Ama Agyeiwaa Obeng

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EDUCATION

California Institute of Technology Pasadena, CA
B.S. in Mechanical Engineering - GPA: 3.9/4.0 *Graduating June 2026*

RELEVANT COURSEWORK

Thermal Science I & II & III; Mechanics I & II & III; Dimensional and Data Analyses in Engineering; Engineering Design Laboratory; Experiments and Modeling in Mechanical Engineering; Waves, Quantum Mechanics, and Statistical Physics; Design and Fabrication
Expected May 2026: Robotics I & II, Robotic Systems

SKILLS

Programming Languages: Python, Java, HTML/CSS, LaTeX, MATLAB
Software & Tools: SolidWorks, AutoCAD, Fusion 360, Ansys, Gmsh, FEA, GD&T, Visual Studio Code, Git
Robotics Software & Embedded Systems: Robot Operating System (ROS), ROS Visualization (RViz), Arduino, ESP32, Raspberry Pi
Manufacturing: FDM/SLA 3D Printing, CNC Mill, Lathe, Horizontal Band Saw, Waterjet, Laser Cutter, Sandblaster, DFM

EXPERIENCE

Mechanical and Civil Engineering Department California Institute of Technology
Undergraduate Researcher *Nov 2024 - Present*

- Researching slope stability and seismic ground motion modeling in Professor Domniki Asimaki's earthquake engineering lab.
- Running sliding mass simulations with Seismo-VLAB (SVL) and refining the Makdisi-Seed methodology to improve displacement predictions during earthquakes.

Nano/microscale Transport Engineering Laboratory (nTEL) George Mason University
Summer Research Fellow *Jun 2025 - Sep 2025*

- Selected and characterized aerosol candidates (carbon soot, sodium chloride, silica) for microgravity thermophoresis experiments aboard the International Space Station under Dr. Jeffrey Moran, supporting research on aerosol migration driven by thermophoresis to improve climate models.
- Conducted particle imaging and analysis with Scanning Electron Microscopy (SEM) and ImageJ software to validate particle visibility, morphology, and size distributions, confirming that the selected aerosols were suitable for the planned experiments.

Facilities & Fleet Management (FFM) – Property Management & Office of Sustainability Prince William County
Engineering Intern *Aug 2024 - Sep 2024*

- Updated and validated energy consumption records for 20+ county buildings using Energy Star Portfolio Manager.
- Analyzed property management and sustainability data to support energy efficiency planning, and presented findings on sustainable building initiatives to the Lead Civil Engineer and Office of Sustainability.

Division of Geological and Planetary Sciences California Institute of Technology & NASA Jet Propulsion Laboratory (JPL)
Undergraduate Researcher *Jul 2024 – Sep 2024*

- Analyzed airborne imaging spectroscopy data from NASA's SHIFT campaign to study seagrass and coastal ecosystems in Santa Barbara, under the mentorship of Dr. Victoria Orphan (Caltech), Dr. John Magyar (Caltech) and Dr. Kelly Luis (NASA JPL).
- Processed reflectance spectra to improve detection of submerged vegetation, assess plant health and stress, and generate georeferenced habitat visualizations within NASA's Science Managed Cloud Environment to support ecosystem monitoring.

Particle Flow & Tribology Laboratory (PFTL) Rice University
Summer Research Fellow *Jun 2023 - Aug 2023*

- Researched abrasive wear under Professor Fred Higgs, applying mesh generation and discrete element modeling to simulate particle behavior in mechanical systems.
- Developed a Python program to analyze mesh geometries and extract parameters (nodes, boundary conditions) from user-provided files, streamlining simulation setup and analysis.

Mechanical and Civil Engineering Department California Institute of Technology
Undergraduate Researcher *Jul 2022 - Aug 2022*

- Researched carbon dioxide sequestration in cement under Professor Melany Hunt, evaluating its feasibility as a long-term carbon sink for sustainable construction applications.
- Performed calculations on CO_2 processes (calcination and carbonation) to assess long-term storage capacity.

