

ALLISTER JAMES SEQUEIRA

GRADUATE MECHANICAL ENGINEER | UNIVERSITY OF COLORADO BOULDER

[allisterjsequeira.github.io](https://github.com/allisterjsequeira)

allisterjames.sequeira@colorado.edu

[linkedin.com/in/allisterjsequeira](https://www.linkedin.com/in/allisterjsequeira)

AUTOMATED VERTICAL BIKE STORAGE – CU BOULDER

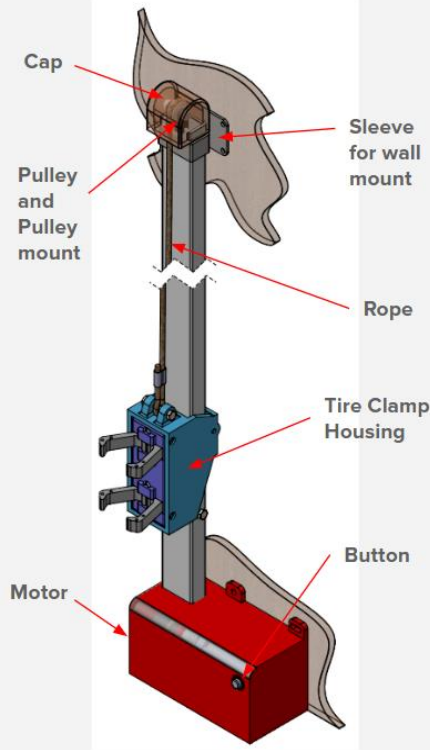
Overview:

- Objective: Design a quick, reliable, and space-optimized, **user-centric** bike storage solution.
- Lift a 60 lb bike to its vertical position within 6 seconds and reduce overall footprint.
- Reduce lift effort by 80% using assisted lifting.
- **Need finding > Ideation > Pretotype > Prototype > Final Product**

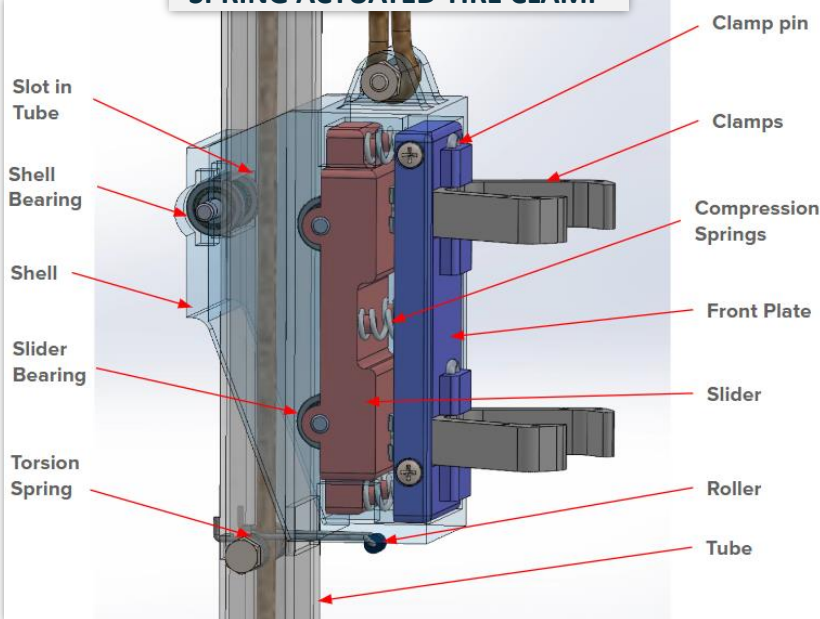
Execution:

- Created complete CAD model on **SolidWorks** including three **injection molded** parts having **DFA/DFM** features:
 - Self-locating features
 - Minimum side action
 - Sufficient draft
 - Top-Down assembly
- Developed functional **prototypes**. Rapid prototyped (**3D printed**) the tire clamp mechanism. Conducted **user testing**.
- Performed **FEA** for critical components.
- Prepared a technical report complete with **CAD drawings**, material, manufacturing and economic analysis.

