Julian Millan

jmillan@andrew.cmu.edu • (804) 696-1537 • https://www.linkedin.com/in/julian-millan-782802257 •
https://github.com/julian-millan • julian-millan.github.io

EDUCATION

Carnegie Mellon University Pittsburgh, PA
Master of Science in Mechanical Engineering - Research. May 2027

- CMU Rales Fellow, 2025 Cohort.
- Machine Learning, Modern Control Theory, Research with Robotic Caregiving and Human Interaction Lab

California Institute of Technology Pasadena, CA
Bachelor of Science in Mechanical Engineering. June 2025

- GPA: 3.5 / 4.0.
- Robotic Systems, Mobile Robots, Class Manipulators and Kinematics, Robotic Planning, Feedback Control Systems, Advanced Robotics: Planning

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RESEARCH EXPERIENCE

Autonomous Robotics and Controls Lab at Caltech June 2024 - September 2024

- Collaborated with Professor Soon-Jo Chung to develop Behavior Cloning and Offline Reinforcement Learning controller models for a bipedal robot, and was awarded the Larson Scholar title.
- Utilized skills in Linux, ROS, Python, Machine Learning, Neural Networks, and Mujoco simulation to improve model performance by 20% and contribute to a publication in progress.

Caltech AMBER Lab June 2023 - September 2023

- Researched with Professor Aaron Ames to design an actuated ankle and foot for a bipedal robot, and received the Class of ‘52 SURF Fellow named title.
- Applied skills in FEA, mechanical design, SOLIDWORKS, and motor choice to shrink the previous design of the ankle while generating weight savings of 80%.

ACADEMIC PROJECTS

Autonomous Maze Solver April - June 2024
Caltech

- Led all software and robotic fabrication for a self-localizing and planning robot capable of solving a random maze. Placed 3rd in class competition and gained skills in report writing.
- Employed skills in ROS2, SLAM, algorithm design, Python, Probabilistic Roadmapping, and motion planning to create a self-driving and obstacle avoidant maze-solving robot.
- Video: https://youtu.be/JR84L-bYDIU.

Robotic Manipulator January - March 2024
Caltech

- Led hardware design, fabrication, and implemented collision-aware kinematic controller for 5-DOF manipulator that played a multiplayer board game with humans and gained skills in project management.
- Conducted mechanical analysis using robotic kinematics and dynamics, resulting in improved stability.
- Video: https://youtu.be/ghnqkQhqNAI.

Senior Capstone Sept. 2024 - Mar. 2025
Caltech

- Led my team’s software and electronics sub-teams for the 40th annual Caltech ME 72 competition.
- Used skills in Arduino, C++, mechatronics, 3D printing, and motor control to lead the team to 2nd place.
- Team Video: https://youtu.be/GwZ6moQvQMk

JARVIS Jan. - Mar. 2025

- Utilized skills in Python, robotic systems, and Linux to design and fabricate fully mobile, back-mounted wearable third arm. Was invited to present at City of STEM LA 2025 and received a PCBWay sponsorship.
- Video: https://youtube.com/shorts/U55WQKHoxPk?si=lOuaHHwc5PsZLzxX

SKILLS

Machining: Laser cutting, water jetting, rapid 3D print prototyping, milling, lathing, and drill pressing.
Robotics: Actuators/motors, Gazebo, Mujoco, RoboClaw, Raspberry Pi, DIY remote control, and Arduino. PID and non-linear feedback control. Trajectory generation/tracking.
Engineering: SOLIDWORKS, Onshape, ANSYS, FEA, and AutoCAD. Team projects with a BOM, PDR, CDR, reports, and final demos. Mechatronics/circuit design. Inverse Kinematics.
Programming: Jupyter, C/C++, Java, and MATLAB. Recursion, Algorithms, Trees. URDF/RVIZ, and Ubuntu. Machine Learning with Offline Reinforcement Learning and Behavior Cloning.

PUBLICATIONS AND PRESENTATIONS

Design and Control of a Passive-Ankle Bipedal Robot - Sorina Lupu, Leo Zhang, **Julian Millan,** Soon-Jo Chung

- In-progress publication based on my research with the Autonomous Robotics and Controls Lab (ARCL).

Designing a Learning-Based Controller for a Bipedal Robot **- Julian Millan**

- Completed final report and oral presentation given at SFP Seminar Day August 2024 based on my research with the ARCL during summer 2024.

Designing an Optimized Robotic Ankle for a Bipedal Robot **- Julian Millan**

- Completed final report and poster presentation given at SFP Seminar Day October 2023 based on my research with the AMBER Lab during summer 2023.

TEACHING EXPERIENCE

- **Mechanical Prototyping TA**: Worked directly with students, demonstrating and teaching shop practices and safety during summer 2023 and 2024. Techniques taught include milling, lathing, and assembly.
- **Dimensional and Data Analyses in Engineering TA:** Created course content, graded exams and assignments, and held office hours. Improved average grade and course feedback compared to a year prior.

COMMUNITY AND SERVICE

- **Caltech Health Advocate:** Volunteer certified EMR and first responder for Caltech and Pasadena.
- **Caltech FCC**: Volunteer orientation small group leader for incoming Caltech freshmen.
- **Caltech Waiter:** Employment that requires setting up, providing, and cleaning up after dinners for students
- **Caltech Grill Master**: Employment that entails grilling meals for students and managing a team of grillers
- **Caltech Admissions Ambassador**: Position that requires answering incoming student Caltech questions.

HONORS AND AWARDS

- **Larson Scholar:** Named SURF title given for my research during summer 2023 with the AMBER Lab.
- **Class of '52 SURF Fellow**: Named SURF title given for my research during summer 2024 with the ARCL.
- **FCC Appreciation Award**: Certificate and dinner received for going "above and beyond" as a mentor.
- **CMU Rales Fellowship Winner 2025**
- **2025 HSF Scholar**
- **Caltech 40th Annual Engineering Design Competition Runner-Up**