PORTFOLIO

NEEMISH TEJASWI

2023

About Me

I am passionate about utilizing technology to positively impact people's lives and strive to create meaningful experiences. My expertise lies in product engineering, with a strong background in mechanical and thermal systems design, manufacturing, computational simulations, and materials science. I am dedicated to conceptualizing ideas and going all the way to realize them.

I have extensive experience in design and manufacturing, and excel at hands-on building, testing, and troubleshooting hardware. Throughout my career, I have worked with a range of teams, including tightly knit research teams, multi-disciplinary research and project teams, large teams with over 20 members, and global design teams spanning multiple time zones. My diverse engineering experiences and hands-on approach allow me to juggle multiple hats throughout the development cycle. Happiest in a fast paced, collaborative, and driven environment tackling complex problems.

Contact

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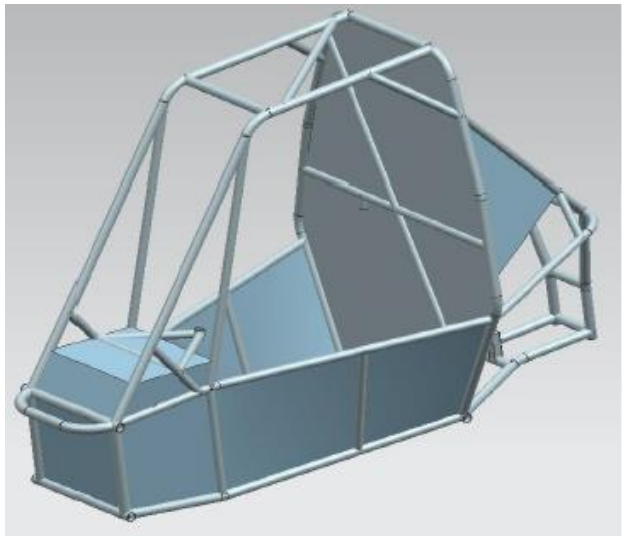
Baja SAE

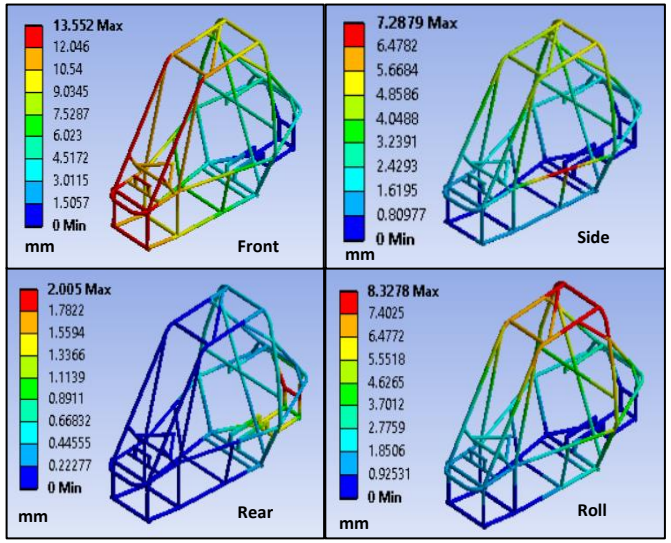
I designed, built and raced off-road race vehicles for over two years to take part in Baja SAE, an inter collegiate design series competition.

During my time with the team, I worked on finite element analysis, CAD modelling, ideating and evaluating new designs, generating concepts for DfM, data acquisition in addition to being a chassis welder for the team.

Baja SAE

As the lead frame designer, I owned all aspects related to structural performance, material selection, tubing & sizing. I carried out static and modal analysis of the frame and explored analysis techniques like Explicit dynamics for structural design.





CAE Team
Structural Performance

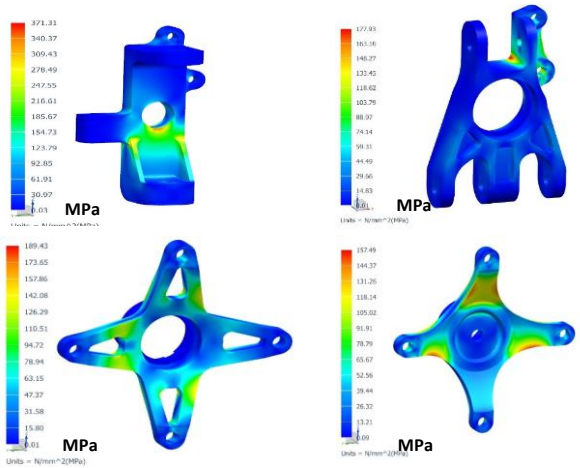
Design Integration Team
Subsystem Mounting

- Positioning of key bracing members
- Design trade offs between Performance, Clearances, and Mounting decisions
- Sizing for Primary and Secondary Tubing
- Incorporate Mountings into Structural Members

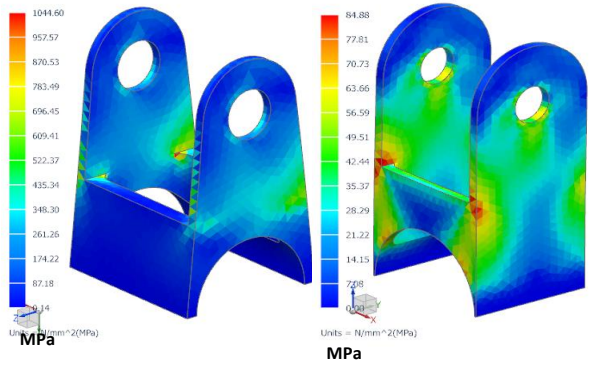
Material	AISI 4130
Tube OD	29.2*mm* / 25.4*mm*
Tube Thickness	1.65*mm* / 1*mm*
Primary Flexure	2787.6 Nm^2

Baja SAE

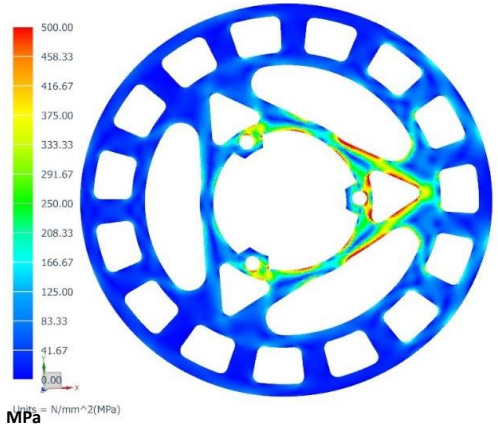
I carried out structural analysis for different wheel assembly components, developed design concepts, assisted in full vehicle assembly and worked on introducing a data acquisition initiative which was our first foray as a team to gain insights via sensors.



Upright and Hubs

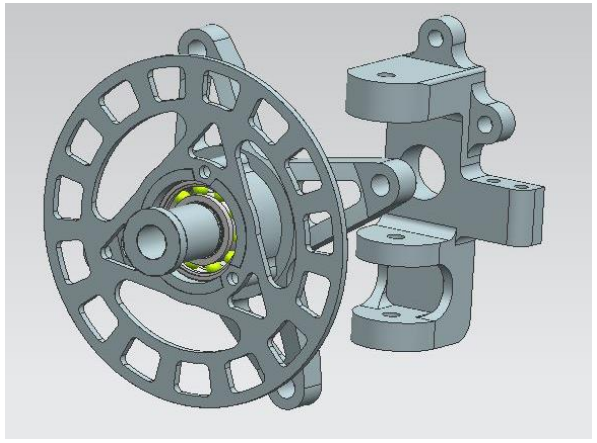


Control Arm and Suspension Mounts

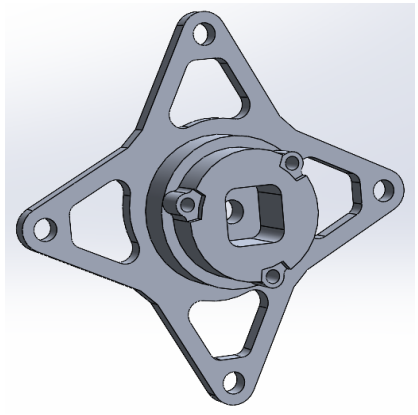


Brake Rotor

Front Upright Joint



Front Wheel Assembly



DFM Concept

Testing

Data Acquisition

Baja SAE

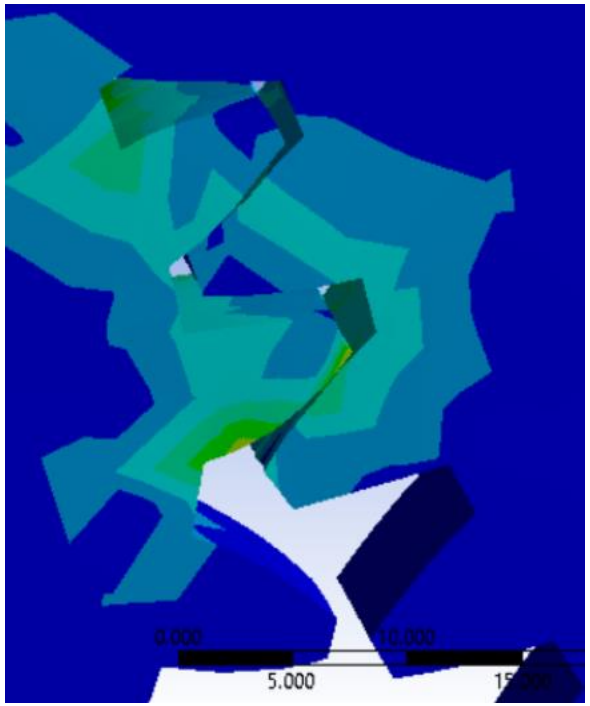
During the manufacturing phase of the vehicle, I was a chassis welder for the team where I utilized TIG with ER 70S2 as the filler material to weld AISI 4130 chromoly with a 2% Thorium Tungsten electrode under DCEN configuration.

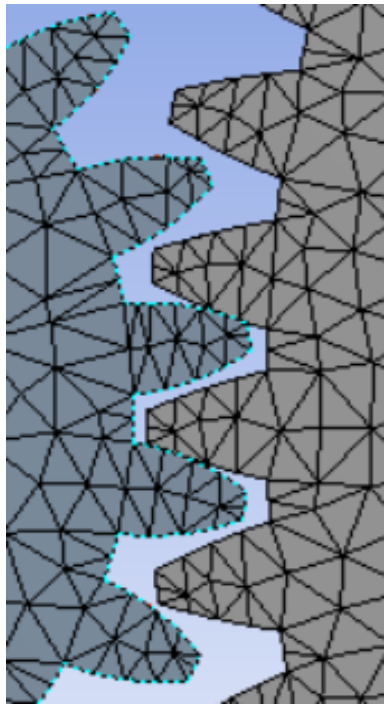
Apart from being a chassis welder for the team, I worked on finishing the chassis and control arms via air gun spraying. I took lead on installing bearings and wheel sub assemblies, I made fixtures for welding and notched tubes to prep for welding.

Baja SAE

I carried out the kinematic design for a two-stage constant transmission ratio compound gearbox with an overall targeted reduction of 9.35.

Overall Ratio	9.35
kW	7.5
Stages	2
Reduction per Stage	3.058
Input RPM	8372
Output RPM	881
Zg	74
Zp	24





I also performed FEA on the gears, shaft and carried out hand calculations for verification.

For gear, the hand calculations were carried out based on the Lewis bending strength of the gear teeth.