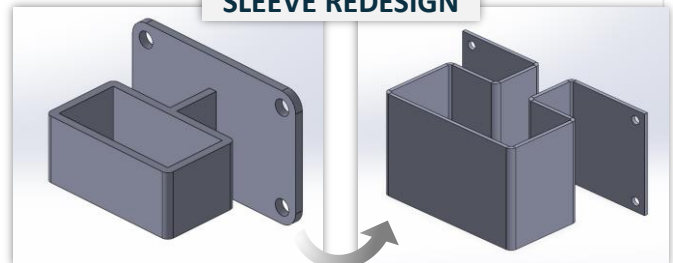
PROTOTYPE



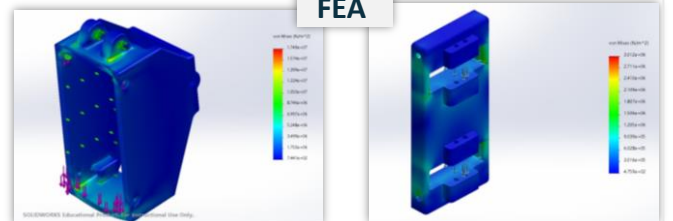
SPRING ACTUATED TIRE CLAMP



SLEEVE REDESIGN



FEA



INJECTION MOLDED PARTS



Results:

- Saved floor space by 45% and eliminated 100% lift effort through automated lifting, achieving a user-centric design.
- Improved **insertion metric** by 39% and reduced **secondary operations** by 18%.

ALLISTER JAMES SEQUEIRA

GRADUATE MECHANICAL ENGINEER | UNIVERSITY OF COLORADO BOULDER

[allisterjsequeira.github.io](https://github.com/allisterjsequeira)

allisterjames.sequeira@colorado.edu

[linkedin.com/in/allisterjsequeira](https://www.linkedin.com/in/allisterjsequeira)

REVERSE ENGINEERING A HAIR CLIPPER – CU BOULDER



Overview:

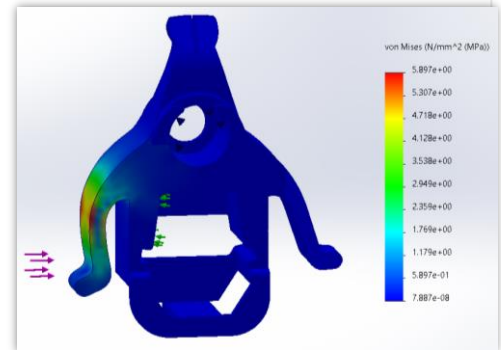
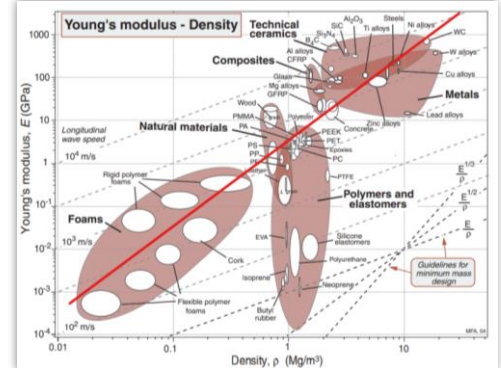
- Implement design changes to reduce product cost by improving DFM/DFA metrics through reverse engineering.
- Disassembly > Initial DFA analysis > Redesign > Validation

Execution:

