# Abylaikhan Mukhamejanov

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## Education

**Lehigh University** — Bethlehem, PA
*Bachelor of Science in Mechanical Engineering, GPA 3.60/4.00* — *Aug. 2023 – May 2027*

- **Activities and Societies:** Researcher at NHI Lab, Lehigh MakerSpace Coordinator, APS, ASME, NASA CSLI
- **Honors and Awards:** ASME IMECE Best Poster Award, Rossin Research Fellow 2025, STEM-SI Research Fellow 2024, M. Levin Best Tech Startup Award, Baker Institute Startup Fellow, Forbes Best SpaceTech Startup Award

## Experience

**Undergraduate Researcher — Robotics & Fluid Dynamics** — Nov. 2023 – Present
*Unsteady Flow Interactions Laboratory, Lehigh University* — *Bethlehem, PA*

- Investigate wave-assisted propulsion for marine vessels, using attached flapping hydrofoils to convert ocean-wave energy into forward thrust and enhance ship stability.
- Built a water-channel testbed for robotic swimmers, modelling 25+ components in SolidWorks and fabricating them via CNC machining, waterjet cutting, and 3D printing while applying DFM/DFA principles.
- Designed an electro-mechanical assembly with linear guides, belts, actuators, sensors (hall, force, laser, encoder).
- Implemented closed-loop PID control and data acquisition system with Simulink, MATLAB, achieving 98% accuracy.
- Utilized Simulink to replicate mass-spring-damper behavior with motor torque control and force-sensor feedback.

**Lead Mechanical Engineer — NASA CubeSat (CSLI)** — Sep. 2023 – Present
*Lehigh University Space Initiative* — *Bethlehem, PA*

- Lead a 10-member structures team of Lehigh's first nanosatellite using VS/SWIR optics to monitor ocean plastic.
- Collaborate across subsystem teams and manufacturers to develop GD&T aligned CubeSat CAD model.
- Raised $200K in six months through alumni outreach, sponsor engagement, and crowdfunding.
- Redesigned 70% of CAD, reducing volume by 33% and mass by 23%, employing FEA to ensure structural reliability.

**Mechanical Engineering Intern** — May 2024 – Aug. 2024
*Aerotargets International LLC* — *Kingston, PA*

- Collaborated with a team to scale and install a military UAV platform into a wind tunnel for aerodynamic testing.
- Developed MATLAB scripts for visualization and reporting of test results and wrote technical documentation.
- Communicated SolidWorks model design change recommendations and presented potential improvements.
- Operated the wind tunnel and collected force sensor data to evaluate lift-to-drag ratio under high Reynolds numbers.

**Head Teaching Assistant — Applied Engineering Methods** — Dec. 2023 – Present
*Lehigh University* — *Bethlehem, PA*

- Teach Python-based robotics control and simulation for a class of 300 and lead a hands-on 40-student lab section.
- Authored 8 new step-by-step lab assignments for BBC micro:bit and Arduino, that engage students in hands-on work and connect class to real-world problems.
- Coordinate a 4-TA team, ensure effective communication and workflow standards, provide individualized guidance.

## Projects and Research

**Research Publications and Presentations**

- **A. Mukhamejanov**, A. Ardic, K. Moored. Uncovering the Fluid–Structure Interactions of Wave-Assisted Propulsion via Cyber-Physical Fluid Dynamics. ***APS Division of Fluid Dynamics***. Houston, TX. Conference presentation.
- **A. Mukhamejanov**, A. Ardic, K. Moored. Design and Validation of a Cyber-Physical Fluid Dynamics System for Bio-Inspired Propulsion Studies. ***ASME IMECE***. Memphis, TN. Conference presentation **(Best Poster Award)**.

**Ferrari 330 P4 Car Injection Molding**

- Designed injection mold plates for a 1:40-scale toy car using SolidWorks, completed Moldflow simulations, generated CNC toolpaths with Mastercam and machined molds on a CNC mill, ensuring manufacturability and time efficiency.

**Formula SAE Carbon Fibre-Aluminum Hybrid Suspension Control Arms**

- Machined aluminum joints via CNC Mill, bonded them to carbon fibre arms with structural epoxy, and validated the hybrid assembly using Ansys FEA, strain gages, and Instron force testing.

## Technical Skills

**Manufacturing & CAD:** SolidWorks, Ansys FEA, CATIA (Intermediate), GD&T, DFM/DFA, CNC Mill
**Software:** MATLAB, Simulink, LabVIEW, Python, C++, Mastercam, Moldflow, Excel, Microsoft Office
**Hardware:** Arduino, NI DAQ, Raspberry Pi, Mechatronics, Embedded Systems, Robotics, Actuators Control