2023, Rochester, IN.

3. **A. Yasin**, and K. Bellur, *A Numerical Study of Coefficient-free Kinetic Evaporation Modeling in Liquid Hydrogen*, 76th American Physical Society Division of Fluid Dynamics Annual Meeting, 19-21 November 2023, Washington, D.C.

2. **A. Yasin**, U. Chakrabarti, K. Bellur, and J. Allen, *An investigation of Marangoni induced flow in Constrained Vapor Bubble ISS experiments*, 50th Midwestern University Fluid Mechanics Retreat, 13-15 April 2023, Rochester, IN.

1. **A. Yasin**, R. Gilligan, D. Heitmeyer, and K. Cohen, *University of Cincinnati Aerial Vehicles (UCAV) Team's solution to the 2022 AUVSI Student Unmanned Aerial Systems competition*, AIAA Region III Student Conference, 23 March 2022, Purdue University, West Lafayette, IN.

Conference Posters

presenters are underlined.

2. **A. Yasin** and K. Bellur, *Modeling of Evaporation in Cryogenic Fuels Without Tuning Coefficients*, 35th NASA Thermal and Fluids Analysis Workshop, 26-30 August 2024, Cleveland, OH.

1. **A. Yasin**, and K. Bellur, *A CFD model of evaporation in liquid Hydrogen without the need for tuning coefficients*, 75th American Physical Society Division of Fluid Dynamics Annual Meeting, 20-22 November 2022, Indianapolis, IN.

Research Projects

Analysis of rotor-induced vibrations in a UAV arm Spring 2022
Advisors: Dr. Milind Jog and Dr. Jay Kim
- Computational analysis of the airflow in a coaxial prop-rotor and the effects of the flow-induced vibrations in the UAV-arm on lift-performance.

A comparative analysis of finite-difference schemes for vorticity-transport equations on non-uniform and curvilinear grids Fall 2021
Advisor: Dr. Shaaban Abdallah
- Developed code to compare the efficiency of finite-difference methods on a non-uniform grid to domain transformation methods using curvilinear coordinates.

Aerodynamic Optimization of a Solar Car Fall 2021 - Spring 2022
Advisors: Dr. Muthar al-Ubaidi and Dr. Alex Wouden.
- Designed the car's body & analyzed its aerodynamic performance using OpenFOAM.
- The project included studying boundary-layer formation and investigating passive methods to reduce drag by relaminarization and delaying flow separation.

Teaching Experience

As Instructor-of-Record

3. ENED 1120: Foundations of Engineering Design Thinking II Spring 2024
2. ENED 1100: Foundations of Engineering Design Thinking I Fall 2023

- Taught two sections of 72 students each semester as the Instructor-of-Record. The courses are required for all first-year undergraduates in the College of Engineering & Applied Science.
- Managed and mentored a team of two graduate and six undergraduate teaching assistants. Contributed to the development of course materials.
- Topics covered: engineering design process, project management, statistical models, spatial visualization, flowcharts & visual programming, dimensional analysis, Python, MATLAB, Visual Basic, statics, and models of physical systems (electrical circuits and mass & energy).

1. ENED 1100: Foundations of Engineering Design Thinking I Spring 2023
- Taught the university-level course to a class of 18 high-school students.

As Undergraduate Teaching Assistant & Peer Mentor

2. ENED 1120: Foundations of Engineering Design Thinking II — Spring 2022
1. ENED 1100: Foundations of Engineering Design Thinking I — Fall 2020, Fall 2021

Honors and Awards

Graduate

- Honorable Mention - *UC Excellence in Teaching Award*, 2024.
- *Travel Grant*, American Physical Society - Division of Fluid Dynamics, 2023.
- *Graduate Incentive Scholarship*, Department of Aerospace Engineering, 2022-2023 and 2023-2024.
- *P&G Simulation Center Student Support Scholarship*, Fall 2022.
- *Graduate Assistant Scholarship*, Department of Engineering & Computing Education, Spring 2023, Fall 2023, and Spring 2024.
- Several conference travel awards by the UC Graduate School, 2022-2024.