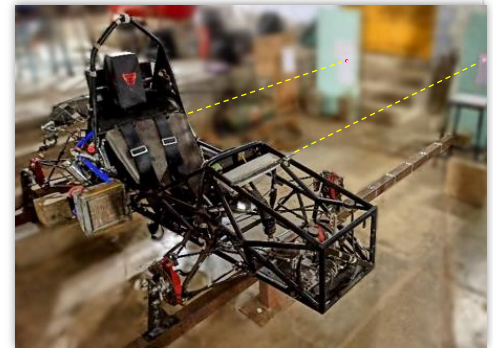
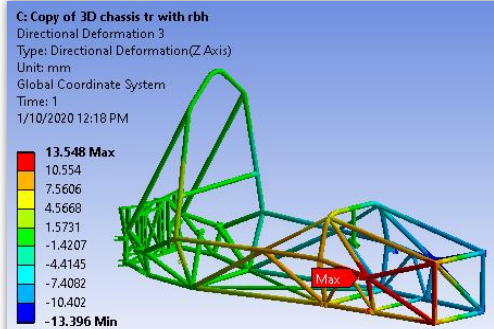
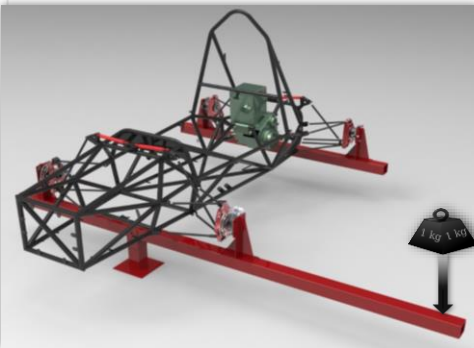
- Redesigned parts using **DFMA principles**:
 - Incorporated **integral springs** in the drive lever, eliminated 2 compression springs.
 - Added **snap fit** features to the housing, eliminated 8 screws.
- Technical report with **GD&T** on drawings.
- Performed **fatigue analysis**, material, cost and manufacturing analysis.

Results:

- Reduced number of components by 33%, reduced assembly time, and improved DFA metrics.
- Reduced product cost by \$3.36 (7.5% ↓).



TORSIONAL STIFFNESS VALIDATION – FSAE SPCE RACING



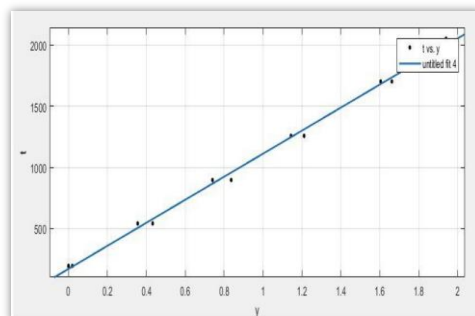
TORSIONAL RIG DESIGN

FEA SIMULATION

STIFFNESS VALIDATION

Overview:

- Objective: Calculate torsional stiffness of **FSAE race car** using FEA and validate through testing.
- Design and **fabricate** a **test rig** to measure angular deflection due to applied torque.



Execution:


- Used **CATIA V5** for CAD, **ANSYS** for FEA, and **MATLAB** to plot and analyze data.
- Used **laser pointers** to measure deflection on screen 10 ft away, increasing measurement accuracy by 9X.
- Performed inhouse fabrication, **SMAW** welding.


Results:

- Achieved acceptable 19.85% absolute error, factoring material and weld joint variations.

ALLISTER JAMES SEQUEIRA

GRADUATE MECHANICAL ENGINEER | UNIVERSITY OF COLORADO BOULDER

 [allisterjsequeira.github.io](https://github.com/allisterjsequeira)

 allisterjames.sequeira@colorado.edu

 [linkedin.com/in/allisterjsequeira](https://www.linkedin.com/in/allisterjsequeira)