Powertrain Architecture → 10 HP 3600 RPM Engine → CVT Belt Drive → Constant Ratio Gear Box → Shafts → Wheels

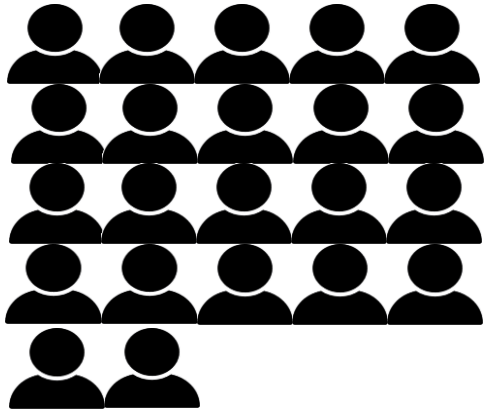
Baja SAE

Leadership, Collaborative Culture, and Inclusion are important to me as person, and I strived to create a good working environment for my team and lead by example whenever possible.

People Led in CAE Team

People Led in DAQ Team

Managed people in Welding Group



2019 TEAM

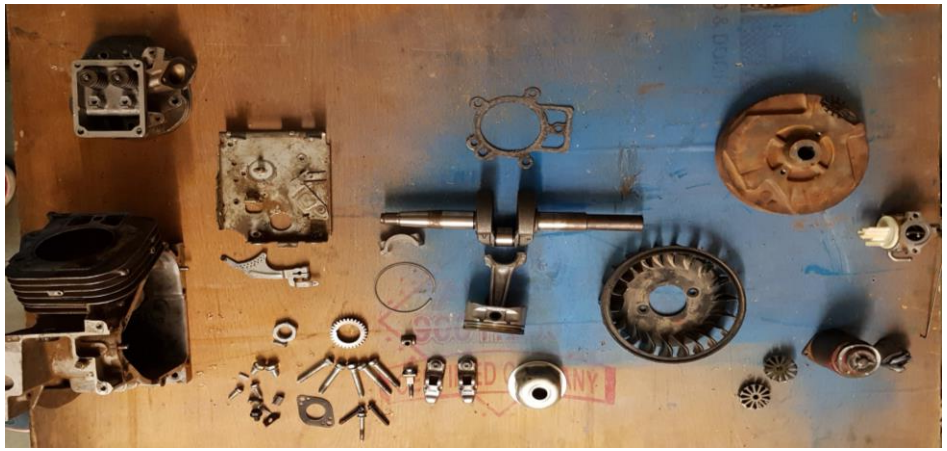
Cross-functional Collaborators

Main Collaborators

Established a data acquisition team, which went on to become a standalone sub team in the future.

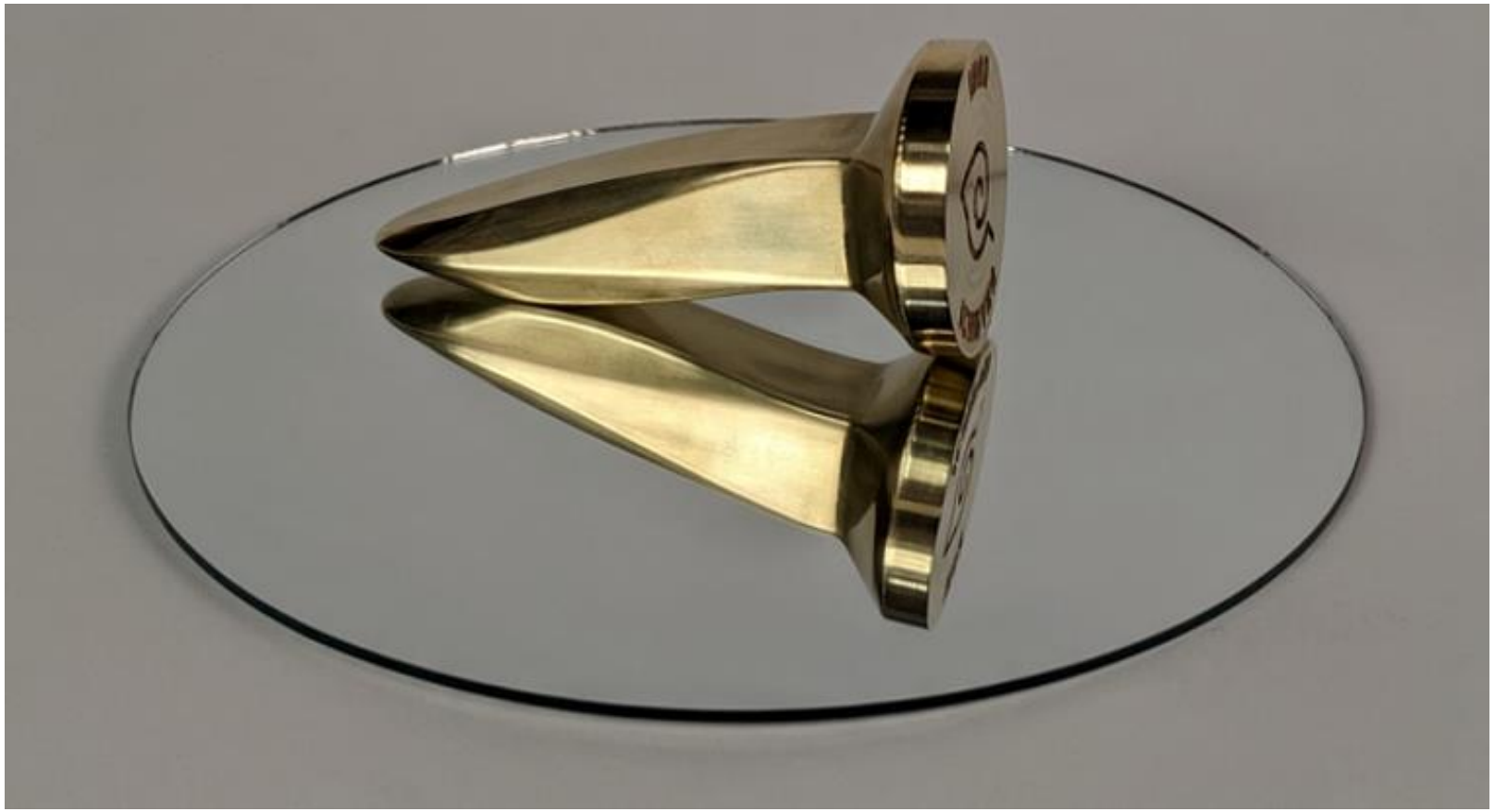
Gave an overview of what we do and how we design, workspace tour to all new team members; familiarize them with the vehicle and different subsystems.

Spearheaded the efforts to organize an intro-meet with a goal to attract diverse people. Over 100 people expressed intent to join the team in the next year.



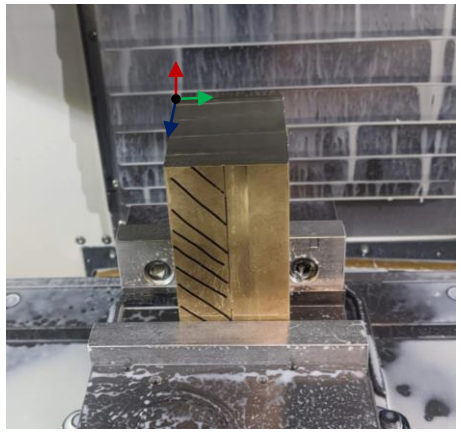
Convinced few teammates to come together and teardown an old engine instead of enjoying a day off

