

# ABYLAIKHAN MUKHAMEJANOV

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## EDUCATION

### • Lehigh University

*Bachelor of Science in Mechanical Engineering | GPA: 3.81/4.00 | Full-Ride Scholarship*

Bethlehem, PA

*Aug 2023 - May 2027*

- **Honors & Awards:** Dean's List (2023, 2024), M. Levin Award for the Best Tech Startup at Lehigh, STEM-SI Summer Research Scholarship, Baker Institute Startup Fellow (\$5000 grant), SpaceTech Battle Most Innovative Startup by Forbes (\$5000 grant).
- **Relevant Coursework:** Computer-aided design (CAD), Fundamentals of Engineering Mechanics, Materials & Processes, Numerical Methods (MATLAB), Thermodynamics I, Electrical Laboratory I, Introduction to Electrical Engineering.

## SKILLS

- **Software:** Python, C, C++, MATLAB, Simulink, LabVIEW, SolidWorks, Excel, Microsoft Office Suite
- **Hardware & Electronics:** NI DAQ, Arduino, Raspberry Pi, Embedded Systems, Microcontrollers, Closed-Loop Control
- **Manufacturing & Testing:** GD&T, DFM, DFA, 3D Printing, CNC Machining, Waterjet & Laser Cutting, PCB Design

## EXPERIENCE

### • Undergraduate Researcher (Underwater Vehicle Design and Control)

*Unsteady Flow Interactions Laboratory, Lehigh University*

Bethlehem, PA

*Nov 2023 – Present*

- Design a **bio-inspired setup** to mimic pitch and heave movements in flexible hydrofoils, leading investigations into their hydrodynamic performance and development of quiet underwater vehicles, a part of a \$7.5M U.S. DOD-funded **MURI project**.
- Integrated, debugged, and calibrated new particle image velocimetry system, high-torque step motors, 6-axis force sensor.
- Designed, built and tested a setup from concept to deployment, utilizing SolidWorks, CNC milling, waterjet cutting, 3D Printing.
- Conducted 35 water channel experiments using NI DAQ (MATLAB) to study hydrodynamic performance and stability.
- Improved movement accuracy to 98.2%, 1.75x better than the previous design, by upgrading mechanisms and embedded systems.
- Reduced noise by 32% by implementing a closed-loop velocity control system and dual-axis tuning using ClearCore (C++).

### • Structures System Lead

*NASA CubeSat Student Launch Initiative, Lehigh University*

Bethlehem, PA

*Sep 2023 – Present*

- Lead the Structures and CAD design of OSPREY, Lehigh University's first nanosatellite, a 3U CubeSat featuring a VS/SWIR camera system to monitor ocean plastic within a 1-square-meter area.
- Manage a team of 6 students, communicate with other sub-leads to integrate deployable solar cells and antenna systems.
- Secured \$125,000 in funding for design implementation and submitted a **proposal** for the NASA CubeSat Launch Initiative.
- Optimized mass budget by 23% and increased payload volume by 33%, ensuring compliance with NASA's design specifications.

### • Research Intern (Aerodynamics and Mechanical Design)

*Aerospace Systems Control Laboratory, Lehigh University*

Bethlehem, PA

*May 2024 – Aug 2024*

- Led wind tunnel tests on AeroTargets' 33% scale LOCOST UAV, focusing on lift, drag, and stability performance.
- Collected and analyzed 100+ experimental data sets using LabVIEW, MATLAB, NI DAQ for data acquisition and analysis.
- Used a 6-axis forces sensor to measure aerodynamic forces, validating results at Reynolds numbers 20% higher than expected.
- Communicated with AeroTargets engineers to recommend fuselage design modifications, achieving a 10% drag reduction.

## PROJECTS

### • Bio-Inspired Riverine Power Generation

*C, G-code, UDP, Wireless Communication, Embedded Systems, Closed-Loop Control, Mechatronics*

Bethlehem, PA

*Aug 2024 – Present*

- Contribute to the design of a \$7.5M U.S. DOD, DOE funded project to develop a hydrokinetic turbine, which uses bio-inspired hydrofoils oscillating in water flow to convert motion into electricity, suitable for remote villages and large cities.
- Boosted power generation output by 57% by designing and implementing a wireless communication system for the closed-loop control and data acquisition that utilizes real-time data analysis to optimize energy extraction efficiency.

### • SkillSat Startup

*Arduino, C++, Python, SolidWorks, Project Management, Cost Reduction, DFM, DFA, Troubleshooting*

Astana, Kazakhstan

*May 2021 – Sep 2024*

- Founded SkillSat, an EdTech startup focused on manufacturing STEM kits that teach students to build stratospheric satellites, raising \$15K in funding and being a Top-3 SpaceTech, Top-15 EdTech Startup by Forbes Kazakhstan.
- Directed the entire product design lifecycle from concept to delivery, designing 25+ prototypes using DFMA principles, leading to 44% cost reductions, with 80+ kits manufactured and distributed to 240+ users across 25+ schools.

## CAMPUS INVOLVEMENT

- **Makerspace Coordinator (Aug 2024 - Present):** Manage 30 3D printers, 2 CNC routers, waterjet and laser cutters, PCB milling machine, assisting in rapid prototyping for 30 students and 10 clubs weekly, supporting 60 cross-disciplinary projects per semester.
- **Senior Teaching Assistant (Dec 2023 - Present):** Teach 500+ students Python programming and hardware integration improving their problem-solving skills through weekly lab sessions and hands-on projects with Raspberry Pi and Arduino.