Summer 2023

This summer, especially June, was huge for our team! The moment we've all been working towards has finally come: the Formula SAE EV competition in Brooklyn, MI. We are so proud of the efforts put forward by our members to get our car to competition. Read more below to see how we placed, what we learned, and what we've worked on in the following months. We'll also introduce all of our new leads in their respective subsystems!
Captain's Note

Dear Penn State Formula Racing Members, Partners, Friends, and Family,

I am thrilled to address you for the first time as the captain of our esteemed team, and I would like to take this opportunity to introduce myself. My name is Joel VanSkiver, and I am a rising senior majoring in Agribusiness Management. In the previous season, I had the privilege of serving as the team’s Finance lead, working closely with our former captain, Nate Dreyer, to overcome various challenges. My passion for motorsports runs deep, and I am honored to lead such an exceptional team. Together, I firmly believe that we have the capability to achieve extraordinary feats, surpassing even our most ambitious goals.

As many of you are aware, our competition this year was unfortunately cut short. We encountered difficulties in passing four out of the six required technical inspections needed to compete. However, it is important to recognize that we were on the cusp of passing our EV Active tech inspection, demonstrating the tremendous potential of our team. Despite the limited points reflecting our achievements, we accomplished remarkable milestones, some of which even elude many second- and third-year teams.

As we embark on the upcoming season, we have dedicated the past few weeks to collecting our ideas and formulating plans for the PSR24 car. This project will undoubtedly be the most ambitious endeavor our team has undertaken to date. Armed with the knowledge and experience gained from our inaugural EV competition, we have learned invaluable lessons and are poised to apply them effectively. If you wish to join us on this thrilling journey, I encourage you to stay updated by reading our monthly newsletter, following our Instagram, or engaging with us on TikTok @nittanymotorsports.

I would like to extend my heartfelt gratitude for the unwavering support you have shown Penn State Formula Racing (soon to be Nittany Motorsports). With your steadfast backing, we can elevate ourselves to unprecedented heights and make this season an unforgettable one. Together, let us strive for excellence and continue pushing the boundaries of what our team can achieve.

Once again, thank you for your unwavering dedication and support.

Warm regards,

Joel VanSkiver
Team Captain
Events

Formula SAE EV Competition

From June 14th to June 17th we traveled to the Michigan International Speedway in Brooklyn, MI to compete in the Formula SAE EV Competition. As a first-year team, making it to the competition alone is a huge accomplishment! By the end of the week, we were able to pass both Accumulator Tech and Mechanical Tech Inspections! We were very close to passing EV Active but fell short at the last item on the list: the energy meter. Nonetheless, we're so proud of the efforts of our members! Overall we placed 41st out of 69 teams! We have gained a lot from this experience and are eager to start working towards next year's car. A huge thank you to all of the members who helped design, build, and test this vehicle—competition attendee or not. This monumental achievement of our team would not be possible without the dedication of our members. Keep reading through to see what we have learned more specifically and what we have in store for the next year!

Stewart-Haas Racing Q&A Session

Before we departed for competition, Mike Bugarewicz, PSU Alum and Performance Director at Stewart-Haas Racing held a Q&A Session with our team! He talked with our members about careers in motorsports and his experience in the NASCAR circuit. We thank him for all of his wisdom and appreciate the support from Stewart-Haas!
Aerodynamics learned a great deal from our time at competition! When we weren’t assisting our team with technical inspections, we utilized the resources available and talked with other teams and vendors. We learned how lap time simulations that can aid us in defining goals for our 2024 design. Additionally, we learned about manufacturing methods that improve weight and airfoil surface and accuracy that we can implement for the upcoming year. Upcoming for Aerodynamics, we have summer work meetings scheduled for each of our project groups to discuss and start designs for our next car.

Chassis

For the second year in a row, are Chassis Lead is Mike Sheppard! Mike is a fourth-year Mechanical Engineering major and this will be his fourth year on the team.
This was a year of many firsts for the chassis subsystem. This year, we built our first full monocoque chassis. It was our first time designing for an EV, and our first time optimizing what materials we used in each section for stiffness and weight reduction. There were many bumps on the road on our journey, but the chassis subsystem faced each and every one down and emerged victorious.

Our first EV competition was a huge success for our chassis development. We were a real head-turner this year! It is unheard of for a first-year team to run a full monocoque, and the fact that we did is a testament to the determination and countless hours of hard work put in by each and every member. In our design review, which is a thesis defense on your design against industry professionals, we scored 3x more points than last year. Taking inspiration from JFK, we chose to go full monocoque not because it is easy, but because it is hard! Overall, this was an amazing year for the chassis subsystem and our end result is something that we are incredibly proud of. Here’s to great things in the 2024 season! Special thanks to Eric Strauch and the Applied Research Laboratory. We could not have done it without your help!

Controls, Brakes, and Safety

Our Controls, Brakes, and Safety Lead for this year is Thomas Franco! He’s a fourth-year Mechanical Engineering major and this will be his fourth year on the team.
Controls, Brakes, and Safety cont.

Controls, Brakes, and Safety had a fantastic competition. Three very dedicated and deserving team members attended: Will Sigety, Erica Lee, and Ben Sobel. As the car did not run, our successes came from mechanical inspection and the design presentation to the judges.