FW31

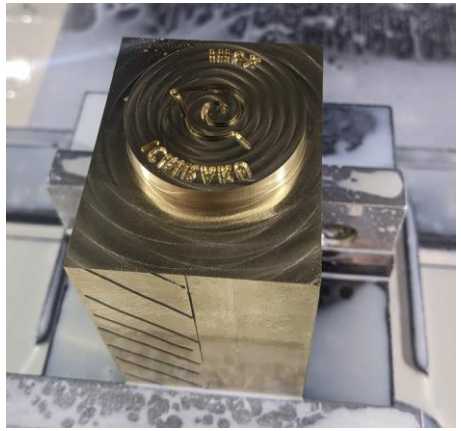


Formula One Inspired Espresso Tamper

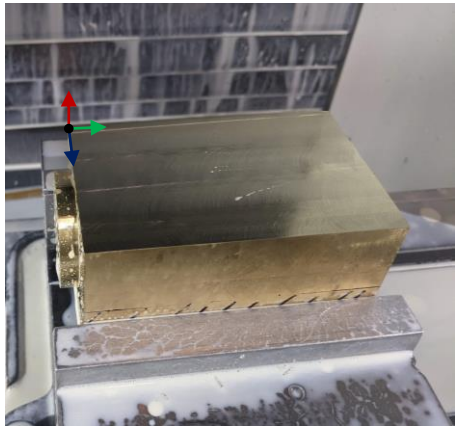
FW31



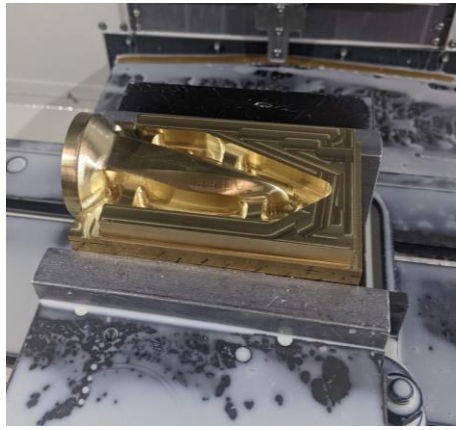
Initial Setup



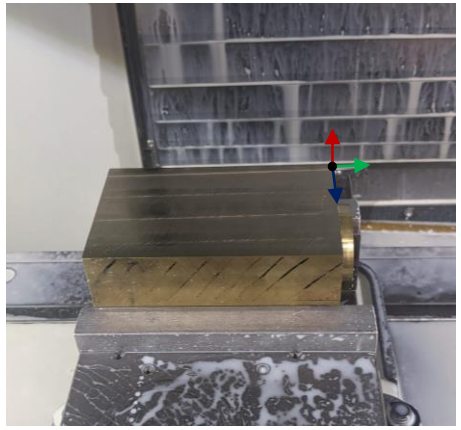
Result: First Operation



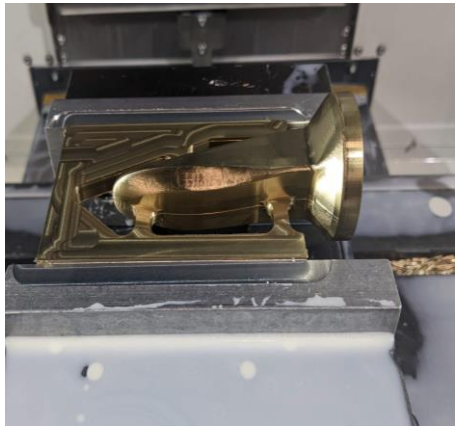
First Part Flip



Result: Second Operation



Second Part Flip

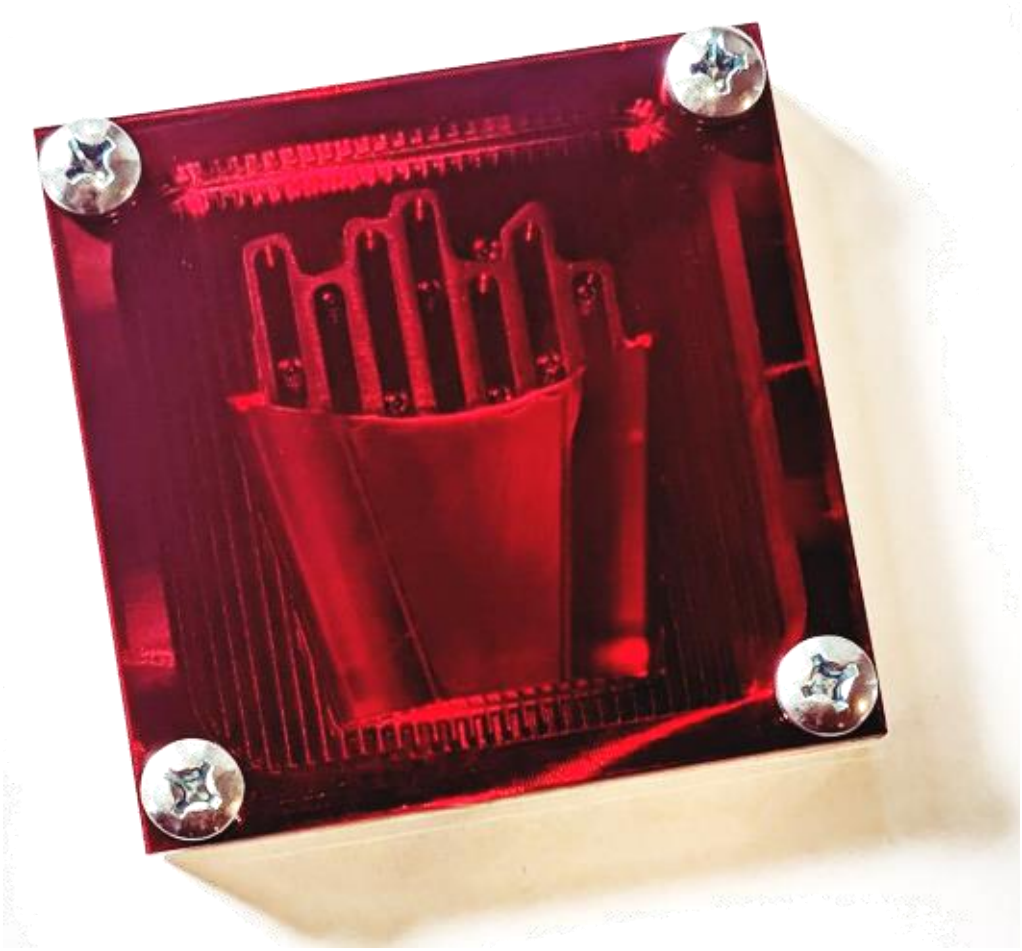


Result: Third Operation

FW31 was machined on a Haas VF2 CNC mill and then finished by hand. The part is made from free machining brass(C360) and work holding was accomplished using tabs.

The main design is inspired by the nose of the Formula One car FW31. The bottom has engravings that convey my love and passion for coffee.

Frites Rouges



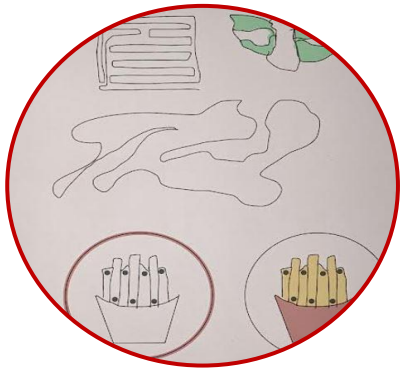
Frites Rouges is my manifestation of a surrealistic maze. The maze is a box of french fries inside with several marbles embedded throughout. This design breaks the notion of “what’s a maze” in different ways. The steel marbles inside the slots of the fries are “trapped” as there is no way to get them out and it’s not possible to get the satisfaction of completing a maze. The steel marble on the outside periphery can be moved around but there is no well-defined start or end point in the maze which again peals away the satisfaction of successfully finishing something like a maze. However, it makes for an interesting desk toy.

The design process involved leaning heavily on lateral thinking for ideation, Fusion for CAM to generate toolpaths for adaptive clearing, pocketing, tapping, scalloping, and finishing operations before machining the part on a Haas VF2. Hand sanding was done to accentuate some surfaces before assembling the maze with steel marbles what are held in place by a red acrylic lid which was laser cut from an acrylic sheet. The assembly is held together by ¼-20 UNC screws.

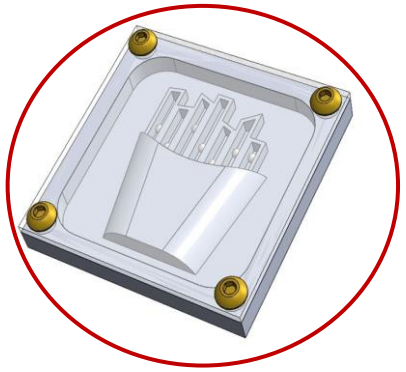
Frites Rouges

MATERIALS: Aluminum 6061 , Acrylic

PROCESSES: CNC Machining, Laser Cutting, 3D Printing (FFF), Assembly

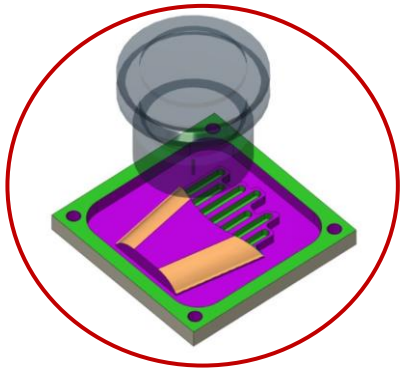


Ideation



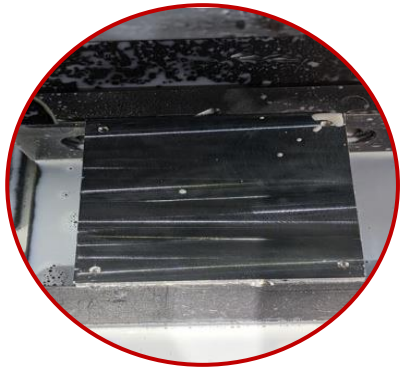
CAD

Prototyping



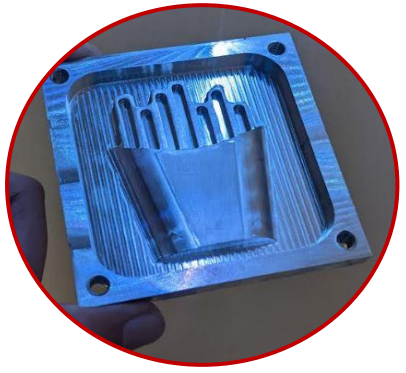
CAM

Tooling

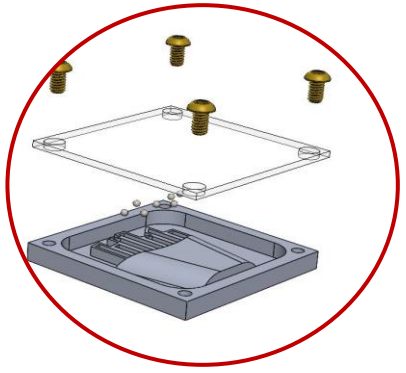


Work holding

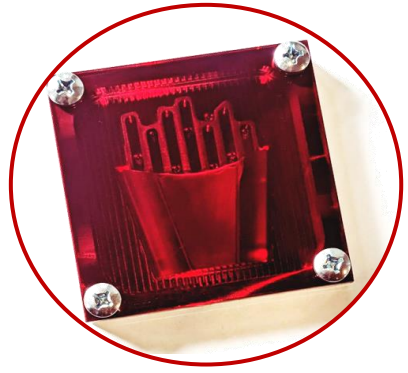
Machining



Finishing



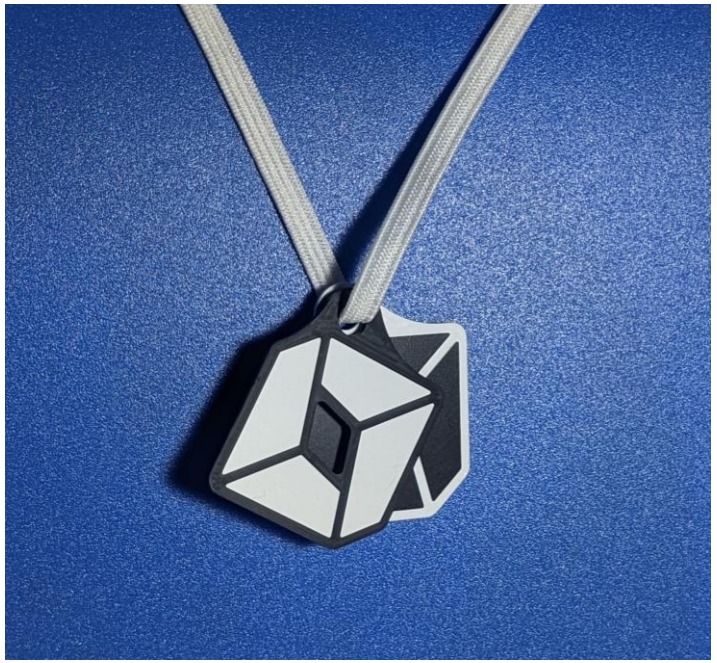
Assembly



Result

MACHINE SHOP EXPLORATIONS

Pendant



MATERIAL: Sign Stock

PROCESS: 1/16th inch end mill on a CNC mill; Used VHB tape to secure the sign stock on to a HDPE block

Magnifying Glass

MATERIALS: Brass, Delrin, Acrylic

PROCESSES: Milling, Silver Brazing, Turning, Spherical Turning, Facing, Threading

Plaque

MATERIALS: Bronze, Sheet Metal

PROCESSES: Sand Casting, Sheet Metal Forming, Gas Welding, Bead Blasting

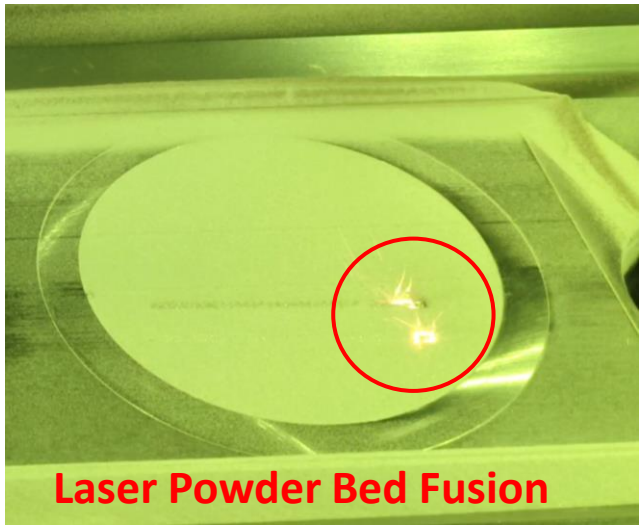
HooXi

HooXi is a topologically optimized bottle opener made for my class ME 349.

