Akash Tambe

Mechanical Engineer

About Me

Hi, I'm Akash, a **Mechanical Engineer** passionate about **innovative design** and **product development**.

I specialize in **CAD modeling**, **stress analysis**, and the integration of **engineering solutions**. I've worked on diverse and impactful projects, including the development of 60-ton friction welding machines and compact 4x4-inch ceiling antennas. My experience spans multiple industries, such as automotive, aerospace, and defense, where I focus on delivering high performance, reliability, and manufacturability in every design.

Outside of work, I enjoy traveling, caring for house plants, watching reruns of The Office, and playing Zelda on my Switch. These activities keep me grounded and help refresh my mind, allowing me to approach engineering projects with renewed energy and creativity.

Stair-Vacuum Robot

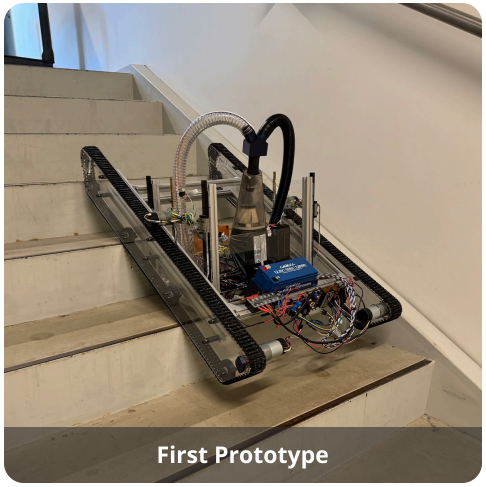
Carnegie Mellon University

Jan 2024 – Apr 2024

As the lead mechanical engineer on a team project, I developed and designed an autonomous stair-cleaning robot. I handled all aspects of the mechanical design, utilizing PTC Creo to create a robust tank-tread system that enhanced stability and maneuverability across various stair types. I engineered the central vacuum box for optimal debris collection and integrated advanced sensors and microcontrollers for autonomous operation. I personally executed the prototyping phase, using 3D printing, laser cutting, and machining techniques to fabricate components and ensure precision in manufacturing and assembly. Conducted rigorous testing to validate the robot's performance, reliability, and adaptability, focusing on manufacturing efficiency and ease of assembly.

Initial Tread Design

Final CAD Model



First Prototype

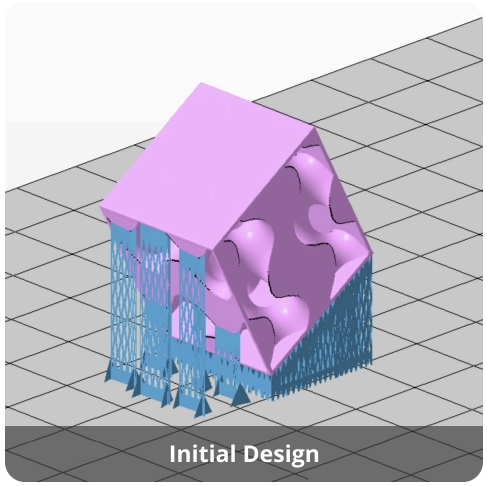
PTC Creo | Python | Arduino | Laser Cutting | 3D Printing | Machining

