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# President's Note

In 2018 the team started a new era for the team when we unveiled Independence. With a new car built on correcting past mistakes, the team was excited to test its performance at the Formula Sun Grand Prix (FSGP) in 2018. After struggling with the make versus buy decision earlier in the year, the team decided making a custom battery protection system (BPS) would give team members a better learning experience while being more cost effective. The system proved to be unreliable a few weeks before the competition, and after many hours of troubleshooting, the problems could not be resolved in time. Although the team had hoped to show off the abilities of a car unlike any other the team has built in the past, we left the competition in good spirits and with a desire to make Independence better than ever.



Testing and using the motors for the Pat's parade



**Ellie Lunte**  
Ceramic Engineering  
Junior



Unveiling April 2018; working on BMS during race



This year the team has revamped Independence to create a reliable and well-tested car before race day. We determined the sources of our problems and started brainstorming solutions immediately after competition, and with many new and enthusiastic members implementing their ideas, we are becoming a team with a renewed drive to succeed. We were able to test the car as early as February which has not been possible for us in several years, and as a result we were able to drive in the St. Patrick's Day parade to share our accomplishments with the Rolla community. As a team we are moving on from the mistakes of the past and are ready to create a new reputation going forward.

# Member Spotlights



**Michael Rouse**  
Senior, Comp Sci  
Electrical Subteam

I joined the team in 2015 and became the Electrical Team lead in Fall 2017. One of the main things we have struggled with in the past is massive amounts of components and code needed for a functional car. First, we had to standardize the code that ran on our circuit boards, which was

done with the help of a common library of code that we would use on all of our circuit boards. This took about a year in total to develop, but we have really started to see the benefits of these efforts. It is easier to hit the ground running and the amount of code debugging the team has had to do has gone down significantly.

Another challenge the team struggled with was the dizzying amount of components needed for the electrical system. The team set about cataloging all of

the common parts we used to avoid unnecessary hurdles in the purchasing process. I designed a program that allows board components to be automatically generated in a consistent format to help ensure that nothing was left out. I'm proud to have worked with the team to become more efficient throughout the years. The experiences I've gained have made me a better engineer and allow me to look forward to graduating feeling the team is in good hands.



**Fred Thornton**  
Senior, EE  
Electrical Subteam

When I first joined Solar Car Team, I had no idea what it would be like or how much I would contribute to the team. I simply had an interest in the project and a friend on the team. But in a short time, all it took was a composite lay-up, an accelerated reconstruction project, and some

shopping at Lowes and I became a full-fledged member, working with other members to solve any problems that come up at a moment's notice.

The electrical team took great care to introduce me to the software used in electrical subteam projects. With their knowledge and help under my belt, I was entrusted with modifying and creating my very own printed circuit board for the car, so now a piece of me will always be with it. It has given me

great joy to be able to apply what I've learned in classes and get to really find out what it is to be an engineer in practice. I cannot wait to see all of our efforts bear fruit when we compete in FSGP 2019.



**Adam Hinkebein**  
Senior, Mech E  
Mechanical Subteam

The thing that has always amazed me about the team since I joined my freshman year was the amount of dedication members put towards this project. After working in groups on campus and in internships, you learn pretty quickly who on a team you can trust to pull their own weight. On

Solar Car you come to expect that everyone is capable of any task you can give them. Overall, our team members are very motivated to ask intelligent questions that allow them to create their own solutions.

While I was chief engineer, fabricating the suspension took most of my time and focus. Throughout construction I asked a small team of three or so students to bond the composite panels that make up the driver compartment together and onto the aero body

of the car. These students, who weren't especially familiar with the design, were able to take the lower half of the car's pieces and assemble them to completion, all with very little instruction. Their efforts despite the circumstances allowed me to prioritize more difficult problems. It's because of stories like these that I've come to appreciate and expect every student working this project to be as dedicated as those before them.

# Chief Engineer's Note

I've had the privilege of serving as the chief engineer of the Missouri S&T Solar Car Team since the beginning of the Spring 2019 semester. Throughout the past two semesters, we've been hard at work improving and preparing Independence for FSGP this summer. Of the work we've done, the most significant has been an overhaul of the electrical system. The pack structure was redesigned and the battery protection system (BPS) reworked. As part of this rework, we purchased an Orion BPS to handle voltage, current, and temperature sensing, which passes this information off to our custom battery management system. At the same time, the programming used on all the different circuit boards in the car was standardized. These efforts have resulted in a much more reliable and efficient system.

**Will Applegate**  
Mechanical Engineering  
Senior



Electrical subteam members hard at work



Testing the motors and BMS, inside and outside

We've also purchased two new motors from Mitsuba to compliment this system. These motors provide us with a high performance plug and play functionality, as well as the ability to run the motor in two different configurations, allowing us to adapt to different operating conditions. We've put in a lot of work this year getting the car ready and we're excited to get out on the road in preparation for this year's competition.



# Sponsors



## Save the Date

Formula Sun Grand Prix 2019 is July 4-6 in Austin, TX, at Circuit of the Americas!

## Contact

If you have an event you'd like us to go to or want to get connected with Solar Car, follow us on social media, email us, or visit the website!



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