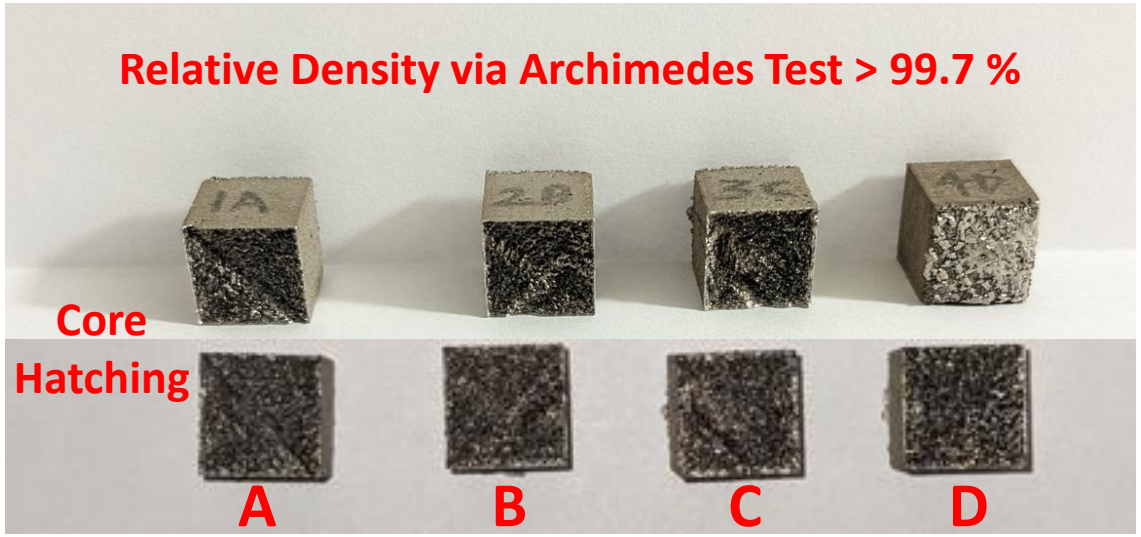
The design was optimized using Fusion 360, the results were further verified using Ansys by creating a FEA study in addition to hand calculations. The opener was realized using SLA and tested successfully on multiple bottles and demonstrated to the whole class.

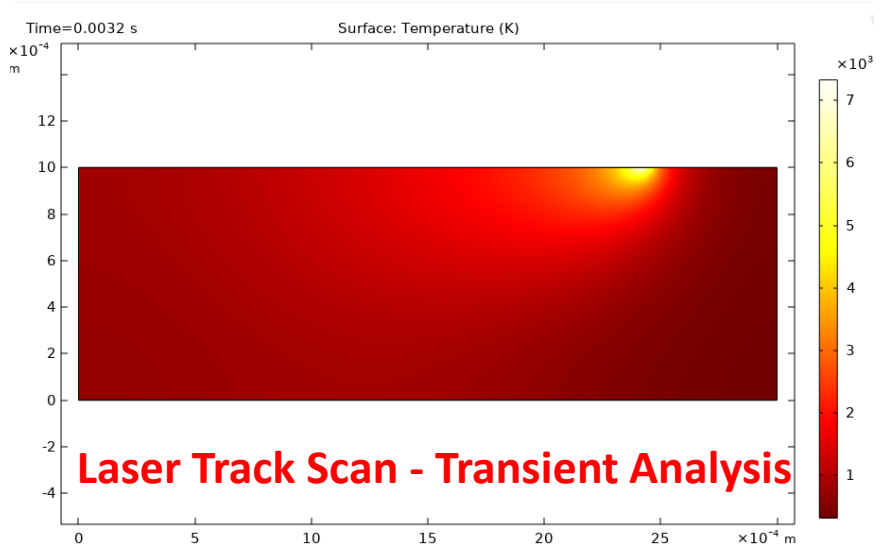
It was judged as the best opener in the class by the teaching team.

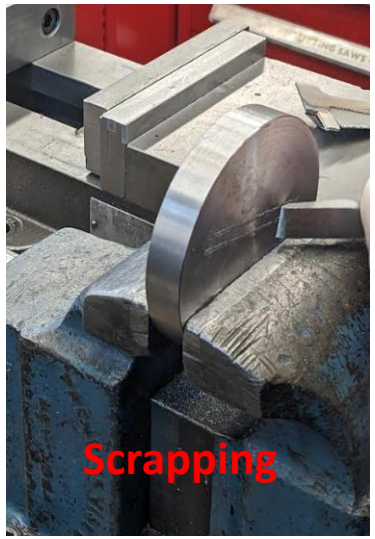
METAL 3D PRINTING



Material: SS-316L
Particle Size: 15-45 micron
Shielding Gas: Argon
Laser Size: 30 micron
Laser Type: Fiber Laser
Layer Thickness: 30 micron
Typical Process Parameters: Oxygen Concentration, Laser Power and Scanning Speed, Re-coater Velocity, Shielding Gas



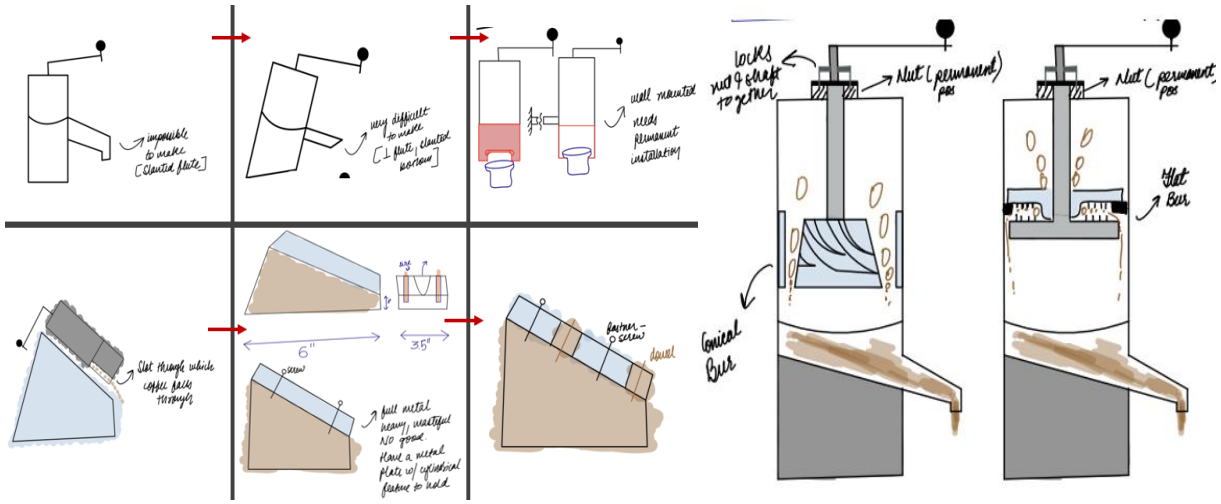




Milaana

Milaana is the coffee bean grinder I created during my course on design and manufacturing. Motivated by my never dying thirst for coffee, this project took lot of machining and some woodworking to realize it.

The design process started with napkin sketches, experience & functional prototypes, to shape design directions and evaluate function. Involved revising the design numerous times as I iterated before finally spending time to machine and assemble it.

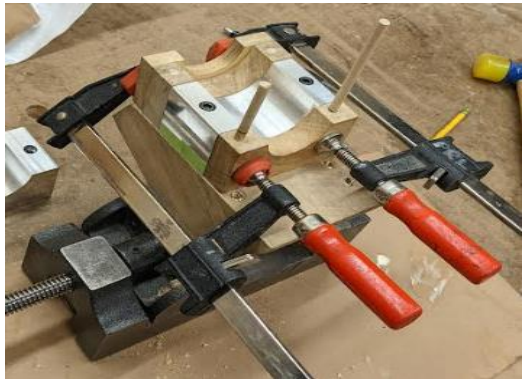
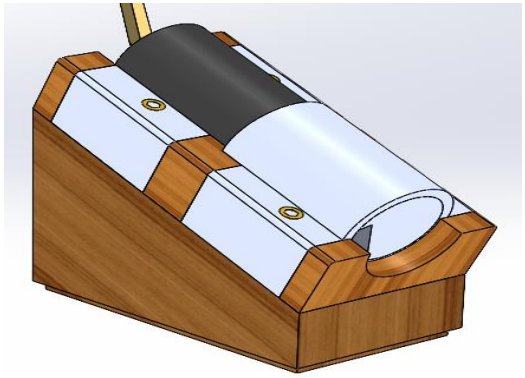
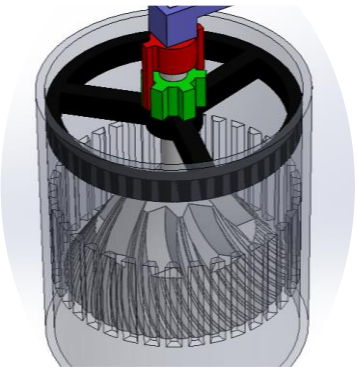


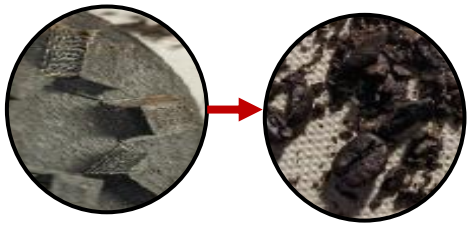
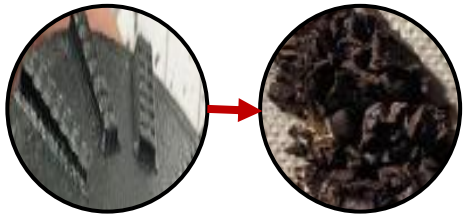
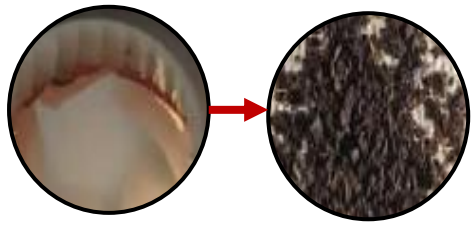
Milaana







