

JAMES AKL
Engineer & Researcher

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SUMMARY

I bring a strong background in **Engineering** and **Mathematics**, with expertise in **Robotics**, **AI**, and **Autonomous Systems**. I hold 5 years of experience in **R&D**, **rapid prototyping**, **technology demonstration**, and **commercialization** with emphasis on:

- **analyzing problems** and requirements, as well as devising **creative solutions** to address them.
- **project leadership**, planning, and management in technical and R&D settings – I enjoy leading and collaborating.
- **software development** (C++, Python), **mathematical modeling**, **autonomous system design**, and **algorithm design**.

My work is **structured**, **meticulous**, and **rigorous** – I am routinely invested in raising and maintaining **high standards**. I seek opportunities in **technology**, **business**, and **industry** to create value via autonomous and intelligent systems.

EDUCATION [Coursework](#)

PhD	Robotics Engineering Dissertation: "Robot Autonomy for Scrap Cutting in Metal Recycling" · Focus: Autonomous robots and systems	Worcester Polytechnic Institute	GPA 4.00/4.00	Aug 2019	Aug 2023
MS	Robotics Engineering Focus: Robot dynamics and control, Artificial intelligence, Data science, Machine learning, Applied mathematics	Worcester Polytechnic Institute	GPA 4.00/4.00	Aug 2019	May 2021
BEng	Mechanical Engineering Thesis: "Robotic Manipulator for Virtual Reality Haptic Feedback" · Focus: Mechanics, Software, Control, Sensors	Lebanese American University	GPA 3.72/4.00	Sep 2015	May 2019
Minor	Mathematics Focus: Analysis, Optimization, Linear algebra, Numerical analysis, Probability, Statistics, Modeling, Algorithms	Lebanese American University	GPA 4.00/4.00	Sep 2015	May 2018

EXPERIENCE

Applied Scientist · Amazon Robotics · Innovation Lab (BOS27)

Aug 2023 – PRESENT: Conducting **robotics R&D** to design/implement algorithms for autonomous fulfillment and logistics. Developing **robotic manipulation** capabilities using **3D perception**, **deep learning**, **task and motion planning**, and **control**.

Doctoral Researcher · Worcester Polytechnic Institute · Manipulation & Environmental Robotics Lab

Aug 2019 – Aug 2023: Solved challenging technical problems by developing **innovative solutions** and **novel algorithms**.

Managed and lead **research projects**, supervised MS students, and collaborated in multidisciplinary teams.

Developed **software** for prototypes, simulations, and experiments (C++, Python, ROS, Bash, Linux, Git, PCL, OpenCV, ...).

Engineered **autonomous systems** for industrial applications using **robot vision**, **control**, **planning**, and **machine learning**.

My work resulted in **8 research publications** in top-tier conferences/journals, as well as **3 patents** filings.

Research Mentor · Worcester Polytechnic Institute · Robotics Engineering Department / NSF REM

May 2022 – Jul 2022: Mentored students in **research methodology**, **data collection/processing**, **image processing**, and **hands-on experiments**. Presented to the NSF REM Program my strategies for **effective mentoring** of research trainees.

Teaching Assistant · Worcester Polytechnic Institute · Robotics Engineering Department

Aug 2019 – May 2020: Assisted in **delivery**, **labs**, and **grading** of courses ('Actuation', 'Sensing', 'Introduction to Robotics').

Visiting Researcher · University of Ottawa · Mathematical Modeling & Physical Experiments

Jun 2018 – Aug 2018: Modeled the vibrations of ribbed plates, and **experimentally** evaluated **analytical models** against numerical models. My work resulted in **2 research publications** in reputable journals in the field of mechanical vibrations.

Research Assistant · Lebanese American University · Multiphysics Modeling & Numerical Simulation

Nov 2017 – Mar 2019: Demonstrated the viability of the 'ionic buoyancy engine' for underwater propulsion using a multiphysics numerical model. My work resulted in a publication at a top-tier conference in the field of smart materials.

