

# Aymane Saissi

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## EDUCATION

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**The Cooper Union for the Advancement of Science and Art**, New York, NY

2021 - Present

Bachelor of Engineering, *Mechanical Engineering*, **GPA 3.98** — Dean's List all semesters

## SKILLS

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**Computer Programs:** Python, C++, Node.js, Node-Red, Linux Operating Systems, Microsoft, Mac, Final Cut Pro, Microsoft Office, SolidWorks, Onshape, Shapr3D, Siemens NX, Matlab, Microchip Studio, MPLAB X IDE.

**Fabrication:** 3D Printing, basic wood construction, Soldering.

**Languages:** Fluent in French, Arabic, and English. Intermediate in Spanish.

## RESEARCH EXPERIENCE

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**Technische Universität Dresden**, Dresden, Germany

Summer 2023

*Mechatronics Engineering Researcher*

- **Led** the design and execution of experimental protocols focused on analyzing the performance and durability of electric motors.
- **Collaborated** closely with **cross-functional teams** to plan and implement experiments, ensuring comprehensive data collection and analysis.
- **Utilized SolidWorks** to engineer connections between electric motors and linear guides, optimizing weight distribution for experimental accuracy.
- **Implemented Node.js and Node-Red** for streamlined data processing and user interface development, enhancing efficiency.
- **Pioneered an algorithmic machine learning framework in Python**, leveraging vibration data to detect early signs of electric motor failure.
- **Contributed** to the development of a **predictive model** to categorize and classify motor failures, improving reliability and performance.
- **Presented** the research on "Condition Monitoring of Induction Motor Using Vibration Signals and Machine Learning Classification" at the **NCUR conference in Los Angeles**.

**Thermo and Fluid Dynamics Lab**, New York, NY

Spring 2023

*Research Assistant and Silfin Internship Award Nominees*

- **Conducted comprehensive experiments** to analyze fluid behavior under varying pressure and temperature conditions.
- Replicated curves to compare theoretical predictions with experimental data.
- **Engineered and fabricated** a series of test nozzles with precise diameters using **CAD design** (SolidWorks) and **machine shop skills**.
- **Utilized a high-pressure chamber**, performing controlled valve operations to initiate and regulate fluid flow.
- **Applied SHADOW-GRAPH techniques** to visually capture and analyze shock diamond patterns.
- Analyzed experimental data using advanced statistical methods and computational tools (MATLAB, Python).
- **Collaborated with my professor** on organizing thermodynamic experiments for students.

**IXperience**, Capetown, South Africa

Fall 2022

*Data Science/ AI Research Intern (remote)*

- Worked with Python libraries (NumPy, pandas, Seaborn, Matplotlib) to analyze various data.
- Collaborated on machine learning models: **supervised and unsupervised learning**.
- Analyzed past data from heart disease patients and built a predictive model using **linear and logistic regression**.
- **Presented** the heart disease prediction model to a **doctor** and **supervisor**.

## PROJECTS

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### Open Channel Flow Research Project, Cooper Union, New York, NY

Fall 2023 - Summer 2024

#### Mechanical Engineering Researcher

- Conducted research on fluid dynamics, focusing on both liquid and gas flows within **open channel systems**, with applications to **aerospace engineering**, particularly **rocket propulsion**.
- Utilized SolidWorks and Autodesk for CAD design to develop specialized nozzles for pipe systems, investigating the impact of various **nozzle geometries** on fluid behavior and **shock wave propagation**.
- Experimented with different inlet configurations and resistance coefficients to identify designs that **minimized turbulence** and facilitated smoother flow transitions, essential for **optimizing rocket nozzle performance**.
- Applied principles of **Mach number and shock wave theory** to study how shock waves propagate in a medium, analyzing their effects on both liquid and gas flows within the designed nozzles.
- Implemented data visualization and analysis tools in Python to provide quantitative assessments of nozzle designs, focusing on **flow efficiency, turbulence reduction, and shock wave mitigation**.
- Conducted experimental validations of theoretical models, using **high-speed imaging** and **pressure sensors** to capture and analyze flow patterns and **shock wave behavior in real-time**.
- Participated in **textbook editing** to integrate findings into broader aerospace and fluid dynamics applications.

### Drone Monitoring and Control (swarm), Cooper Union, New York, NY

Fall 2021 - Spring 2022

#### Student Researcher

- Implemented **drone swarm control** using **Robot Operating System (ROS)**, Linux, and Python, enabling synchronized operation of multiple drones for collaborative tasks.
- Utilized **Vicon cameras** and open-source drone technology to **monitor** and analyze the **motion** of the drone swarm, ensuring precise **navigation** and **coordination**.
- Recorded and analyzed data to identify and troubleshoot drone malfunctions, such as defective rotors or communication issues, employing diagnostic techniques to rectify issues promptly.
- Collaborated with multidisciplinary teams to optimize swarm behavior and enhance efficiency in task execution, demonstrating effective communication and teamwork skills.
- Contributed to the development of algorithms for autonomous decision-making within the drone swarm, leveraging Python programming and ROS frameworks to implement navigation and obstacle avoidance functionalities.
- Assisted in the **repair and maintenance of drones**, including **hardware** replacement and **software updates**, to ensure optimal performance and reliability during research experiments.

## HONORS AND AWARDS

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*Innovator Merit Scholarship, 2021 - 2025,*

*Half Tuition Scholarship, 2021 - 2025*

*Jacqueline Bernstein and Marvis Scholarship, 2021 - 2025*

*Silfin Internship Award Nominees, Spring 2023*

*Albert Nerken School of Engineering, Fall 2022 Awards*

*Tau Beta Pi Engineering Honor Society Member*

## PRESENTATIONS AND PUBLICATIONS

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### The National Conference on Undergraduate Research (NCUR), Long Beach, CA

Spring 2024

#### Presenter

- Presentation of research on "Condition Monitoring of Induction Motor Using Vibration Signals and Machine Learning Classification" at the NCUR conference

## EXTRACURRICULARS

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### Mathematics Tutor, New York, NY

Fall 2022 - Present

- Helped students understand mathematics concepts and succeed in their classes such as: Calculus, Differential equations, and Probability.
- Held online and in person sessions for students