

A portrait photograph of Aarav Bedi, a young man with dark hair and a beard, smiling at the camera. He is wearing a black hoodie with the American Eagle Outfitters logo on the chest. The background shows a scenic outdoor setting with trees and a body of water under a blue sky.

Aarav Bedi - Mechanical Engineering Portfolio

Hi, I am Aarav Bedi, a mechanical engineering junior undergraduate from University of California, Berkeley. I specialize in Mechanical Engineering Manufacturing and Design for Manufacturing using various experiences.

Contact Information

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Educational Background:

Education

- **University of California, Berkeley - Aug. 2022- May 2026**

Bachelor of Science in Mechanical Engineering,

Relevant Coursework: Solid Mechanics, 3D Modeling and Design, Manufacturing and Design Communication, MATLAB, Finite Element Analysis, Electronics in Engineering, Thermodynamics, Fluid Mechanics, Mechanical Behaviors of Materials, Structural Aspects, Stats and Data Science.

Technical Skills

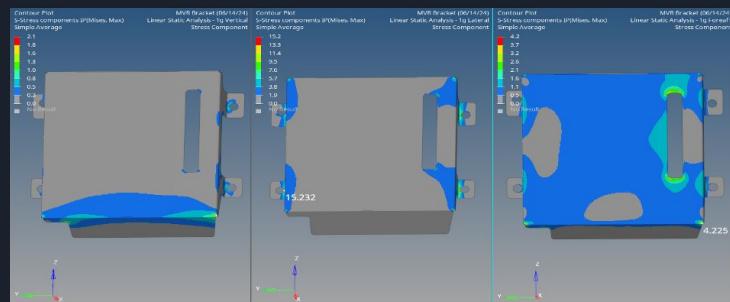
- **Software and Tools:** SolidWorks, CATIA, CREO, TruckSIM, SmartUQ, Altair One HyperMesh FEA, MATLAB, CFD Ansys, Fusion 360, AutoCAD, GD&T, Python, MQTT.
- **Machining Skills:** Welding, Milling, CNC machining, 3D Printing, 3D Scanning, Instron Machine, laser cutting, TIG, Waterjet, Poly Jet Printers, Wood Shop, Lathes, Composites Layup, Dremel.



Projects List:

1. Internship at PACCAR for Finite Element Analysis(FEA)
2. Personal CAD Projects using SolidWorks for better learning.
3. Formula Electric Berkeley - Aerodynamics Manufacturing Lead.
Currently advising Aerodynamics subteam with design and development
of front wing, rear wing, and bodywork.
4. Personal Project: Project Miata
5. Laser engraving Mazda Miata 1992 Piston head with name and
silhouette
6. 3D Printing Formula Electric Berkeley Vehicle for new room decor.

Internship at PACCAR



Objectives:

- Finish high-objective FEA projects for various clients like Peterbilt, Kenworth and DAF Trucks.

Technologies used:

- Altair One Hypermesh 2021.2, Hyperview 2021.2, Hypermesh 2024, CAD softwares(varying)

Challenges faced:

- Various iterations because of varying modal and linear static analysis. Changes in CAD models for better outcome.
- Used various materials mainly related to steel and hard plastic. Frequency, displacement, etc. were obtained using softwares.



Outcomes:

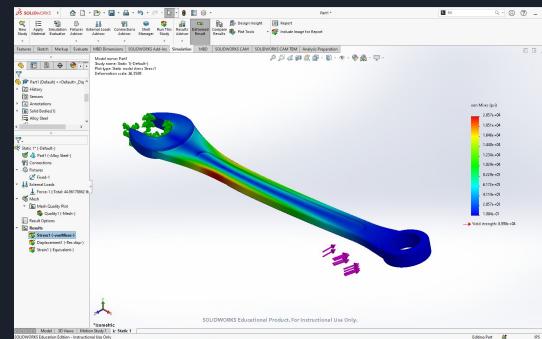
- Presentations to clients and accepted FEA simulation later implemented to manufacturing phase for real life testing on track and future production of the project.