SKILLS

Software	C++ · Python · Bash · Git · Linux · CMake · OpenCV · PCL · Open3D · Eigen · OctoMap · NumPy · Pandas SciPy · PyTorch · scikit-learn · scikit-image · matplotlib · ROS/Gazebo · MATLAB/Simulink · Mathematica
3D Tools	Blender · MeshLab · Nvidia Omniverse · Meshmixer · Meshroom · F3D · Fusion 360 · SolidWorks
Robotics	Kinematics · Dynamics · Control · Motion planning · Calibration · Simulation · Manipulation & Grasping Bin picking / packing · Logistics / fulfillment · Metal cutting · Waste sorting · Soft robot control
AI & ML	Deep learning · Perception · Computer vision · Synthetic data · Search algorithms · Probabilistic reasoning
Platforms	Universal Robots · Franka Emika · Nvidia Jetson · Intel RealSense · Arduino · Raspberry Pi
Research	Surveys/reviews · Mathematical modeling · Simulations · Physical experiments · Field work
Publishing	LaTeX · Technical writing · Photo-editing · Illustration/diagrams · Video-editing · MS Office
Social	Presentations · Communication (technical, general) · Collaboration (cross-disciplinary)
Language	English (native fluency) · French (professional fluency) · Arabic (professional fluency)

PUBLICATIONS [Preprints](#)

- [2023]¹ **Cut Sequencing Algorithm for Safely Disassembling Large Structures** [Accepted, *IEEE CDC*]
- [2023]¹ **Vision-based Oxy-fuel Torch Control for Robotic Metal Cutting** [Accepted, *IEEE/RSJ IROS*]
- [2023]¹ **CNN-based Task State Estimation for Safer Automation of Oxy-fuel Metal Cutting** in *IEEE CASE*
- [2023]¹ **Feature-driven Next View Planning for Cutting Path Generation in Robotic Metal Scrap Recycling** in *IEEE T-ASE*
- [2022]⁷ **VisDA 2022 Challenge: Domain Adaptation for Industrial Waste Sorting** in *PMLR/NeurIPS Competition Track*
- [2022]⁴ **ZeroWaste Dataset: Towards Deformable Object Segmentation in Cluttered Scenes** in *IEEE CVPR*
- [2021]¹ **Towards Robotic Metal Scrap Cutting: A Novel Workflow and Pipeline for Cutting Path Generation** in *IEEE CASE*
- [2021]² **ECNNs: Ensemble Learning Methods for Improving Planar Grasp Quality Estimation** in *IEEE ICRA*
- [2020]¹ **Comparing & Optimizing Analytical, Numerical & Experimental Vibration Models for [...]** in *IStructE/Elsevier Structures*
- [2019]⁴ **Simplified Setup for the Vibration Study of Plates with Simply-supported Boundary Conditions** in *Elsevier MethodsX*
- [2019]¹ **Ionic Buoyancy Engines: Finite Element Modeling & Experimental Validation** in *SPIE Smart Structures*

¹⁻⁴ Superscripts indicate authorship position in co-authored publications.

PATENTS

- Feature-driven Next View Planning of 3-Dimensional Surfaces** · [18/119,547](#) · Filed Mar 9, 2023
- Autonomous Robotic Cutting System** · [63/413,739](#) · Filed Oct 6, 2022
- Salvage Metal Cutting Robot** · [17/721,553](#) · Filed Apr 15, 2022

VOLUNTEERING

Reviewer · IEEE and Sage Publications · International Journals & Conferences

Jun 2021 – PRESENT: Conducting scholarly peer reviews for reputed journals (IJRR, RA-L, T-ASE, TMECH) and conferences (ICRA, IROS, CDC, CASE) in the areas of robotics, AI/ML, control, automation, mechatronics, and autonomous systems.

Faculty Candidate Reviewer · Worcester Polytechnic Institute · Robotics Engineering Department

Feb 2023 – Mar 2023: Attended weekly seminars of faculty candidates to the WPI Robotics Engineering Department. Submitted written evaluations of candidates' potential in research, teaching, supervision, funding, and inclusive work.

AWARDS

Dr. Glenn Yee Tuition Award, 2022
WPI Robotics Engineering Department

LAU Most Novel Club Award, 2018
Founded the Emerging Technologies Club

LAU Engineering Scholarship, 2015
Won a design and programming competition