

SAMARA BAIDWAN

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EDUCATION

Harvey Mudd College, Claremont, CA

B.S. in Engineering | GPA: 3.78/4.00

Expected May 2028

Current Coursework: Electronic & Magnetic Circuits, AI-Amplified Prototyping, Advanced Systems Engineering I

Relevant Coursework: Materials Engineering, Experimental Engineering, Engineering Design & Manufacturing

ENGINEERING PROJECTS

Engineering Clinic — Bioimaging Illumination Electronics

August 2026 - Present

Industry-Sponsored Project

- Designed from scratch in KiCad a high-power 14-LED series PCB (~25 V, 700 mA constant-current) for a fluorescence imaging platform; iterated to v2 with wide copper pours for uniform illumination and heat spreading and test points at every node; now debugging first assemblies through per-LED test-point isolation and continuity checks.
- Co-designed a modular 40-LED white-light array with a distribution board splitting a 1.2 A driver channel to 300 mA per strip; testing the two-channel constant-current driver and PWM/strobe camera synchronization across sub-teams.

Autonomous Surface Vehicle — Environmental Sensing System

January 2026 - May 2026

Course Project — ENGR80 Experimental Engineering

- Designed and calibrated wind speed and direction sensors (A3144 Hall-effect anemometer, MLX90316 magnetic-encoder wind vane); achieved $R^2 = 0.99$ wind-tunnel calibration and fused vane angle with IMU heading for true wind direction.
- Troubleshooted the anemometer through repeated failures: redesigned its base in CAD to relieve wire strain that was snapping sensor pins, identified a missing pull-up resistor, and verified pulses on an oscilloscope before confirming Teensy counts.
- Integrated sensors with a Teensy 4.0 and microSD logging; validated in pool, lake, and ocean deployments, diagnosing a field failure on-site (reversed magnet polarity) with an oscilloscope. Presented to the Engineering Visitors Committee.

LEADERSHIP EXPERIENCE

MuddSub — Harvey Mudd Underwater Robotics Club

August 2025 - Present

Co-President, Mechanical — Elected 2026

- Lead mechanical development of Crush, a new autonomous underwater vehicle for RoboSub: heading gripper-actuator prototyping and enclosure-panel machining; configured the electronics layout and designed the ZED 2i stereo-camera mount.
- Coordinate and onboard 36 members (~23 active) in SolidWorks, machining, waterproofing, and mission-actuator design; restructured mechanical work into 5 sub-teams with a 30-task dependency tracker and presentation-based technical reviews.

Harvey Mudd College Makerspace, Claremont, CA

August 2025 - Present

Head Steward, Coordination (August 2026) — Steward since 2025

- Co-lead a 1,200+ user makerspace with six other departmental stewards, coordinating training and onboarding for a 50+ student team in laser cutting, FDM/SLS/SLA 3D printing, waterjet cutting, electronics, and other fabrication tools.
- Redesigning steward training procedures and standardizing 30+ user and steward manuals; track training requirements in Google Sheets and meet weekly with faculty management to prioritize safety and user-experience improvements.

RESEARCH EXPERIENCE

University of New South Wales (UNSW) — Materials Science Lab, Sydney, Australia

May 2026 - August 2026

Undergraduate Researcher — Alloy Development & Characterization

- Co-developed 21 Cu-based carbon-bronze alloys as a lead-free bearing material on a team of three; calculated compositions, prepped charges, and performed arc melting, heat treatment, metallography, optical microscopy, & hardness testing.
- Improved data visualization in the lab's MATLAB image-analysis pipeline (carbon area fraction and particle-size histograms) and refined the hardness-testing procedure. Attending TMS 2027.
- Fabricated and heat-treated Zr-based alloys for space nuclear-reactor cladding research; analyzed differential scanning calorimetry (DSC) heating/cooling curves to evaluate phase-transformation temperatures.

Harvey Mudd College — Molecular Engineering Lab, Claremont, CA

January 2025 - December 2025

Undergraduate Research Assistant — Nanoparticle Fluorescence Characterization

- Diagnosed circular-dichroism instrument calibration errors through hardware inspection and weekly calls with the manufacturer; ran fluorescence experiments and authored a characterization SOP.

TECHNICAL SKILLS

Electronics & Instrumentation: KiCad PCB design, Teensy/Arduino, soldering, oscilloscopes, multimeters, sensor calibration

Design & Fabrication: SolidWorks, Autodesk Fusion, manual machining, waterjet/laser cutting, 3D printing

Lab & Characterization: arc melting, heat treatment, metallography, optical microscopy, hardness testing, DSC

Programming & Analysis: MATLAB, Python, Excel, GitHub