(Not allowed to share a lot of information due to NDA but the pictures on the right are final results of a few projects I performed during my time at PACCAR)

Personal CAD Projects

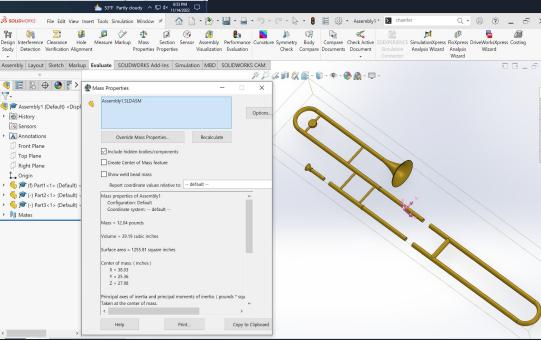
Objectives:

- Playing around with various CAD, FEA, CFD and Composite FEA softwares for getting a deeper understanding of designing and implementation



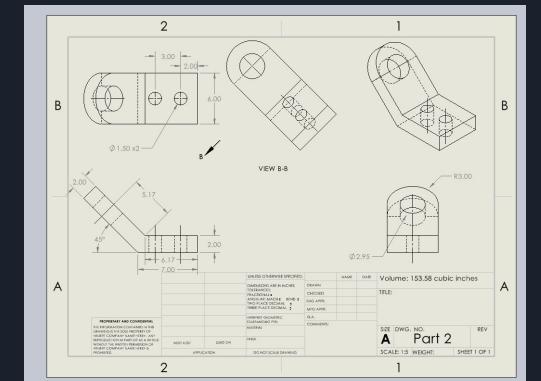
Technologies used:

- SolidWorks, AutoCAD, Fusion 360, CATIA, Creo(amatuer level). Learnt CFD using Ansys and Cadence, FEA on Altair One, Fusion 360 . Also tried Composite FEA(currently working on it)



Challenges faced:

- Brainstorming ideas
- Learning new tools from scratch using youtube videos and office hours with mechanical engineering professors.
- Designing products for 3D printing which required various sizes and material composition.



Outcomes:

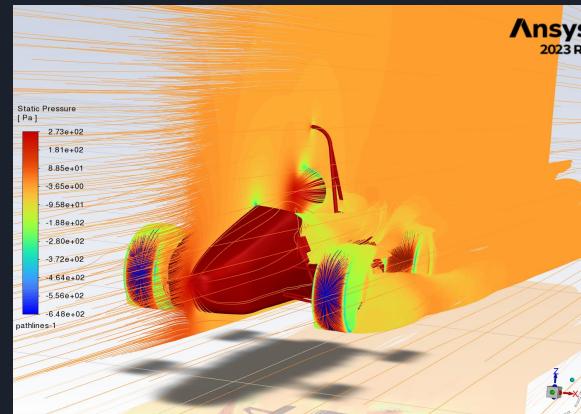
- Proficiency in CAD, CFD and FEA softwares used in industries for large scale production.

More pictures in the “extras” slide

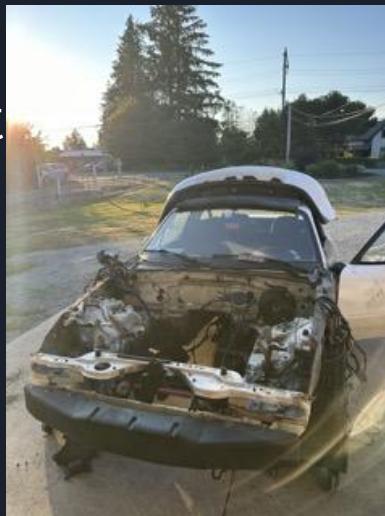
Formula Electric Berkeley - Aerodynamics Advisor and Engineering Lead

- **Role Overview:** Currently spearheading a team of 20 engineers, I am dedicated to enhancing manufacturing processes and aerodynamic designs, consistently achieving greater efficiency than projected timelines.
- **Innovative Design Techniques:** Actively developing advanced resin infusion methods and collaborating with CFD and CAD subteams to engineer aerodynamically superior wings that significantly increase downforce, drag, and torque.
- **Material and Design Expertise:** Extensive experience in designing and manufacturing vehicle aerodynamics using state-of-the-art materials including carbon fiber, fiberglass, Kevlar, and resin. Skilled in employing SolidWorks PDM for iterative CAD modeling and leveraging Composite FEA for material testing.
- **Simulation and Prototyping:** Accrued over 800 hours in CAD and 400 hours in CFD, performing detailed simulations to perfect designs prior to fabrication. Expert in various fabrication techniques such as layups, and proficient with the Instron machine for testing dogbones, as well as Dremel and CNC machining for precise tooling board cuts.