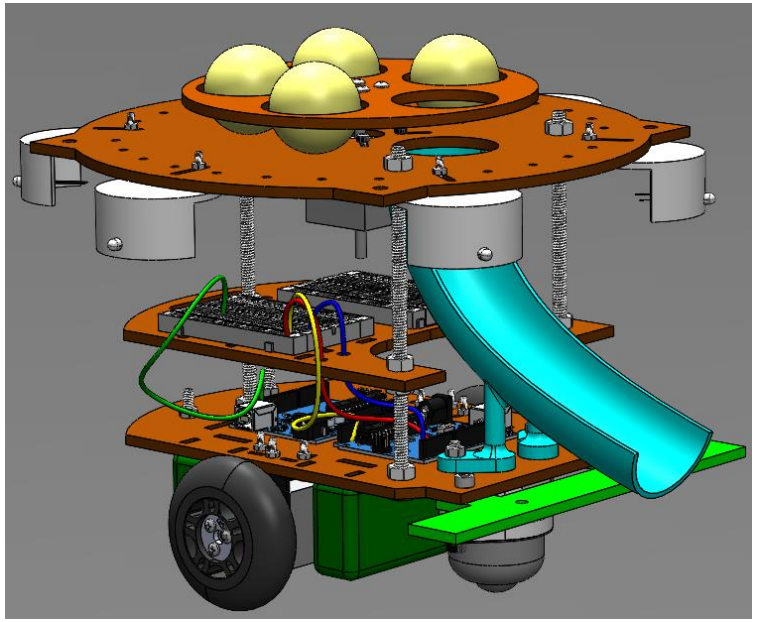





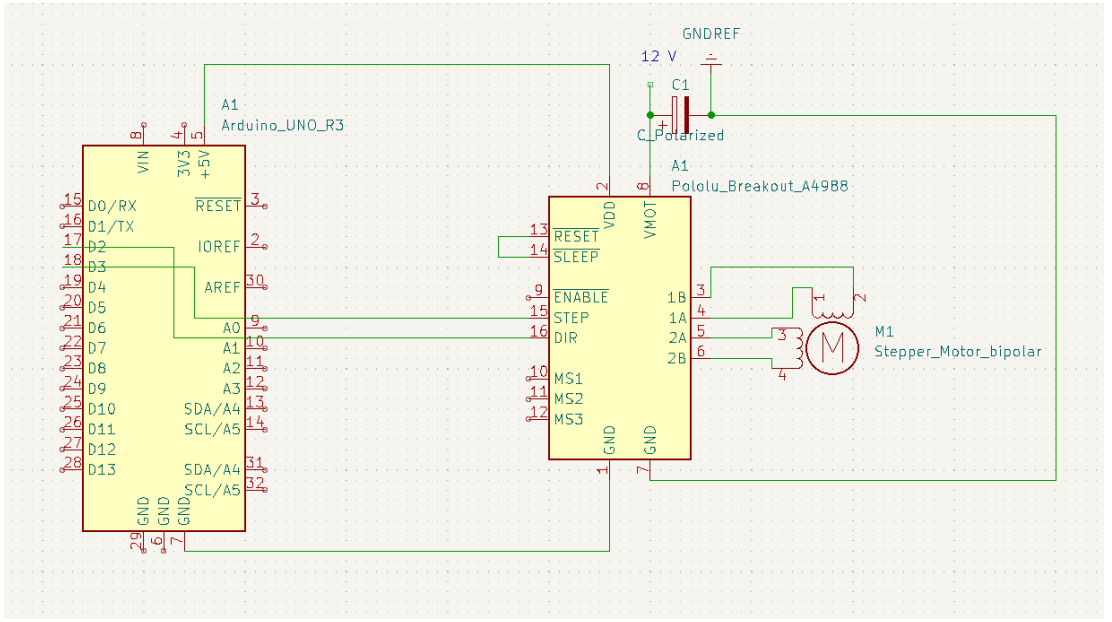




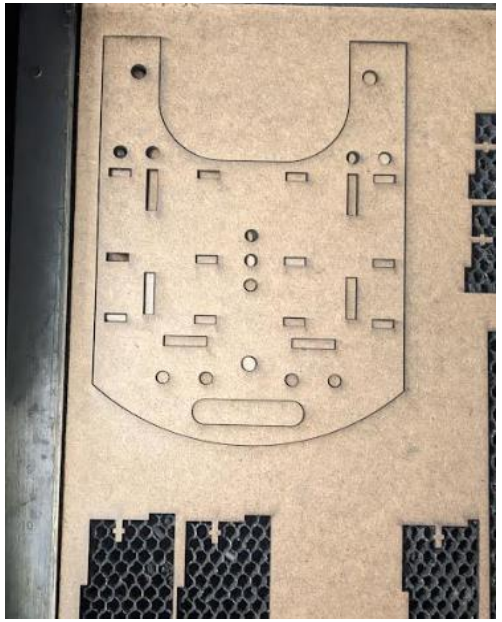
Prototyped Burr Geometries

Mechatronics

My team of 4 created an autonomous robot to compete in the annual me210 mechatronics competition, our goal was to navigate a simulated high profile Oscars red carpet event and deliver press for our film to the attendees in order to win an award.





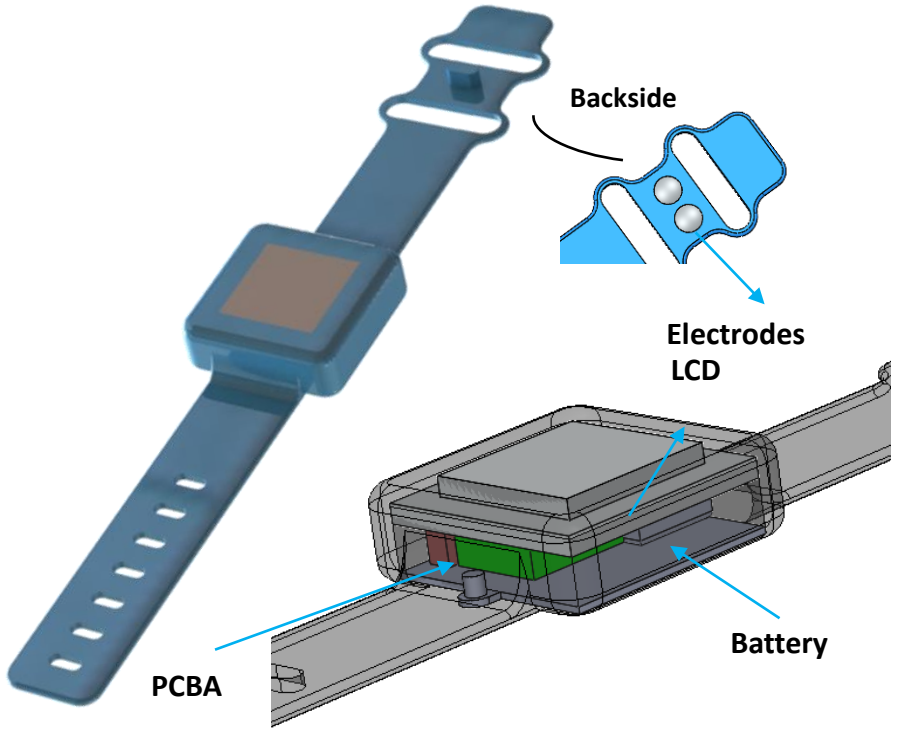


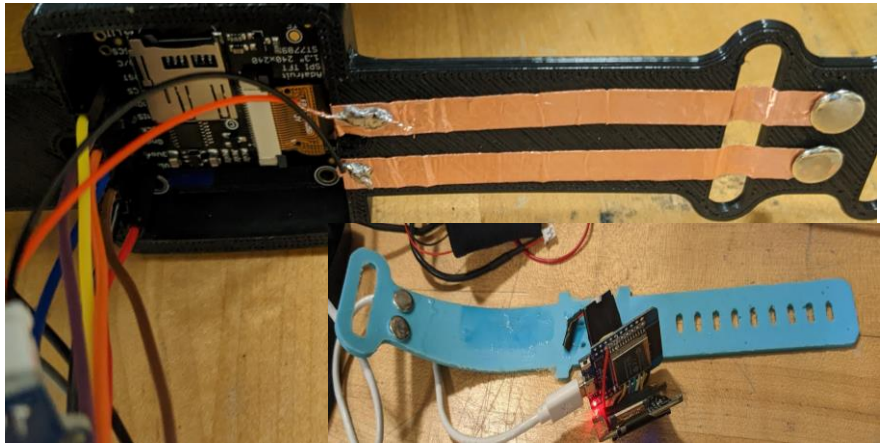
I designed and realized the PRESS delivery mechanism including its full electro-mechanical design, was responsible for integration of all other electrical and mechanical sub systems into the robot including designing the robot chassis and different sensor mounts. I created the complete CAD model (pictured above) of our bot and made sure that all the integration happens without any hiatus. I designed a revolver style delivery mechanism, actuated by a stepper motor for precise PRESS delivery. I fabricated all the mechanical parts, procured COTS parts before assembling.
PROCESS: Electro-mechanical Design, Software Design, Motor Control, Inter-processor communication, Soldering, 3D Printing, Laser Cutting

Future Talents

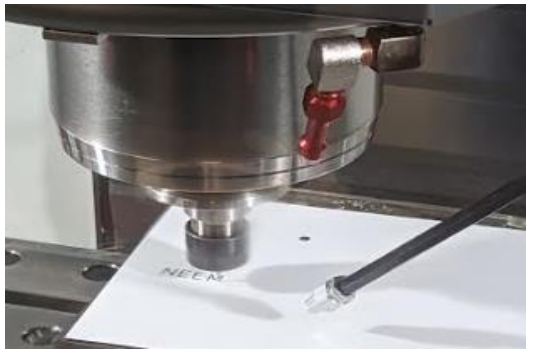
Spread across 5 time zones, Future Talents was a Stanford ME310 global design innovation project between 5 universities and corporate partners. As a part of this project, our team developed and prototyped a solution to support employee wellness in the tech. industry. This included developing a wearable device that tracks stress levels in employees through their skin response and developing intervention tools and mechanisms for both the employee and the employer. We ran multiple user experience and testing studies and carried out ethnographic need finding to understand the problem space.

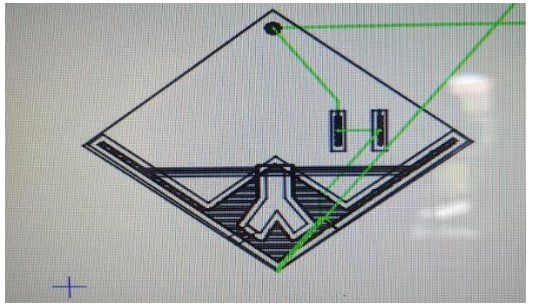
Future Talents

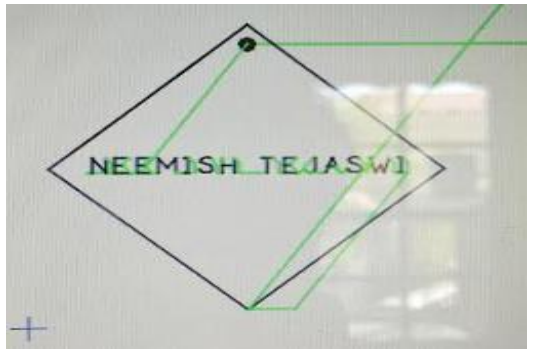


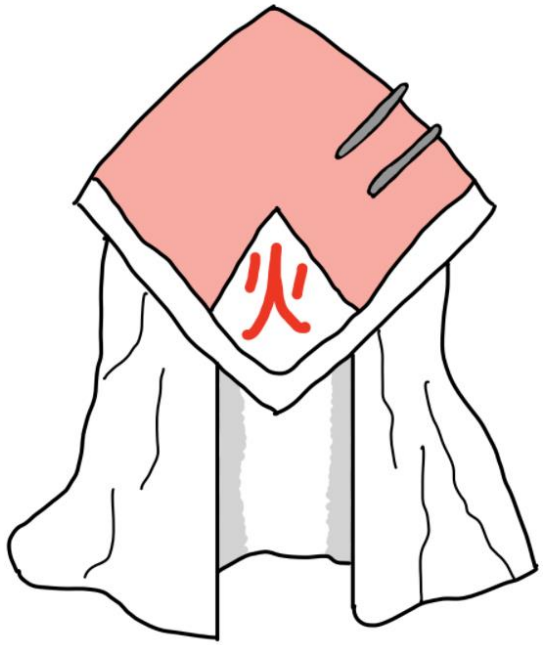


火影 Will of Fire









I designed and machined a two-sided luggage tag for my bag pack. The tag is the Hokage hat from my favorite anime Naruto.

I programed the part by hand without relying on a CAM system and used a 1/32nd inch end mill for the job. The stock was secured to a fixture plate held between vise jaws using VHB tape.

High Heat Flux Cooling

I studied high heat flux cooling for computer chips and as a part of a research project during my undergrad. where I carried out CFD analysis on 50W computer chip being cooled by a direct jet impingement cooler.

