

JAMES AKL

Robotics Scientist

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Greater Boston, MA, USA

SUMMARY

Expertise in **robotics, AI, and autonomous systems** with strong foundations in **engineering and mathematics**.

5 years of experience in **scientific research, systems R&D, rapid prototyping, technology demonstration** with emphasis on:

- **analyzing problems** and requirements, as well as devising **creative solutions** to address them.
- **software development, mathematical modeling, algorithm design, robotic systems design and integration.**
- **team and project leadership**, planning, and management in technical and R&D settings.

My work is **structured, meticulous, and rigorous** – I am routinely invested in raising and maintaining **high standards**.

I seek opportunities in **technology, research, and industry** to create value via autonomous and intelligent systems.

EDUCATION

PhD	Robotics Engineering	Worcester Polytechnic Institute	2019–2023
	Focus: Autonomous robots and systems · Dissertation : "Robot Autonomy for Scrap Cutting in Metal Recycling"		
MS	Robotics Engineering	Worcester Polytechnic Institute	2019–2022
	Focus: Robot dynamics and control, Artificial intelligence, Machine learning, Applied mathematics, Data science		
Bach	Mechanical Engineering	Lebanese American University	2015–2019
	Focus: Robotics, Software, Control, Mechanics, Sensors · Thesis : "Robotic Manipulator for VR Haptic Feedback"		
Minor	Mathematics	Lebanese American University	2015–2018
	Focus: Analysis, Optimization, Linear algebra, Numerical analysis, Probability, Statistics, Modeling, Algorithms		

EXPERIENCE

Amazon · Innovation Lab (Fulfillment Technologies & Robotics)

Postdoctoral Scientist (2024/03 – Present)

- Conducting **robotics/AI research** spanning **robot learning, perception, control, manipulation, human-robot interfacing**.
- Leading a prototyping team and developing innovative **robotic fulfillment systems**.

Applied Scientist (2023/08 – 2024/03)

- Conducted **robotics R&D** to design/implement algorithms for autonomous fulfillment and logistics.
- Developed **robotic manipulation capabilities** using **3D perception, deep learning, task and motion planning, and control**.

Worcester Polytechnic Institute · Robotics Engineering Department

PhD Candidate (2019/08 – 2023/08) with the Manipulation & Environmental Robotics Lab

- 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 (2022/05 – 2022/07) with the NSF REM Program

- 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 (2019/08 – 2020/05)

- Assisted in **delivery, labs, and grading** of robotics courses ('Actuation', 'Sensing', 'Introduction to Robotics').

SKILLS

Software	C++ · Python · Bash · Git · Linux · CMake · ROS2 · OpenCV · PCL · Open3D · Eigen · OctoMap · PyTorch SciPy · scikit-learn · scikit-image · matplotlib · Isaac Sim · 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
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

- [2024]¹ **Robot Perception for Transporting Items from Bins with Identical Objects to Bins with Mixed Objects** in *Amazon CSS*
- [2023]¹ **Cut Sequencing Algorithm for Safely Disassembling Large Structures** in *IEEE CDC*
- [2023]¹ **Vision-based Oxy-fuel Torch Control for Robotic Metal Cutting** in *IEEE 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 EAPAD (Smart Structures)*

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

PATENTS

- Autonomous Robotic Cutting System** · [18/377,196](#) · Filed Oct 5, 2023
- Feature-driven Next View Planning of 3-Dimensional Surfaces** · [18/119,547](#) · Filed Mar 9, 2023
- Salvage Metal Cutting Robot** · [17/721,553](#) · Filed Apr 15, 2022

SERVICE & VOLUNTEERING

Scholarly Reviewer · IEEE and Sage Publications · International Journals & Conferences
2021/06 – Present: Conducting scholarly reviews for journals (IJRR, RA-L, T-ASE, TMECH) and conferences (ICRA, IROS, CDC, Humanoids, CASE) in robotics, AI/ML, control, automation, mechatronics, and autonomous systems.

Faculty Candidate Reviewer · Worcester Polytechnic Institute · Robotics Engineering Department
2023/02 – 2023/03: 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.

Visiting Researcher · University of Ottawa · Mathematical Modeling & Physical Experiments
2018/06 – 2018/08: 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 · Multi-physics Modeling & Numerical Simulation
2017/11 – 2019/03: Demonstrated the functionality of the 'ionic buoyancy engine' for underwater propulsion using a multi-physics numerical model. My work resulted in a publication at a top-tier conference in the field of smart materials.