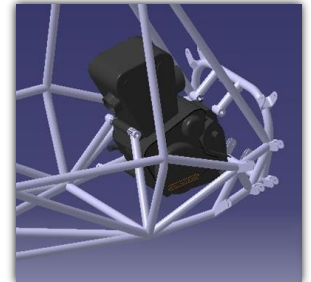
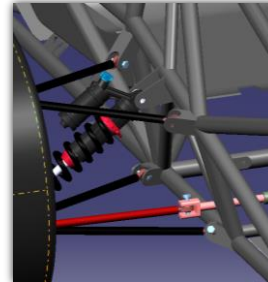
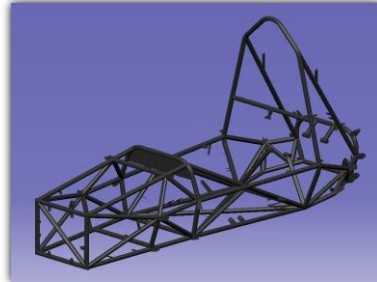
FORMULA SAE RACE CAR – CHASSIS LEAD – SPCE RACING



DESIGN

Design

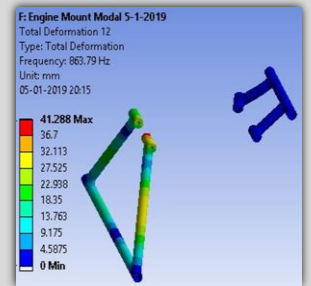
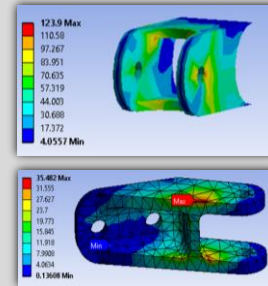
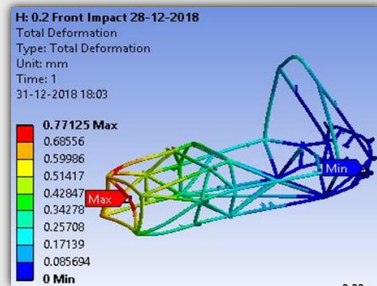
- Designed FSAE chassis for two national competitions
- Used CATIA V5 for CAD
- Interdepartment coordination, interference elimination
- Accurate mounting of every component interfaced



ANALYSIS

Analysis

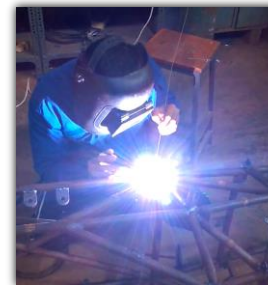
- Used ANSYS for FEA
- Crash Simulation- front, side, and rear impact
- Torsional stiffness analysis and modal/vibration analysis
- Suspension and Powertrain mounts' structural analysis



FABRICATION

Procurement & Fabrication

- AISI 1018 steel tubes
- Tube bending, tube laser cutting, CNC machining
- Laser cut jigsaw steel welding fixture design
- SMAW & TIG welding and Powder coating



TESTING

Testing, Validation & Safety

- Torsional stiffness test rig
- Driver Ergonomic design rig
- Tube tensile test
- Track testing



PRESENTATION


Reports, Presentation & Results


- Detailed Documentation and Technical Reports
- Presented at national competitions FB19 and FB20
- Design event: 4th rank
- Overall rank: 6th rank



ALLISTER JAMES SEQUEIRA

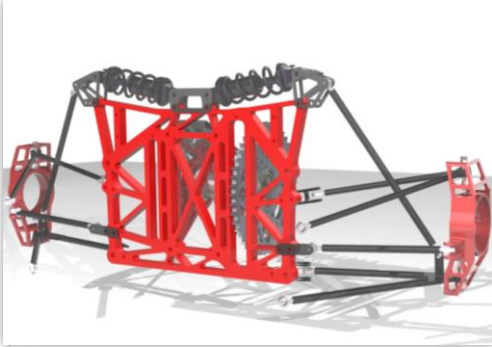
GRADUATE MECHANICAL ENGINEER | UNIVERSITY OF COLORADO BOULDER

 [allisterjsequeira.github.io](https://github.com/allisterjsequeira)