Inlet Temperature	10-degree C
Chip Power	50 W
Flow Rate	600 ml/min
Jet Configuration	4x4
Jet Diameter	0.6 mm
Fluid	Water

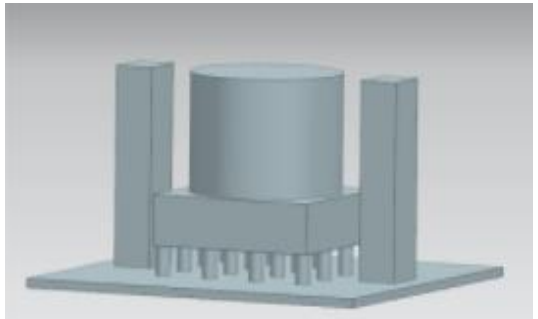
Model the cooler using Siemens NX, carried out CFD analysis using ANSYS Fluent

Researched multiple methods for high heat flux cooling.

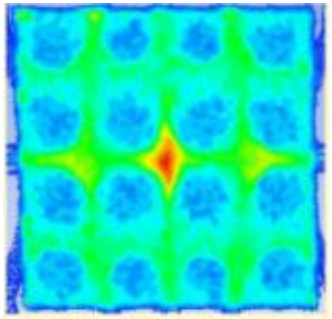
Modelled and simulated a direct jet impingement cooler at steady state.

Predicted a temperature rise of 10-degree Celsius for a 50W Chip.

Results within the expected range. But experimental verification was not carried out.



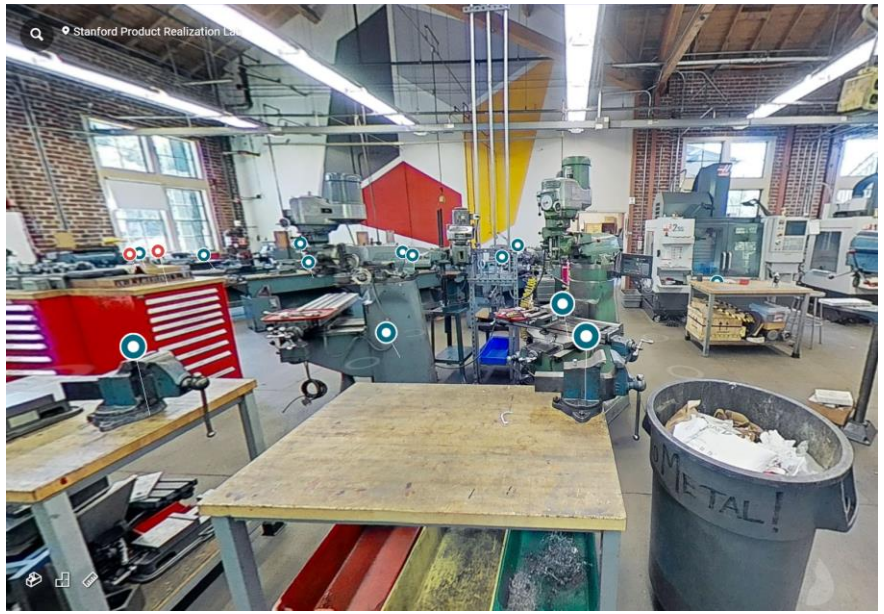
Extracted Flow Domain



Temperature Profile at Chip Interface

Virtual Field Trips

making @ stanford



https://ixd.su.domains/vft/

Creating an inclusive environment and empowering others resonates with me. Often the first step is the most intimidating one and is the hardest. I work with the Interaction Design group at Stanford University to help them create virtual guides and field trips to the different maker spaces on campus. I have been a maker throughout my engineering career, and it has given me great joy and satisfaction, but having an engineering background is not required to be a maker, creator, or an inventor. I work on this project to empower people with the tools to take the first step in the journey of becoming life-long makers. (Links below to public parts of the projects)

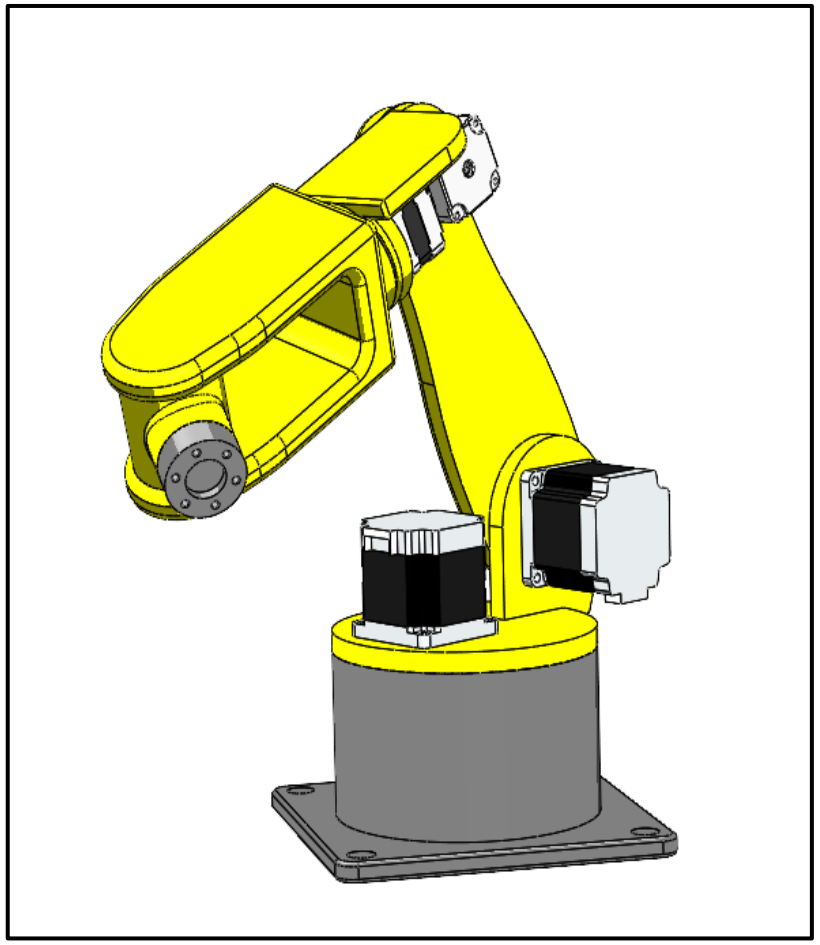
Mechanical Engineering

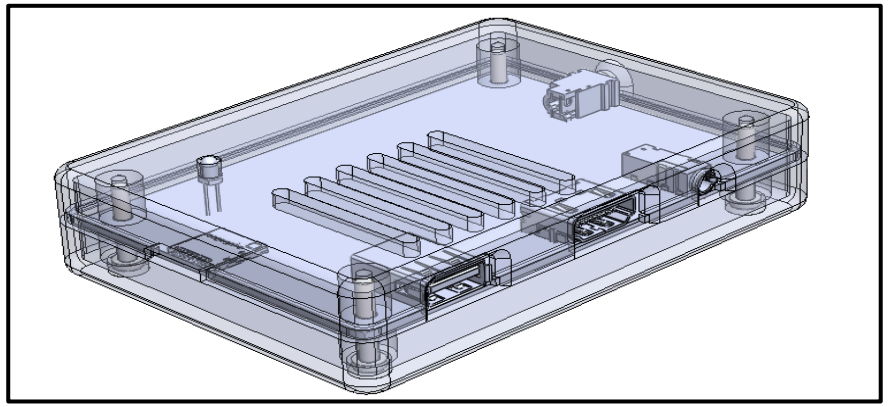
Virtual Personal Visits to Stanford Maker Spaces

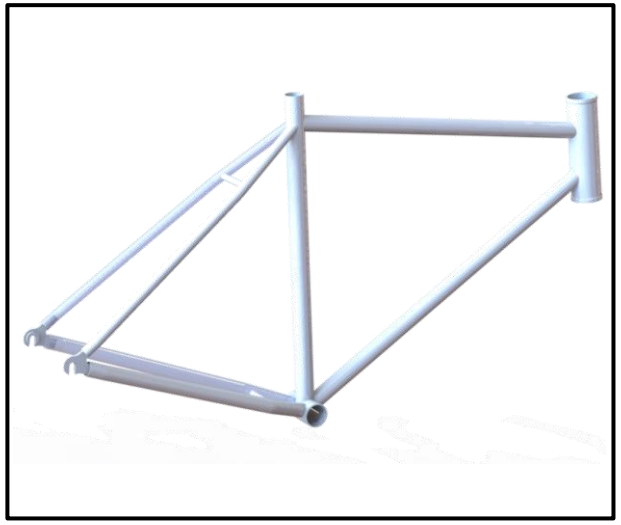
Stanford provides a variety of well-equipped maker spaces and a world-class program in how to use them, yet students with no prior experience in making can be intimidated by the machinery or the complexity of skill involved in learning to use it. We are creating a virtual experience of Stanford's maker spaces that will invite students to explore, learn about equipment and activities, and hear from fellow students who have developed making skills using these spaces and the resources they offer. Our project aims to encourage many more students to feel welcome and confident in their ability to learn to use these spaces.

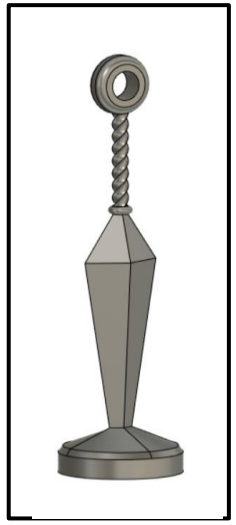
Rebecca Currano, Veronika Domova, David Sirkin, Mark Cutkosky