More pictures in the “extras”



Project Miata - Performance Enhancement Initiative



Engine Upgrade: Modified a 1992 Mazda Miata 1.6L engine by integrating a turbocharger, elevating horsepower from 120 to 190hp, achieving a gain of 5-10 hp per psi of boost.

Custom Dashboard Design: Redesigned the engine using new pistons and leveraged CAD and printing technologies to create a dashboard for real-time turbo and coolant monitoring.

Suspension and Brake Overhaul: Enhanced vehicle dynamics by upgrading the suspension system and braking components, significantly improving handling and stopping performance.



Custom Mazda Miata Piston Head Artwork

Conceptualization: Fueled by a passion for automotive aesthetics and personal decor, I initiated the project by sourcing a silhouette of my dream car, the F82 BMW M4.

CAD Design and Prototyping: Employed CAD software to accurately design the BMW M4's silhouette, integrating it with my name to create a detailed and scalable template for laser engraving.

Creative Process: Selected a piston head from a 1992 Mazda Miata as the base for the artwork. Utilized Photoshop to refine the CAD-generated design, preparing it for the engraving process.

Laser Engraving Execution: Collaborated with a local laser engraving service to imprint the meticulously designed silhouette onto the piston head, ensuring precision and fidelity in the artwork.

Refinement and Presentation: Thoroughly cleaned the engraved piston head using an ultrasonic cleaner to remove any residual grease and dirt, enhancing its aesthetic appeal for display as room decor.

Documentation: Captured and presented a series of step-by-step photographs, detailing the transformation from an automotive component to a unique piece of art, tying in my engineering skills and artistic vision.



3D Printing Automotive Room Decor

Project Overview: Driven by a passion for automotive design, I embarked on a project to infuse my room with automotive aesthetics. Utilizing advanced design and manufacturing technologies, I aimed to create a highly detailed and functional miniature vehicle model.

Design and Prototyping:

- **Software Utilized:** Employed SolidWorks and Fusion 360 for intricate 3D modeling, ensuring precise design specifications and aesthetics.
- **Material Selection:** Chose PLA material for its suitability in 3D printing, providing the desired finish and durability.
- **FEA Testing:** Conducted Finite Element Analysis to optimize the structural integrity and performance of the model, particularly focusing on suspension dynamics to withstand real-world stresses.



Fabrication Challenges:

- Encountered initial setbacks with suspension modeling, which led to comprehensive redesigns.
- Overcame printing challenges through iterative testing and adjustments, spanning over three months of dedicated troubleshooting.



Final Assembly:

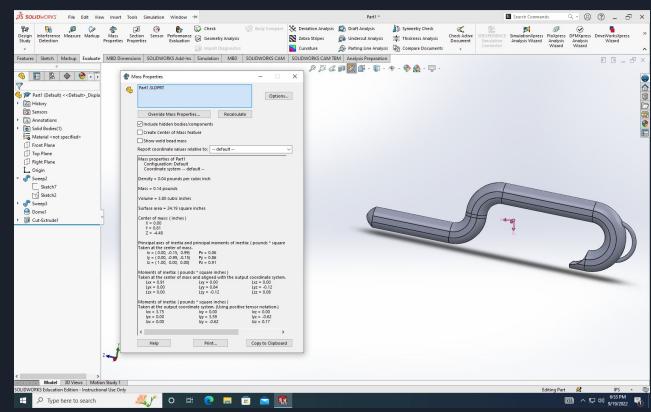
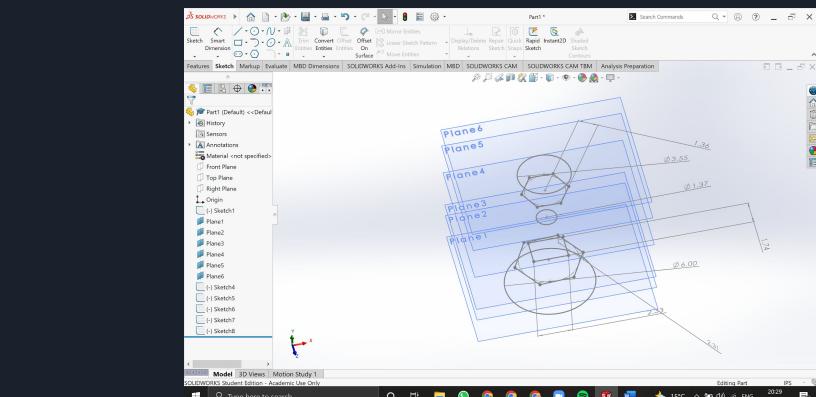
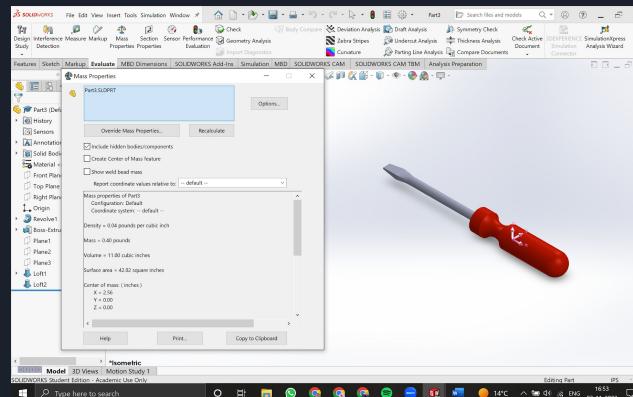
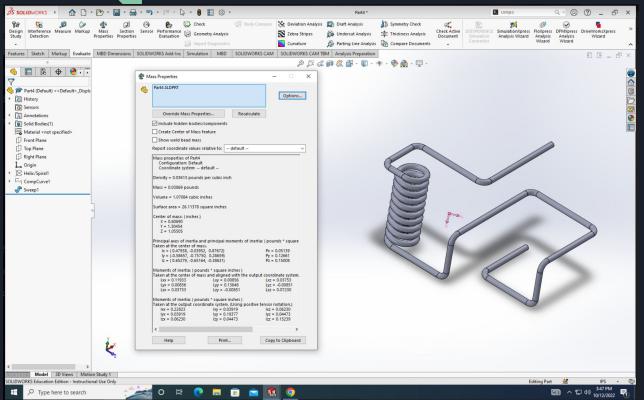
- Successfully printed and assembled all components, including custom-designed 3D printed wheels.
- Carefully calculated the radius and ratio design system, ensuring seamless integration of front and rear wings to the main bodywork.

Learning Outcomes: This project was a profound learning curve in 3D modeling, CAD, FEA, and 3D printing. It not only enhanced my technical skills but also reinforced my problem-solving capabilities in mechanical design.

- **Future Plans:** Motivated by the success and insights gained from this project, I am eager to tackle more complex automotive design projects in the future.

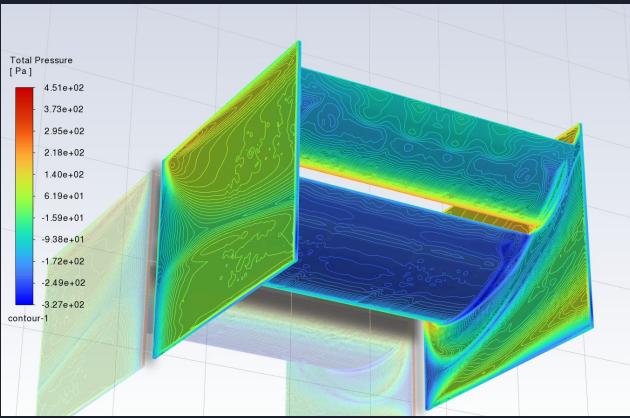
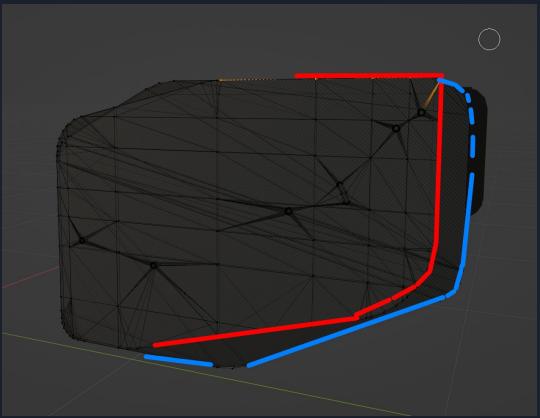
Extras

Personal CAD Projects:



Extras

Formula Electric Berkeley





Thank you!

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