PROJECTS

Robotics – Atlas vs. Floating Ball Simulation California Institute of Technology
Undergraduate Student *Nov 2025 – Dec 2025*

- Collaborated in a team of three to program a 30-DOF humanoid robot, Atlas, in ROS and RViz to detect and reach a ball placed randomly in its workspace while minimizing vertical lift-off of its feet, as part of a course taught by Professor Gunter Niemeyer.
- Used task-priority, damped Jacobian inverse kinematics to achieve smooth, stable whole-body motion with a primary hand-reaching task and a secondary foot-height constraint to preserve ground contact across reachable and unreachable targets.

Engineering Design Laboratory (I/ME 072A & II/072B) – 3 Remote Controlled Robots California Institute of Technology
Undergraduate Student *Sep 2024 – Mar 2025*

- Designed and built three remote-controlled robots for a Bot Hockey tournament with a team of six, placing 3rd in the 40th Annual Engineering Design Competition in a course taught by Professor Michael Mello.
- Organized into sub-teams (Chassis, Drivetrain, Electronics, Shooter Automation) to streamline fabrication and testing.
- Prototyped and fabricated components using CAD, laser cutting, waterjet machining, and CNC milling for final assembly.
- Led the transition from Bluetooth (Xbox controller) to radio control (FlySky system), significantly improving response time and reliability after mock competition testing revealed connection issues.

Design and Fabrication (ME 014) – Two Step Gearbox Transmission California Institute of Technology
Undergraduate Student *May 2024 – Jun 2024*

- Designed and built a two-step gearbox transmission using CAD, laser cutting, and CNC machining for prototyping and final assembly in a two-week course competition with a team of five under Professor Michael Mello.
- Achieved 3rd place overall by reaching 250 revolutions per minute in 37% less time than predicted by MATLAB simulations.
- Implemented modifications including lubrication, re-machining misaligned shafts, and re-tapping threaded holes which improved the system performance and increased the maximum speed from 488 rpm to 503 rpm (within 3% of target).
- Collaborated in initial team design discussions to balance manufacturability and performance, ultimately selecting steel gears with acrylic housing for optimal results.

Large-Scale Event Stage Design & Construction California Institute of Technology
Construction Lead *Dec 2022 – Apr 2023*

- Led a four-month project to design and build a large-scale stage (platforms, railings, stairs) for Caltech's annual Lloyd (a residential community) "Interhouse" event, coordinating with campus administration for safety inspections and approvals.
- Fabricated and assembled structural components using power tools and shop equipment, delivering a final build that safely supported 500+ attendees during the event.

Introduction to Robotics (ME 008) – Gimbal Design Challenge California Institute of Technology
Undergraduate Student *Sep 2022 – Dec 2022*

- Collaborated in a team of three to design and fabricate a two-axis gimbal using CAD and 3D printing, integrating motors and a webcam for pan-tilt motion in a course taught by Professor Gunter Niemeyer.
- Programmed object detection and tracking in Python, enabling real-time target identification through computer vision.
- Implemented feedback control algorithms (proportional control, spline interpolation) to improve accuracy and responsiveness
- Calibrated system performance by mapping pixel coordinates to motor angles, which allowed us to quantify the field of view, response bandwidth, and tracking error.

CALTECH COMMUNITY INVOLVEMENT HIGHLIGHTS

- Teaching Assistant, Eng. Design Lab I & II (Sep 2025-)
- Treasurer, Engineers Without Borders (May 2025-)
- Vice President, Black Student Union (Apr 2024-Jun 2025)
- Hixon Writing Center Tutor (Apr 2023-)
- Caltech QuestBridge (Sep 2022-)
- Caltech Society of Women Engineers (Sep 2022-)

Lloyd House - Caltech Residential Community:

- Head Peer Advocate (Apr 2025-)
- Head Equity & Title IX Advocate (Jun 2024-)
- Advocacy Committee Rep (Mar 2024-Mar 2025)
- Representative-At-Large (Feb 2023-Feb 2024)

PRESENTATIONS

Caltech Summer Undergraduate Research Fellowship (SURF) Seminar Day - Pasadena, California (Oct 2025)
Quantifying Thermophoresis and Self-Thermophoresis of Aerosols in Microgravity for Improved Climate Modeling. [Poster]