Alex Zixuan Li

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EDUCATION

Columbia University, School of Engineering and Applied Sciences — New York City, NY
Egleston Scholar (Top 2.5% of Class of 2028) — Expected Graduation: 2028
Bachelor of Science, Mechanical Engineering, GPA 4.172/4.0, Dean's List
Relevant Coursework: Accelerated Physics, Mechanics, Linear Algebra, Multivariable Calc

Ridley College, IB Diploma — Ontario, Canada
45/45, the highest in school history | SAT: 1570 (M800, R770) — Graduated 2024
Awards: Governor General Medal (Academic Valedictorian), Headmaster's Tie

RESEARCH EXPERIENCE

Robotics and Rehabilitation Lab at Columbia — New York City, NY
Research Assistant — Jan 2025 – Present

- Assisted in data collection by guiding experienced yoga masters to document muscle activation and body positioning with SEMG sensors and motion trackers, establishing an expert performance baseline.
- Implemented the wire-activated robotic platform (RobUST) using forward and backward kinematics to replicate expert-level movements in novices.

Creative Machines Lab at Columbia — New York City, NY
Project Lead — Sep 2024 – Present

- Refined the bistable mechanism in a fish robot at the Creative Machines Lab, transitioning from a plastic-based to a carbon-fiber structure to boost oscillation frequencies and energy efficiency.
- Advanced the design by integrating a bio-inspired carbon-fiber fishbone for improved energy transfer and validated performance through experiments compared to state-of-the-art designs.

Bionic Squid AUV Research — Ontario, Canada
Independent Researcher — Jan 2022 – Aug 2024

- Designed a Bionic Squid AUV for coral reef monitoring by leading prototype development, testing, and iterative design refinement to enhance agility, compactness, and propulsion efficiency.
- Conducted hydrodynamics research using Ansys CFD simulations to optimize drag reduction, pioneering an innovative disk structure that improved maneuverability.

Tripedal Robot Research — Ontario, Canada
Research Assistant — Dec 2023 – Present

- Designed a tripedal robot using SolidWorks and refined its movement mechanics in PyBullet to achieve stable, energy-efficient performance across diverse terrains.
- Mastered inverse/forward kinematics, configuration plane analysis, robotics simulations, and other skills in collaboration with UCLA PhD mentor.

PROFESSIONAL and EXTRACURRICULAR EXPERIENCES

Robotics Club AUV Team at Columbia — New York City, NY
Mechanical Lead — Sep 2024 – Current

- Led an 80+ member AUV team as mechanical lead by organizing the design and development of key hardware components (thruster configuration, torpedo, end-effector, and hull) through CAD modeling, 3D printing, machining, and assembly.
- Collaborated with software engineers to develop and implement autonomous functionalities, enabling the team's inaugural participation in the RoboSub competition in August.

Columbia Space Initiative Aqua Robot Team at Columbia — New York City, NY
Marine Engineer — Sep 2024 – Current

- Led robotic automation, fluid dynamics optimization, and sensor integration to develop an effective autonomous underwater sampling vehicle.
- Implemented automated AUV sampling protocols for algae bloom monitoring that replaced manual methods, boosting efficiency.

Huahom Technology — Shenzhen, China
Engineering Intern — Jun 2024 – Aug 2024

- Assisted in CAD modeling for AI-driven iris identification devices, improving accuracy and strengthening cybersecurity solutions.
- Contributed to mathematical calculations for an eye-tracking detection system, refining gaze monitoring capabilities.
- Supported soldering/circuitry tasks.

3I Robotics LTD — Shenzhen, China
Software Engineer and Designer — Oct 2022 – Nov 2023

- Collaborated with software and mechanical engineers to develop navigation, localization, mapping, and simulated motion control features for vacuum robot, resulting in robust performance and advanced algorithmic integration that enhanced reliability.
- Authored a technical paper detailing software design and algorithmic strategies, capturing solutions to complex challenges.

PUBLICATIONS

"A Novel Squid-Inspired AUV Design: Revolutionizing Coral Reef Preservation Through CFD and Experimental Insights into Drag and Maneuverability," published by *Science and Technology of Engineering, Chemistry and Environmental Protection* (ISSN 2959-6157) and indexed by EI. **Engineering Profile**

"Bionic Squid-inspired Robot Facilitating Underwater Monitorization and Preservation of Coral Reefs," published by 2023 *IEEE International Conference on Sensors, Electronics and Computer Engineering*

"To Build or Not To Build: Determining a Quantitative Metric for Land Planning and Allocation," accepted by *Interdisciplinary Humanities and Communication Studies* (ISSN 2959-6149), indexed by CPCI / CrossRef / DOAJ / CNKI / Google Scholar.

"Copernicus' Rhetoric: Arguments for Heliocentrism in the Early 16th Century," accepted by *Interdisciplinary Humanities and Communication Studies* (ISSN 2959-6149), indexed by CPCI / CrossRef / DOAJ / CNKI / Google Scholar.

HONORS & AWARDS

13th Naval Academy Science and Engineering Conference (NASEC) Columbia's nominated delegate	2024
International Science and Engineering Fair (ISEF) Team Canada, 4th award in Category Robotics	2023
International Outstanding (World Champion), International Mathematics Modelling Challenge (IMMC)	2023
Canadian Mathematics Olympiad (CMO) for Top 90 highschooler in math	2023
Honorable Mention, S.T. Yau Science Award Semi-finalist (Top 8 in NA)	2023
Bay Area Science and Engineering Fair (BASEF), Gold medal in Engineering & AI	2023
VEX EDR Robotics Canadian Champion & 4 times World Championship Qualifier	2020-2024

GRANTS & FELLOWSHIPS

Summer at SEAS Fellowship	2024

VOLUNTEERING

Girl Up STEM Ontario, Canada

Founder Sep 2020 – Current

- Organized and participated in "Walking a Mile in Her Shoes" at Ridley College: Mobilized male-identifying allies to wear women's high heels and march around campus, raising awareness for gender equality in STEM.
- Organized a fundraising concert: Featured over 10 performances by teachers, parents, and students, generating entrance fee revenue to bolster Girl Up STEM initiatives.
- Authored and disseminated a scientific booklet: Highlighted 24 overlooked women scientists of the Scientific Revolution; printed copies, sold on Amazon, and exhibited in art galleries.

STEM is Fun Ontario, Canada

Education Advocate Mar 2022 – Current

- Led a team of 10 to develop free online Python tutorials and lecture in Robo&AI, expanding global access to STEM education and reaching an international audience.
- Taught robotics to 60 elementary school children during camps, fostering early STEM engagement and hands-on learning experiences.

TECHNICAL SKILLS

- Computer Aided Design (SolidWorks, Fusion, AutoCAD) and 3D-printing
- Coding in Python, C++, and MATLAB
- Ansys CFD Simulation
- Soldering and Circuitry
- Engineering Motion Capture (Vicon Nexus)