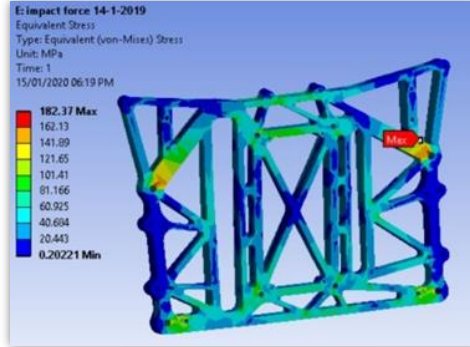
 allisterjames.sequeira@colorado.edu

 [linkedin.com/in/allisterjsequeira](https://www.linkedin.com/in/allisterjsequeira)

FSAE ALUMINIUM BULKHEAD – SPCE RACING



CAD DESIGN RENDERING



FEA ANALYSIS



CNC MILLED & ANODIZED

Overview:

- Designed a detachable Al 6061 rear bulkhead for mounting the rear vehicle assemblies.
- Mountings include **75% of Suspension mounts** including 4 wishbone, 2 toe, 2 rocker and 2 spring/damper mounts.
- Drivetrain mountings** include 2 rear engine mounts and 2 drive spool/sprocket mounts.

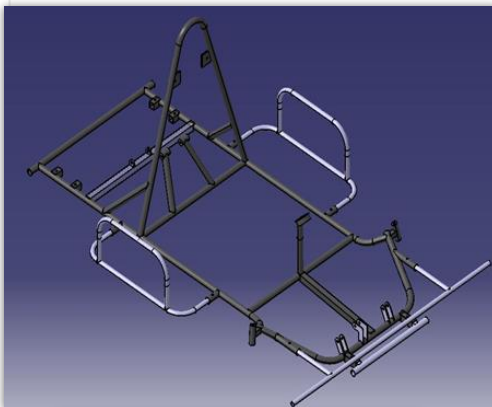
Execution:

- Used CATIA V5 for CAD, ANSYS for FEA analysis.
- Performed **Topology Optimization** achieving optimal strength and minimized weight.
- CNC** machined for precision mounting locations.
- Anodized** for improved corrosion and wear resistance, and the signature 'red' color.

Results:

- Improved accuracy in 80% of mountings of the complete rear assembly components.
- Eliminated misalignment of drive spool, due to uneven chain tensioning.
- Eliminated the need for complex fixtures for welding mounts by using Bolted joints.

GO-KART – CHASSIS ENGINEER – SPCE RACING



CHASSIS CAD DESIGN



PVC PROTOTYPE



Overview:

- Designed and Fabricated a Go-kart chassis in freshman year for the national competition IKC 2018.

Execution:


- Used CATIA V5 for CAD, ANSYS for FEA analysis.
- Used **PVC pipes for prototyping** to ensure ergonomic design.
- 3D ladder frame **lowered ground clearance** to 1.5 inches, 25% lower than predecessor.


Results:

- Secured 2nd Rank in the Design Event at the national competition IKC 2018.

ALLISTER JAMES SEQUEIRA

GRADUATE MECHANICAL ENGINEER | UNIVERSITY OF COLORADO BOULDER

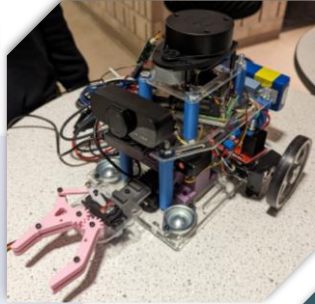
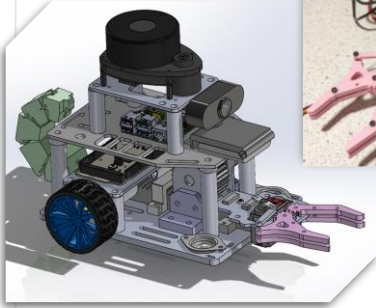
 [allisterjsequeira.github.io](https://github.com/allisterjsequeira)