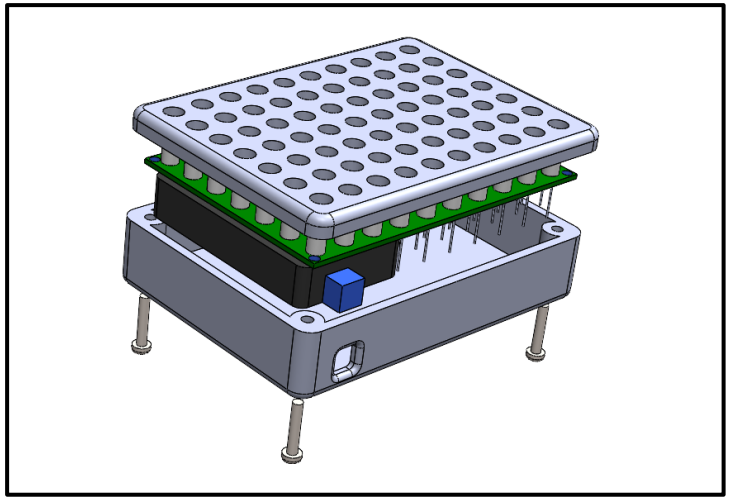
Some CAD Work











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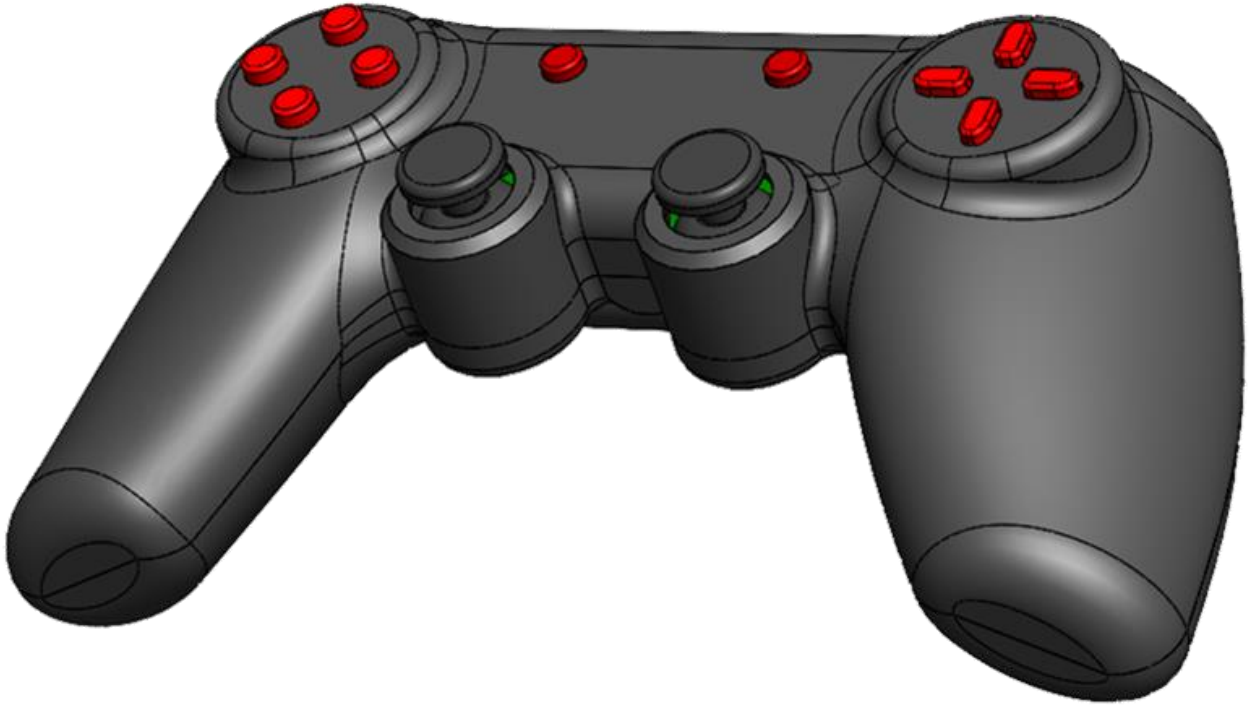

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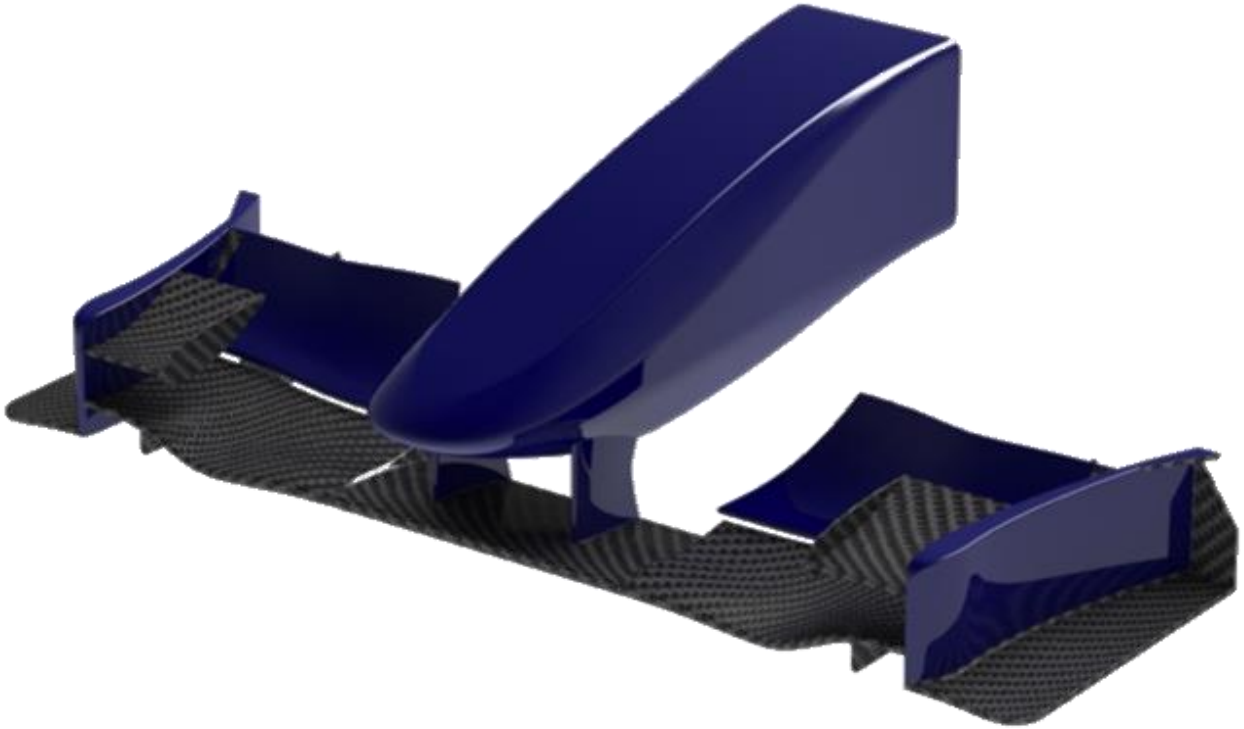

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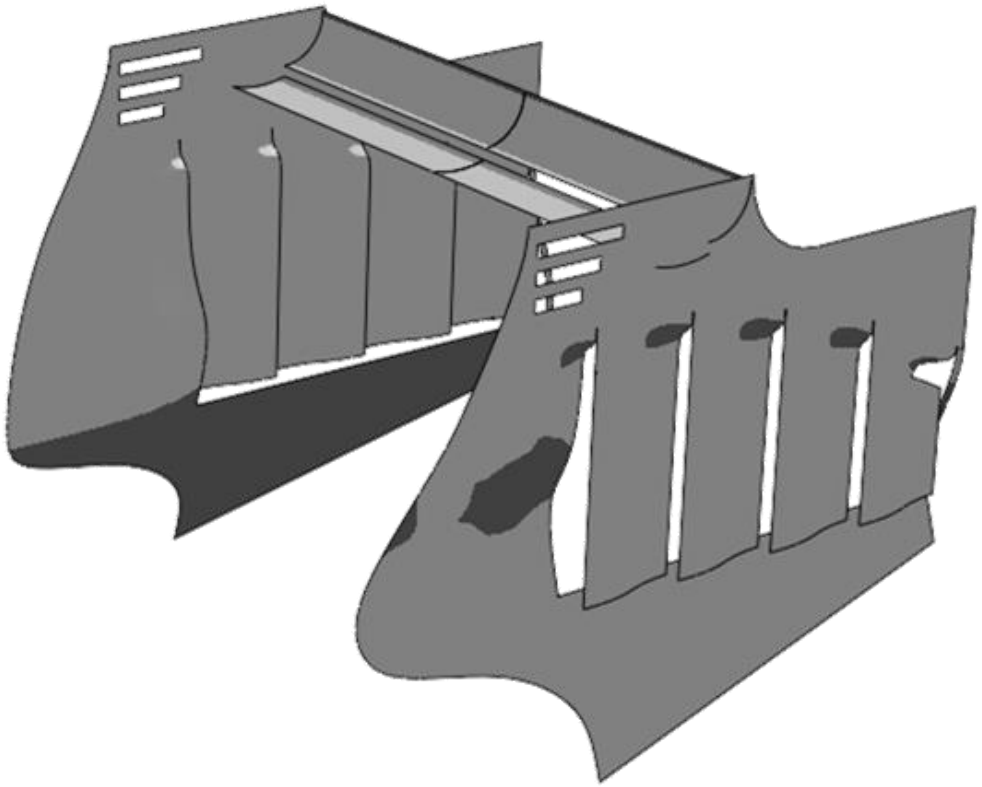

