JACOB SAYONO

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EDUCATION

University of California, Los Angeles (UCLA) *Expected 2024*
B.S. in Mechanical Engineering, Minor in Data Science Engineering.

Saddleback College | Irvine Valley College *Graduated 2019*
A.S. in Engineering, A.S. in Physics, A.A in Mathematics.

PUBLICATIONS

CubeSense++: Smart Environment Sensing with Interaction-Powered Corner Reflector Mechanisms.
Xiaoying Yang, **Jacob Sayono**, Yang Zhang.
Proceedings of the 36th Annual ACM Symposium on User Interface Software and Technology (UIST), 2023.
[Paper] [Video] [DOI] [Press]

MiniKers: Interaction-Powered Smart Environment Automation. **(Initial Accept – Top 4%)**
Xiaoying Yang, **Jacob Sayono**, Jess Xu, Jiahao "Nick" Li, Josiah Hester, Yang Zhang.
Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), 2022.
[Paper] [Code] [DOI] [Press]

PENDING REVIEWS

[Redacted] This research seeks to wirelessly charge wearables using interaction as power and capacitive coupling.
Anonymous Authors.
Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems (CHI), 2024.
[Redacted]

CURRENT WORKS

Visible Light Backscatter with Interaction-Powered LCD Shutter Mechanisms for Smart Sensing.
- First-author. In preparation for submission to *ACM IMWUT '24 Journal.*

Optimizing Multi-Agent Task Assignment with Conditional Case Swapping for Online Task Generation.
- Co-author. In preparation for submission to *IEEE RA-L '24 Journal.*

PRESENTATIONS

UCLA Summer Undergraduate Research Program (SURP) Symposium: "CubeSense#" [Journal] *Sep 2023*
UCLA Undergraduate Research Week: "MiniKers" [Media] *May 2023*

RESEARCH EXPERIENCE

Verifiable & Control-Theoretic Robotics Laboratory (VECTR Lab at UCLA) *Jun 2022 – Present*
Undergraduate Researcher | **Advisor: Brett Lopez** (@ucla.edu) | Mentor: David Thorne
- Proposed mathematical theory for conditional task swapping in a multi-robot system, implemented code for preliminary test scripts, and provided ROS support for simulations to verify optimization algorithms in time-sensitive missions involving online task allocation and path planning. [Code]
- Generated grid environments (office-like, forest-like, and random maps), streamlined initialization of multi-robot cluster and task locations for outputs of performance benchmarks against existing algorithms, and created detailed figures that cumulated into a research paper for *ICRA '24*. [Preprint Paper] [Code]

Human-Centered Computing & Intelligent Sensing Laboratory (HiLab at UCLA) *Jan 2022 – Present*
Undergraduate Researcher | **Advisor: Yang Zhang** (@ucla.edu) | Mentor: Xiaoying Yang
- Developed a real-time light analysis and area tracking android application for experiments to verify design concept, prototyped mechanisms to verify backscatter signals, and shared codes and 3D designs with collaborators from external universities to utilize in their experiments, amplifying project scope. [Code]
- Designed retrofitting mechanisms that transform human interaction into RPM values that simultaneously: (1) exhibit a gradual change in radar cross-section signal pattern, (2) do not exceed maximum framerate threshold of radar hardware, and (3) induce highest reflector signal frequency relative to human noise.
- Enabled comprehensive design comparisons for most optimal radar cross-section signal pattern using a shielding mechanism of varying vents to discretize signals, in addition to a standard and computational design approach, while balancing optimization between system performance and human experience.