 allisterjames.sequeira@colorado.edu

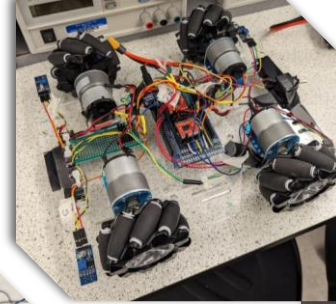
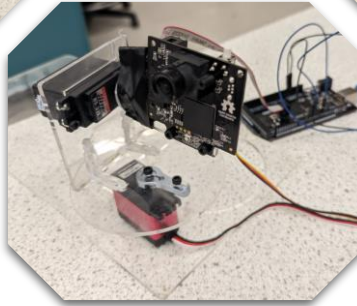
 [linkedin.com/in/allisterjsequeira](https://www.linkedin.com/in/allisterjsequeira)

MECHATRONICS PROJECTS – CU BOULDER

ROBOPET CHAMELEON



OBJECT TRACKING CAMERA



TANKS 'PHANTOM'



Overview: Map and navigate surrounding, recognize expressions & follow commands. Electronics: LiDAR, Camera, RPi, Arduino.

Contribution: Managed mechanical design

- Designed complete model, **SolidWorks**.
- Used **3D printed PLA** for **robotic claw, rack & pinion**, and curling tail mechanisms. Used **laser-cut acrylic** sheets to build the chassis.
- Developed **Arduino C++ code** for claw mechanism, used servo motors.

Overview:

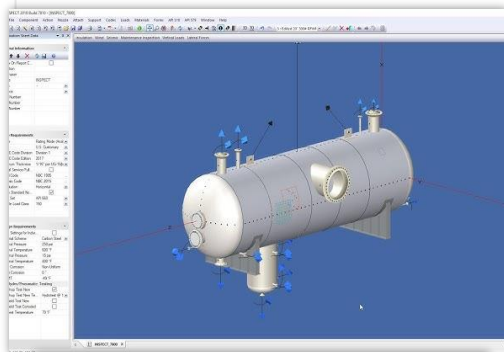
- Developed Automated object tracking camera.
- Used Pixy Camera, servo motors and Arduino.
- Application: Surveillance and Security, automated photo and videography.

Overview: Designed an autonomous robot tasked with launching projectiles at an opponent robot and self-reloading.

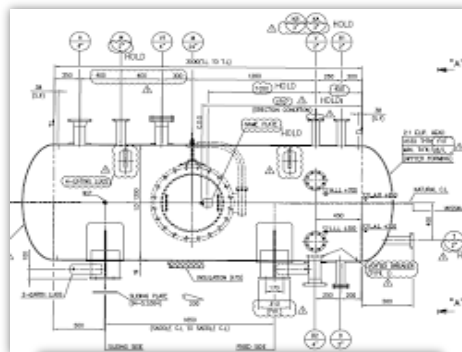
Contribution:

- Developed C++ code for **autonomous navigation** and **opponent detection**.
- Used **IR sensors** for navigation and **Pixy camera** for opponent detection using Pixy camera.
- Used servo motor for turret alignment. Flywheel and **solenoid** for shooting.

STATIC EQUIPMENT ENGINEER – BURNS & MCDONNELL



COMPRESS VESSEL MODEL



VENDOR DWG. REVIEW



STACKED HEAT EXCHANGER

Responsibilities:

- Designed Refinery Equipment like Pressure Vessels, Heat Exchangers.
- Prepared **Technical specifications** including Datasheets.
- Evaluated Vendor Bids, **Reviewed Vendor Drawings**, Calculations and Test Procedures.

Experience:

- 2-year **consultancy** experience collaborating with clients and vendors.
- Managed 11 exchangers including 4" thk. vessels **reaching 2000 psi and 750 °F**.
- Accustomed with Industry Codes like **ASME BPVC, API, PIP**, client standards.

Achievements:

- Resolved equipment support design issues, eliminating major fieldwork proposed, saving the client \$10k+.
- Established adequacy of existing exchanger weld design according to Code, saving the client thousands.
- Delivered a seminar on saddle design for horizontal vessels.