Alexander Minor

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Education

Carnegie Mellon University (CMU), Pittsburgh, PA — Expected Graduation May 2027

- Bachelor of Science in Mechanical Engineering | 4.00 GPA (Dean's List)

Work Experience

CMU Manufacturing Futures Institute – Robotics Researcher — Pittsburgh, PA | Jan 2026 – Present

- Architected a robot-agnostic ROS 2 control framework to unify command protocols across Universal Robots UR20 and Yaskawa Nex10 manipulators
- Designed custom pneumatic manifolds, tool-changers, and fixtures integrated with ATI force-torque sensors
- Integrated tactile (GelSight), optical (RealSense), and thermal sensor (Seek Thermal) streams into ROS 2
- Developed force-feedback teleoperation system for hard surface interaction tasks like grinding or sanding

CMU Manufacturing Futures Institute – Manufacturing Automation Intern — Pittsburgh, PA | Aug 2025 – Dec 2025

- Engineered a modular industrial PLC application platform leveraging PLCnext hardware architecture
- Developed a PLC application for automated PCB soldering with custom temperature profile tracking and complete technical documentation

LMU Robotics and Intelligent Systems Lab – Undergraduate Research Assistant — Los Angeles, CA | Aug 2024 – May 2025

- Engineered low-latency network communication between Magic Leap 2 AR headsets and ROS 2
- Implemented real-time AR visualizations, synchronizing virtual trajectory previews with physical robotic arm movements

LMU Intelligent Networked Systems Lab – Undergraduate Research Assistant — Los Angeles, CA | Aug 2023 – Dec 2023

- Co-developed a multi-UAV drone swarm system designed for autonomous wildfire detection and analysis
- Built telemetry data logging pipelines for the Parrot Anafi Ai drone platform
- Simulated flight dynamics and mission protocols to evaluate autonomous drone behavior before field testing

Campus Makerspace at CMU & LMU – Student Worker, Fabrication Expert — Pittsburgh, PA | Aug 2023 – Present

- Maintained industrial 3D printers, laser cutters, and fleet management infrastructure
- Advised student and faculty engineering projects in additive manufacturing, manual machining, and precision laser cutting

Project Experience

CMU Robotics Club Quadruped Project – Project Lead & Lead Mechanical Designer — Aug 2025 – May 2026

- Designed and tested compact cycloidal gearboxes to maximize torque density and durability for leg actuation
- Configured physics-based simulation environments and real-time motor control loops for quadruped gait execution

Fully 3D-printed 6-Axis Robotic Arm – *Creator & Lead Robotics Engineer* (Personal Project) — Aug 2023 – Aug 2025

- Designed, fabricated, and assembled custom cycloidal/planetary gearboxes and structural arm components
- Implemented ROS 2 trajectory planning using MoveIt and stereo-vision camera feedback for autonomous guidance

Autonomous Underwater Submersible Probe – Team Lead & Lead Hardware Engineer — Aug 2020 – May 2023

- Led additive manufacturing and hydrostatic pressure testing for two 3D-printed submersible hulls
- Engineered an autonomous sensor payload integrating IMU, pressure, temperature, GPS, and ambient light sensors

Low-Cost Camera Motion Capture System – Creator & Solo Developer (Personal Project) — Aug 2021 – May 2023

- Developed an open-source optical motion capture pipeline utilizing consumer webcams and algorithmic pose estimation

Leadership & Awards

Vice President, LMU Robotics Club — 2024 – 2025

Board Member, LMU Additive Manufacturing Club — 2024 – 2025

Germany's Young Researchers Competition, 2nd Place Statewide — 2020 – 2023

1st place, German Mathematics Olympiad Statewide — 2018 – 2022

Skills

Programming Languages: Python, C++, Embedded C, Golang, MATLAB

Design: Onshape, SolidWorks, Fusion 360, KiCad, Ansys Finite Element Analysis

Manufacturing: 3D-Printing, Laser-Cutting, Manual Machining, Wood Working

Robotics: ROS 2, ros2_control, MoveIt, Gearbox Design, Motor Control, Computer Vision, Robot Path Planning, UAV Control

Electronics: PLC, STM32, Arduino, Sensor Data Gathering, Soldering, Electrical Wiring, PCB Design

Linux: System Administration, Shell Development, Hosting, Networking, Debugging

Languages: Fluent in English and German, Conversational in Russian