High-Efficiency Heat Exchanger

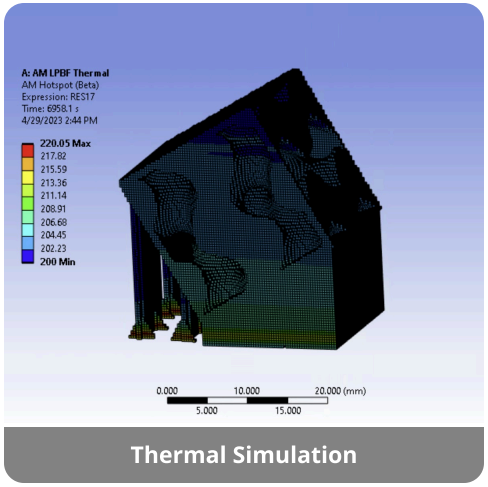
Carnegie Mellon University

Jan 2023 – Apr 2023

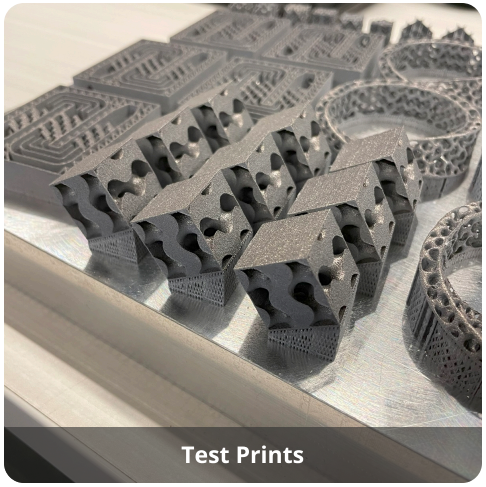
As part of a team, I was responsible for developing a high-efficiency heat exchanger for high-performance vehicles using additive manufacturing techniques. Focusing on optimizing thermal performance, I utilized gyroid structures to maximize surface area for heat transfer while minimizing material usage. I designed the complex geometries in PTC Creo and performed CFD simulations using ANSYS Fluent to evaluate temperature and pressure distribution. The project aimed to reduce drag and enhance cooling efficiency, making the heat exchanger both lightweight and compact for racing applications. My role also involved refining the manufacturing process, utilizing 3D printing to produce prototypes that significantly improved thermal management and reduced the overall size of the cooling systems.



Initial Design



Thermal Simulation



Test Prints

PTC Creo | ANSYS | CFD | Rapid Prototyping | Additive Manufacturing | 3D Printing

Jan 2022 – Sep 2022

Friction Welding Machine

Friction Welding Technologies

I led the design and development of a $350,000, 60-ton friction welding machine, managing the entire project lifecycle from concept to assembly. Utilizing SolidWorks and AutoCAD, I performed detailed modeling and design of sheet metal, cast, and machined parts. I conducted ANSYS simulations to optimize the structural integrity of the machine and implemented Failure Mode and Effects Analysis (FMEA) to identify potential failure modes and mitigate risks. I also included safety features such as proximity sensors on doors and emergency stop buttons to enhance operational safety. Additionally, I designed a new CNC user operator manual with a sheet metal casing. My role involved overseeing the integration of mechanical, electronic, and pneumatic systems, ensuring seamless operation and compliance with quality standards.

Friction Welding Machine

Operator Console

Project Management | SolidWorks | AutoCAD | ANSYS | DFMA | GD&T | FMEA

Compact Ceiling Antenna

JMA Wireless

Oct 2020 – Dec 2020

I designed a compact, 4x4-inch omnidirectional antenna using SolidWorks, optimizing RF performance and manufacturability with Design for Manufacturing and Ease of Assembly (DFMA) principles. The antenna's design required only two injection-molded casings and two PCBs, which were securely held in place with snap-fit features, eliminating the need for additional hardware. The entire assembly could be installed through a single hole in any office ceiling tile, simplifying installation. I used resin 3D printing for rapid prototyping to refine the snap-fit features and ensure precise PCB integration before transitioning to injection molding. ANSYS simulations were conducted to ensure optimal signal quality and performance, making it a reliable and efficient solution for in-building communication.

Example Design 1

Example Design 2

Mounted on Ceiling Tile

Product Development | SolidWorks | ANSYS | DFMA | 3D Printing | Injection Molding

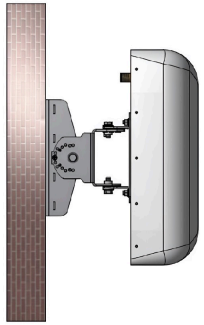
Stadium Antenna

JMA Wireless

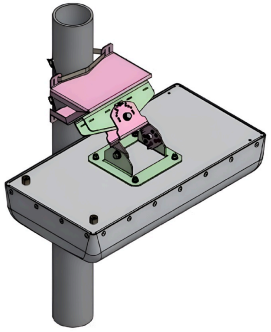
Jul 2020 – Sep 2020

I designed and developed custom stadium antennas for NFL stadiums to enhance wireless connectivity using SolidWorks and AutoCAD. I personally built 8 prototypes, out of which 4 are installed in the Dallas Cowboys stadium. After rigorous RF performance testing, I optimized the design for production using DFMA principles, leading to the manufacture of 120 antennas—4 for each of the 30 NFL stadiums. To meet the diverse mounting requirements of each stadium, I developed several sheet-metal brackets for versatile installation options, including ceilings, walls, poles, and over walls. This ensured each antenna met strict structural and performance standards, delivering reliable connectivity during games.

Stadium Antenna



Wall Mount



Pole Mount

Product Development | SolidWorks | ANSYS | GD&T | DFME | Sheet Metal