Alec Perkins

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PORTFOLIO WEBSITE: alec-perkins.github.io/portfolio

EDUCATION

The University of California, Santa Barbara — IP: Bachelor of Science (B.S.), Mechanical Engineering   Expected *June 2026*
Cumulative GPA: 3.63 — UCSB C.O.E. Honors Program

WORK EXPERIENCE

Undergraduate Research Collaborator - Materials & Manufacturing for Aerospace Extremes Lab   *October 2024 - Present*
College of Engineering — UC Santa Barbara, CA

• Practice and document the operation of Tethon's Bison 1000 DLP 3D Printer with polymer burn-off and sintering postprocessing to test material properties of High Alumina Ceramic-Resin prints
• Troubleshoot solutions for multi-variable print failures in order to perfect the repeatability of the manufacturing process
• Conduct experiments with sintering of ceramic-resin green prints to overcome challenges in post processing of additive manufacturing parts and improve production quality
• Analyze impact of environmental variations on printing outcomes to reduce errors in material data collection
• Perform three point and four point bending tests to determine the strongest application methods for sintered High Alumina in Aerospace environments and industry
• Processing JPL's aluminum thin wall tensile test data with MATLAB to conclude and write comparative results for publication

Undergraduate Research Assistant - Begley Research Group   *May 2024 - Present*
College of Engineering — UC Santa Barbara, CA

• Utilize FEA tool ABAQUS to conceptualize, develop, and analyze three-dimensional models of 3D-printed lattice (meta) materials
• Create detailed project documentation with presentations overseen by M.E. Professor Matthew Begley and Dr. Patrick Ziemke
• Develop structural analyses that enable repeatability, replication, and expansion of research findings on lattice application.

PROJECTS

Engineers Without Borders - Solar Table Project with Local Team   *October 2023 - Present*

• Coordinated and led multiple 5 - 10 person teams through the process of planning and construction
• Model Solar Table prototype using SolidWorks and ABAQUS to test for safety and structural integrity
• Analyze wind force impacts to determine maximum deflection and resultant forces on the structure
• Designed and redlined part drawings in SolidWorks to be machined in different shops on and off campus
• Learned how to TIG weld custom-fit components together that were too difficult to get machined

Automatic Baseball Collecting Rover with Camera Vision and Control Guided Navigation   *April 2025 - June 2025*

• Designed and manufactured a fully autonomous rover using computer vision (OpenCV), Arduino microcontrollers, and PID control systems to detect, navigate to, and collect baseballs across multiple terrain types with around a 90% success rate
• Implemented iterative prototyping methodology through 5 design cycles, conducting failure analysis on electrical systems, redesigning mechanical collection mechanisms, and optimizing performance based on real-world testing data
• Led cross-functional team integration of hardware and software systems, troubleshooting critical wiring failures, implementing proper grounding protocols, and establishing autonomous state machine with 4 operational modes
• Executed comprehensive testing and validation across concrete, grass, and turf surfaces, tuning PID controller gains for each environment and documenting performance metrics for manufacturing scalability

Spring-Mass System Simulation - MATLAB   *October 2023 - November 2023*

• Modeled a system of two masses and three springs connected in alternating series using MATLAB
• Applied eigenvalue and eigenvector analysis to create equations for motion simulation
• Plotted system dynamics to visualize real-world physical behaviors under arbitrary displacement conditions

PUBLICATIONS IN PROGRESS

• Characterization and comparison of thin wall aluminum powder bed fusion A.M. with water jetted thin wall manufacturing
  UC Santa Barbara's MMAX Lab, California Institute of Technology's JPL
• Additive manufacturing of ceramic high alumina octet lattice structures by DLP 3D printing
  UCSB's MMAX Lab, UCSB's Begley Research Group

RELEVANT SKILLS

FEA - ABAQUS | Material Research | MATLAB | CAD - SolidWorks | Machining | Python | Control System Design & Tuning

*More information about recent projects and coursework featured on my website: alec-perkins.github.io/portfolio