ADVANCED SKILLS

Software:	C++, Python, Linux, ROS, MATLAB, Jupyter, LaTeX, Git.	*Basic: CV, ML, SLAM.*
Electrical:	Arduino, Raspberry Pi, Sensors, Motors, Soldering, Controls.	*Basic: Circuit Design & Analysis.*
Mechanical:	3D Printing, SolidWorks (Certified License), Product Design.	*Basic: CNC, Wire EDM.*

Leadership Projects

DevX: Autonomous Rover *Dec 2021 – Present*

Product Manger | Autonomy Team Lead

- Rallied 4 cross-functional teams (mechanical, electrical, software, autonomy) to plan each timeline and iteration for all aspects of BruinBot: mobile app, database server, rover hardware.
- Mentored engineers to establish fundamental deep-learning vision and path planning algorithms to create **ROS-powered** autonomy and teleoperation both in simulation and on physical hardware. [Code]

Industry Experience

ROBOTIS (Robot is …) *Jan 2019 – Aug 2019*

Mechatronics Intern | **Supervisor: Brandon Antillon** (Deceased)

- Abstracted key insights to create a detailed array of print outcomes from various 3D printer settings, including dual-nozzle configurations, serving as a practical reference and comparison tool for future interns.
- Avoided expenses on testing hardware material analysis by creating stress analysis machine for company's office under a $300 budget and using ROBOTIS-servo (Dynamixel) encoders.
- Demonstrated precise control over servos with a microcontroller, programming movement sets frame-by-frame to cater to young customers, ages 12 and under, who requested customized poses and trendy dances.

Unison Consulting, Inc. *Jun 2018 – Dec 2018*

Data Analyst Intern | **Supervisor: Donald Arthur** (@unison-ucg.com)

- Created budgets and cost-volume-profit analyses for car rentals in multiple airports from monthly enplanements data, presenting documented analyses to team meetings to convey projected revenues.
- Integrated systematic formulas into automated scripts to streamline calculations of massive numerical data into digestible chunks for company clients to visualize and cross-reference.

Extra-Curriculars

The American Society of Mechanical Engineers (ASME) *Oct 2019 – May 2022*

Robotics Software Engineer | Computer Vision Engineer | Control Systems Engineer

- Established ROS architecture for closed-loop control, enhancing team engagement and collaboration by modularizing tasks to develop underwater autonomous navigation for RoboSub competition.
- Developed image processing pipeline in Python OpenCV to identify underwater lattice points and boundaries; further fine-tuned parameters of Canny edge detection and Hough transforms in MATLAB.
- Avoided additional purchases in controllers for drivetrain and arm motors by creating a simple DIY high-power H-Bridge solution, enabling high torque bi-directional motor control with high-resolution encoder.

The Society of Automotive Engineers (SAE) Supermileage Vehicle *Sep 2021 – Apr 2022*

Powertrain Engineer | Electrical Engineer

- Redesigned a Hall effect sensor-based encoder for real-time RPM detection on embedded system (C++) and implemented PID throttle control that utilized interrupts to minimize latency for duty cycle adjustments.

Graduate-Equivalent Courses

MAE C163B: Dynamics of Robotic Systems *[Grade: A+]*

- Simulated motion planning and trajectory optimization of robotic arm given set of constraints. [Code]

MAE C163A: Kinematics of Robotic Systems *[Grade: A]*

- Developed 4-DOF robotic arm and verified FK/IK solutions on 3D-printed hardware. [Code]

Private/Online Education

Udacity: School of Autonomous Systems *July 2022 – Sep 2022*

- Self-Driving Car Nanodegree Program Certification.

Symposiums

Southern California Robotics Symposium (SCR) *Sep 2022*

- Volunteered to host workshops and facilitate research panel discussions, actively engaging in dialogue.

Honors & Awards

2024 UCLA Undergraduate Research Fellows Program (URFP) *$3000*
2023 NSF REU: Summer Undergraduate Research Program (SURP) at UCLA *$6500*
2023 UCLA Dutra-Liu Family Endowed Centennial Scholarship in Engineering *$4500*
2022 UCLA Chih-Ming Ho Quasi-Endowed Scholarship Fund *$1000*

- Awarded to 1 student who has exemplified academic and research excellence on an interdisciplinary level.

2018 Saddleback College Honors Certificate-Track Program

Community Involvement

Mongolia International University: *Visiting Volunteer, Teacher.* *Spring 2023*
Phi Theta Kappa Honor Society: *Administrator Coordinator, Volunteer, Tutor.* *Jan 2017 – May 2019*
Associated Student Government at Saddleback College: *Honors Board Spokesman.* *Sep 2016 – May 2019*