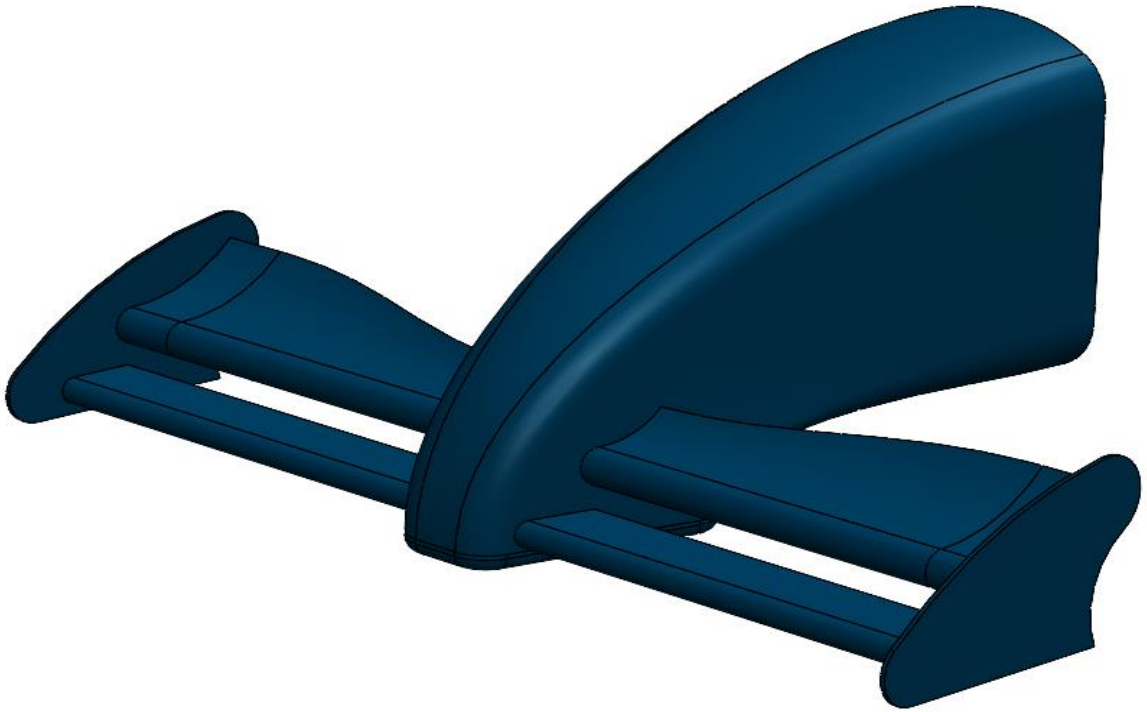

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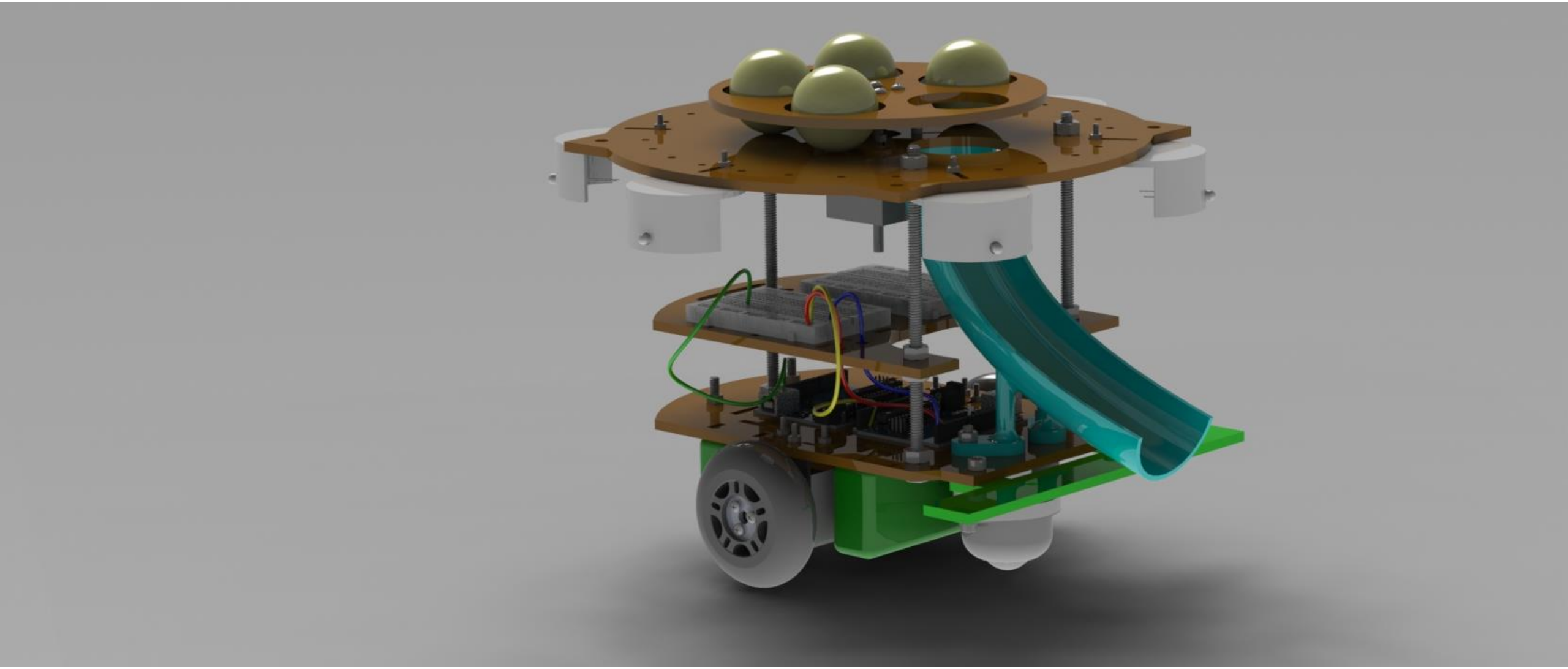

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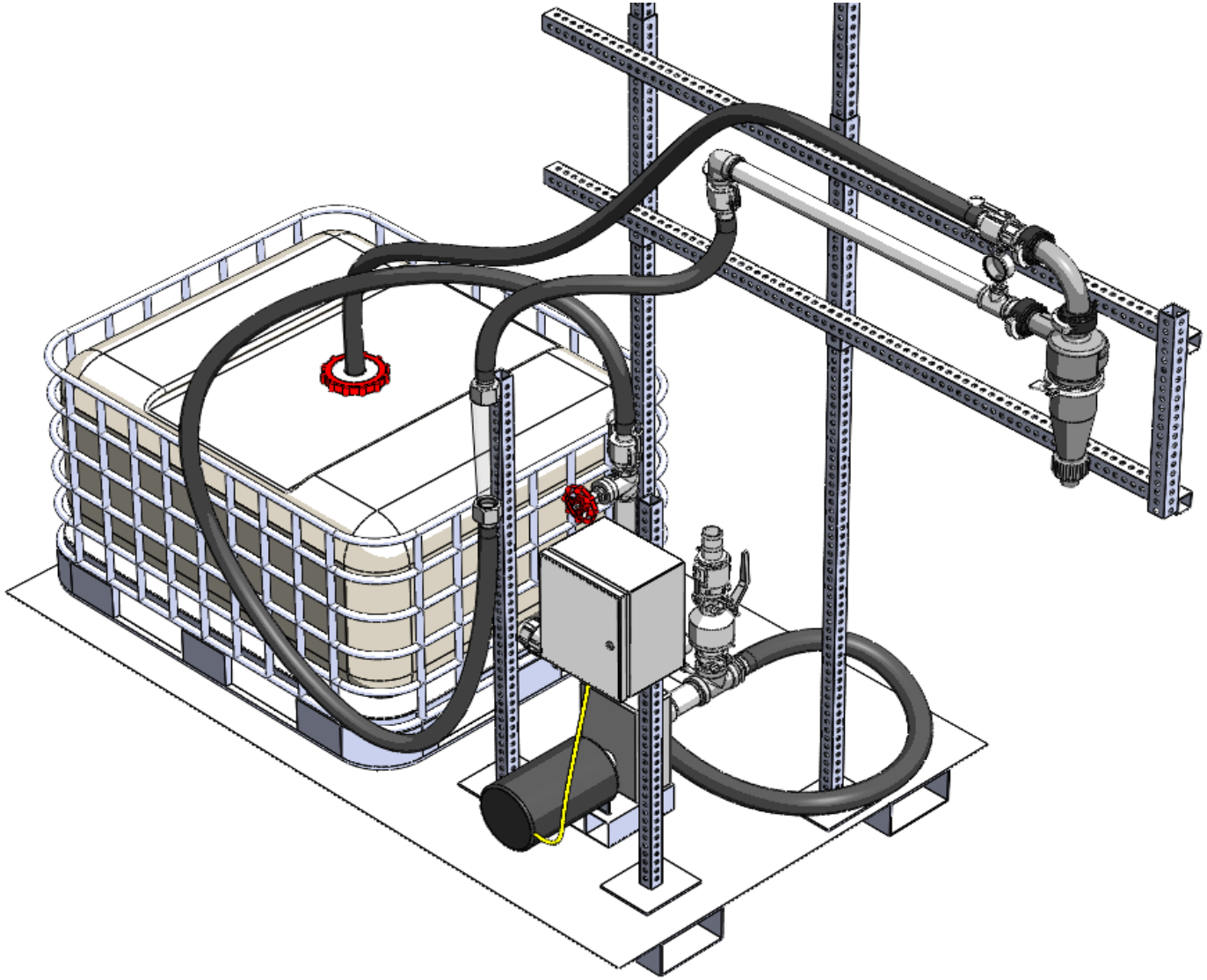
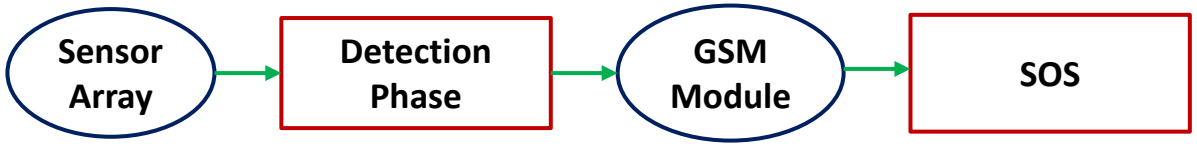


startup weekend

India witnesses **one serious road accident every minute** and **16 die on Indian roads every hour**. (NDTV)

Developed a critical experience and functional prototype for **accident detection and alert unit** for automobiles.

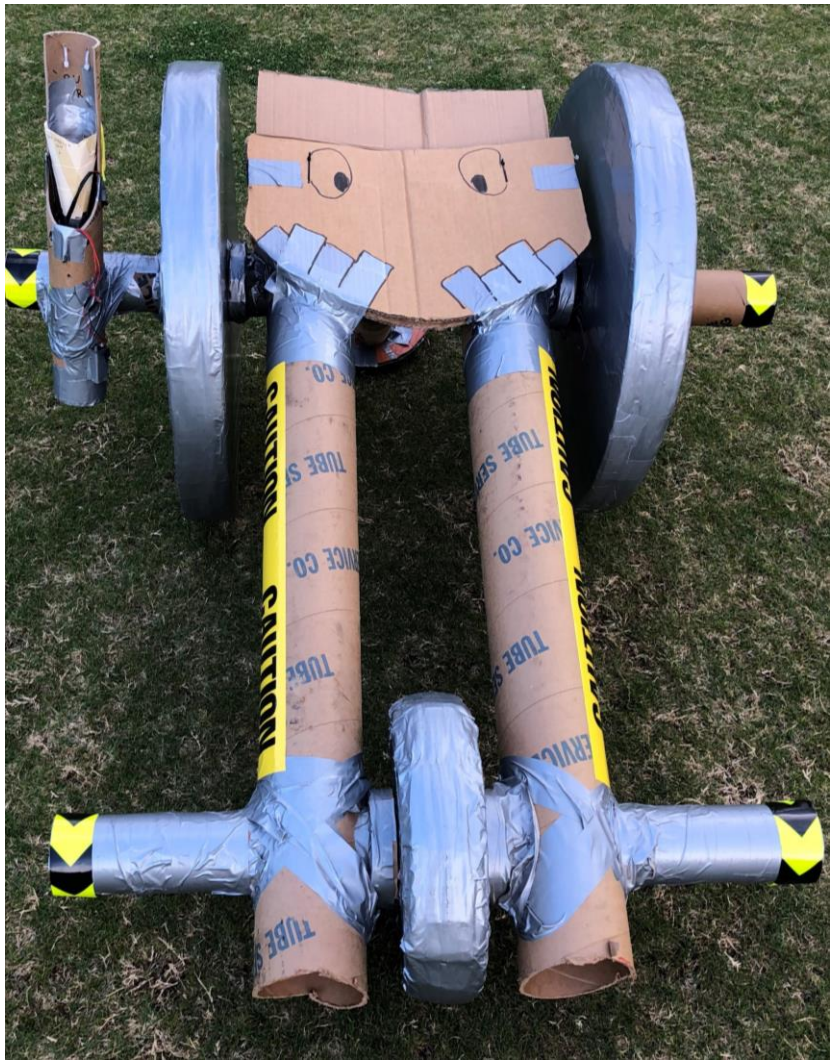
The product vision was to create an after-purchase add-on that **attaches to the OBD(on board diagnostic) port of automobiles**. The core functionality was to be able **to detect an accident** and automatically **send out a SOS** to emergency response services along with friends and family.



Team(size of 6) secured **second position** and 30 days of co-working space, after an elevator pitch and demonstration with a critical experience prototype to a panel of investors.

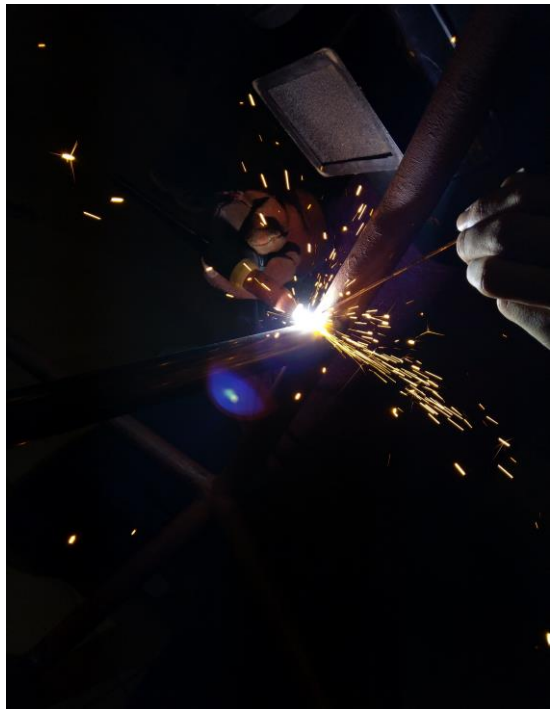
Worked with a **team** (in 2016) to develop a prototype for our product using Arduino; Business Model Canvas and VPC to essentially create a Startup in less than 54 hours

Paper Bike Challenge



Built a self-propelled paper bike out of scrap cardboard and some duct tape to take part in the annual ME310 paper bike race to create awareness and champion sustainable living.

Paper bikes constructed from scrap showed how problems like waste management can be tackled in neat ways and living sustainably is so much more than just throwing your waste in the right trash bin.




RUN CNC
POWER ON
POWER OFF
EMERGENCY STOP
HANDLE JOG
RESET
DISPLAY


CHARM

THANK YOU