



Development of an Off-Road Race Car

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College Park Scholars – Science & Global Change Program

Mechanical Engineering

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Introduction:

Over the course of the semester, I have worked on the research and development of components for the Terps Racing Baja SAE car.



The race car from the 2021 season, "TR21"



Site Information:

Name of Site: **Terps Racing**

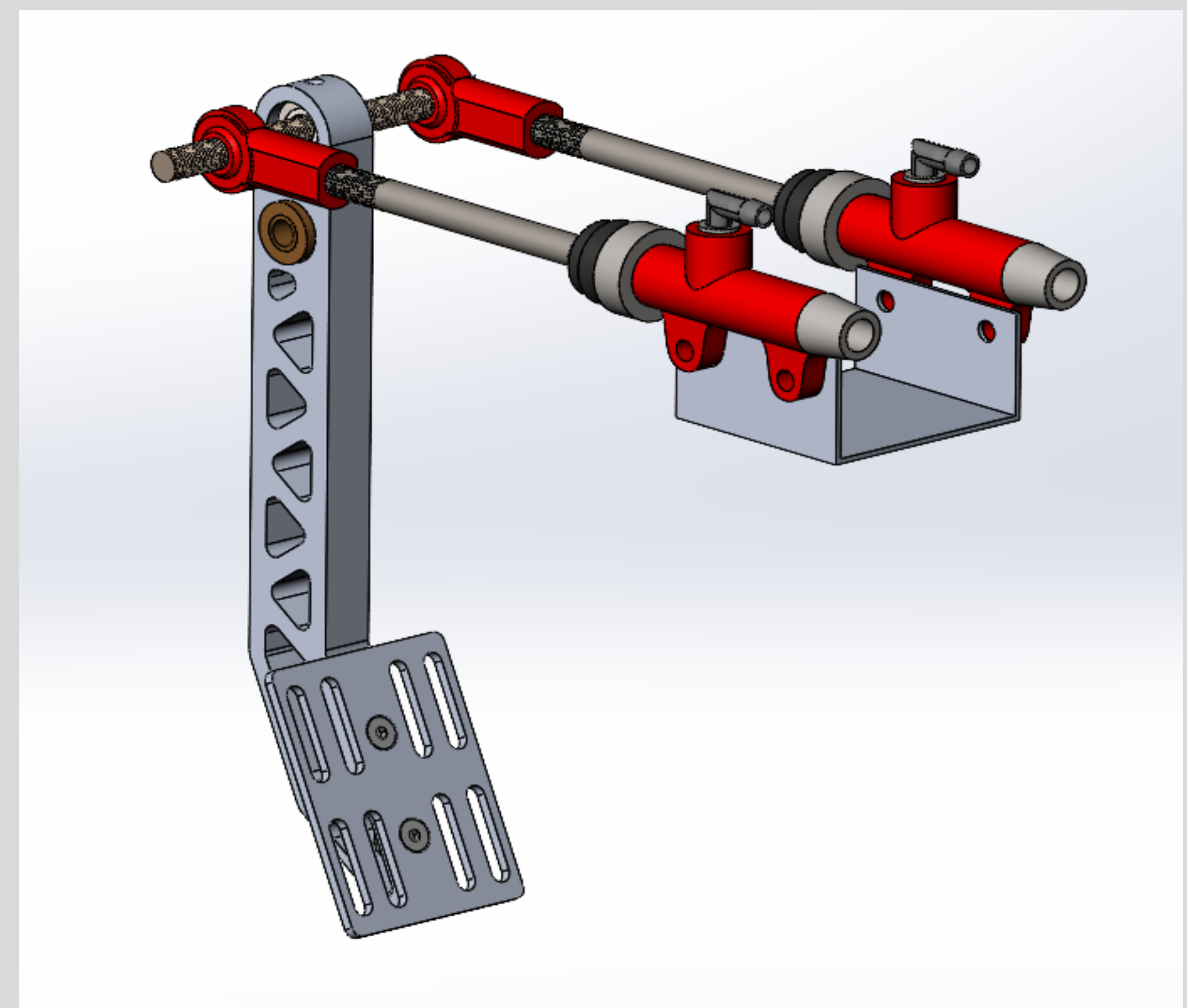
Address: **J.M. Patterson Building**

Your supervisor: **Scott Schmidt**

The site mission: **Design and manufacture an off-road race car to compete with other schools**

Project Goals:

A redesign of the braking system was required due to a rule change. The new rule stated that the brake pedal must be able to withstand an input force of 450lb, which the previous design did not satisfy. This new design met that criteria and was lighter than the old pedal.



Screenshot of the brake pedal and master cylinder assembly.

Activities:

This project involved lots of Computer Aided Design (CAD), simulation, and manufacturing in the shop. I have learned how to use various machines in a machine shop such as a mill, lathe, welder, and more. I have been responsible for optimizing the brake system and have learned about the functions of components in an effective brake system,

I started by researching brake systems used by other race teams to brainstorm ideas for what I wanted to do with my design. This allowed me to get a better understanding of how a brake system functions. I took these ideas and used Solidworks to aid the design process with 3D models of components. I used a simulation called Finite Element Analysis in Solidworks to perform stress calculations based on a set of required criteria. Through this process, I was able to design the brake pedal shown to the right, which satisfied the goals I had set out at the start of the project.

Impact:

Through this project, I have learned so much about the engineering design process. During my project, many other students were doing similar projects, for example redesigning the suspension arms. I got to see, from start to finish, the design process of many different projects, starting with an idea and finishing with the manufacturing of components. This experience has taught me valuable information that cannot be taught in classes, such as how to balance my time effectively, and has been very enjoyable.

Future Work:

Next year, I will be the leader of the suspension sub-team and will have the responsibility of leading members in their design projects, overseeing the manufacturing of suspension components, and contributing to a successful racing team.

Acknowledgments:

- **Scott Schmidt**, Terps Racing Faculty Advisor
- **Dr. Thomas Holtz**, SGC Faculty Director
- **Dr. John Merck**, SGC Faculty Director