Undergraduate

- *Undergraduate Research Fellowship*, UC Office of Research, 2021-2022.
- *Outstanding Senior Award* by the College of Engineering & Applied Science, 2022.
- Dean's list for five semesters.
- *Global Outreach Scholarship*, University of Cincinnati, 2015.

Academic Service

- Served as the *faculty mentor* for students in the First-Year Engineering Program, 2023-2024.

Work Experience

Ohio Innocence Project, Cincinnati, OH — Summer 2022
Student Worker, College of Law, University of Cincinnati

- Cataloged and archived case files.

GMi Companies, Lebanon, OH — Spring 2021 - Summer 2021
Product Development Engineering Co-op

- CAD and engineering drawings for production parts.
- Worked on over ten products, taking concept designs to final products.
- Prototyped mechanisms and parts to validate design concepts.
- Designed and conducted experiments to characterize materials.

Regal Beloit Corporation, Florence, KY — Spring 2019, Fall 2019
Manufacturing Engineering Co-op

- Performed calculations for gear manufacturing.
- Wrote software to generate G-code for CNC control.
- Calibrated torque monitoring systems for large turbines.
- Designed custom torque tools for use on large coupling assemblies.

3D Paradise, New Delhi, India — Spring 2018 - Summer 2018
Research and Development Intern

- Worked on the design and development of industrial-grade FDM 3D printers.
- Collaborated with the marketing team on client presentations.

Shaperjet, New Delhi, India — Spring 2017 - Summer 2017
Engineering Intern

- Design optimization of FDM printers to improve production quality and efficiency.
- Optimized slicing software to improve compatibility with the company's products.

Student Teams

UC Aerial Vehicles Team Summer 2021 - Summer 2022
President
- Led the student team competing in AUVSI SUAS competition; designing, building, and flying UAVs capable of autonomous flight, aerial mapping, payload airdrop, static & dynamic obstacle avoidance, and object detection, localization, & classification.
- The team placed 9^{th} out of 71 teams and was awarded the safety award.
- Developed the drop-release mechanism design and optimization, flight testing, project planning, design reviews, funding, logistics, and team operations.
- Project partly funded by the *Ohio Space Grant Consortium.*
- Project advisors: Dr. Kelly Cohen.

UC Solar Car Team Spring 2021 - Spring 2022
Mechanical and Aerodynamics Lead
- Student team competing in the American Solar Challenge, designing, building, and racing a solar-powered car.
- Led the mechanical team during the design of the university's first solar car.
- Established methodology of design reviews and project planning.
- Responsible for overall system design and aerodynamic optimization of the car.
- Project advisors: Dr. Muthar al-Ubaidi and Dr. Alex Wouden.

FlyUC Spring 2019 - Fall 2020
President and Propulsion Lead
- Student team competed in the GoFly competition. Designed a single-passenger electric VTOL aircraft.
- Oversaw system design and design reviews.
- Worked on the aerodynamic optimization of coaxial propeller systems.
- Project advisor: Dr Shabaan Abdallah.

Computer Skills

Languages: C, C++, Python, VBA, HTML.
Software: MATLAB, Ansys Fluent, SolidWorks, OpenFOAM, Star CCM+, Simcenter 3D, LaTeX, Git/GitHub, LabVIEW.

Extra-Curriculars

Hindustani classical music
- Studying Tabla under Prof. James Feist at the College-Conservatory of Music, University of Cincinnati since 2019.
- Performed at music conferences and recitals at Ball State University, University of Cincinnati, and the Cincinnati Art Museum.

Taekwondo
- 4th dan Kukkiwon black belt.
- Served as a junior instructor and president of the UC Taekwondo Club, 2020-2022.

Amateur radio
- Technician-class amateur radio operator license, FCC callsign: KE8WUP;
- Volunteer radio operator for the Queen City Emergency Net.

Volunteer interviewer for the **1947 Partition Archive**. Conducted interviews of the eyewitnesses of the *Partition of India*, in India and Canada.

Worked as a researcher for visual art exhibition *Interfaces of Being*, presented at the Korean Culture Center, New Delhi, India, researching 18th-century Urdu poetry.