Our car passed mechanical inspection, a testament to the team members to design within the rules! At the 2022 competition, while we did pass, the braking system was very problematic and almost caused us to not pass inspection on at least two occasions. Our focus was to fix those issues for this car, and we can say we succeeded in that effort.

For design, we were the highest-scoring subsystem for the second year in a row. In 2022, we scored 9 out of 25 points while this year, we scored 16 out of 25 points. Big steps were made to create an emphasis on validating what we design, as this was the most glaring flaw we received as feedback in 2022. While we improved on that, the feedback we got this year surrounds how do we tell the story of what we do, what are we proud of, and more validation in other specific areas to tie the car together.

That leads the subsystem to today. With a new subsystem lead, meetings have started to define metric-based goals and targets that we should design to that will ultimately make the car better. We have a solid foundation when it comes to what we designed for the 2023 car. Now, we can improve on the shortcomings, with a plan to start optimizing certain areas for performance gains.
Drivetrain

Our Drivetrain Lead for this year is Tyler Stasko! He is a third-year in Mechanical Engineering and this will be his third year on the team.

As the team attended the 2023 Formula SAE EV competition in Michigan, drivetrain worked extremely hard to get the car in shape for racing both before and during the competition. During a track day just prior to departing to competition, the formula car was able to be run at full capacity to give the drivetrain components a full test. All components worked at full capacity with no errors! Huge shoutout to Jonathan Quarrick, Zachary Mosier, Tyler Stasko, Dominic Dudiak, and Josh Kaleida for all the hard work they dedicated during the competition week. While only a small amount of the drivetrain members were able to be brought, it was a whole team effort to get the system in working order so that it could function at full capacity. As far as design review goes, there was a large improvement over the validation from last year, and we are excited to keep the upward trend during the upcoming academic year. Without the leadership of Josh Kaleida, the design and validation wouldn’t be where it was going into competition. Drivetrain is excited for the upcoming year as lots of lessons were learned and improvements are ready to be made. Time to hop back into design and get to work!

Finance

Our new Finance Lead is Zac Allen! He is a third-year in Agribusiness Management and this will be his second year on the team.
Finance cont.

Finance has had a hectic last few months. In May the group competed in the business presentation competition virtually in preparation for the June FSAE EV Competition. In June the group visited Michigan International Speedway for the 2023 Formula SAE Electric Vehicle competition where they competed in the Cost Presentation and Cost Scenario Categories. Finance is happy to report that the team improved in all categories from our 2022 competition! Since the competition, our group has continued working on acquiring new sponsors, retaining current sponsors, and overall subsystem responsibilities. Also, a huge shoutout to every member of the finance subsystem as without you all the team literally wouldn't have a car at all. Finance is very excited about the upcoming year and can't wait to continue working hard our next car!

High Voltage Electronics

For the second year in a row, our High Voltage Electronics Lead is Abdu Keeley! He is a third-year Electrical Engineering student and this will be his third year on the team.

High voltage came into competition with a lot of passion and little sleep. Finishing our wiring harness was a huge push that we made just in time. We were able to run the car for one track day and made huge performance improvements throughout the day. Last-minute feedback on a pre-tech video we submitted saw modifications to the accumulator cell tap wiring. This took a very long time and honestly left the team pretty drained. We made it to Michigan and began the several-part technical inspection. We were able to pass both Accumulator tech and Mechanical tech on day two. We ran into a large number of small issues that stole a lot of time from the team. A lot of these were caused by cutting corners in the rush to finish the wiring harness. Due to this, we only had one morning to pass the rest of the dynamic technical inspection and EV Active.
High Voltage Electronics cont.

We ended up frying a circuit board due to reverse polarization and that was the final straw that took too long to fix. We ended up getting into EV Active Friday night but were unable to complete it. Overall, we came incredibly far as a team, and I am so proud of Electronics. We came in as a fresh first-year EV team and Electronics was able to accomplish all the following: build a strong core of members, create all necessary working custom circuit boards from scratch, build an Accumulator and pass tech, make a functional ring hardness, run a fully functional EV car at our test tract, and many more feats. We were frustrated with the failure but are motivated to turn it into fuel (or in our case, charge) for next year. We have the team for the coming year to build the best car our team has ever seen. Thank you to all our sponsors and supporters, we couldn’t have come this far without you.

Low Voltage Electronics

For the second year in a row, our Low Voltage Electronics Lead is Chris McKinney! He is a fourth-year in Computer Engineering and this will be his fourth-year on the team.

The Low Voltage had a successful performance at competition and the track day leading up to it. Although we did unfortunately not past the final round of static technical inspection. All of the low voltage systems performed correctly within the car. Most notably was the performance of our throttle to motor system, which included throttle sensors, a discrete circuit board for adjustment, the STM32 microcontroller, and CAN bus communication with the motor controller. This system passed all inspections during competition and reliably worked during our driving tests performed prior to competition. Additionally, the BSPD (brake system plausibility device) was successfully tuned and passed technically inspection. Every element of shutdown system also successfully shutdown the vehicles tractive system.
Low Voltage Electronics cont.

As for future plans for the LV sub-system, we have a lot of ambitious ideas and improvements. Firstly, we will be focusing on a top-down approach to our system where we completely design our architecture before designing every board. This allows us to put more effort into our wiring harness initially as well as better understand what the capabilities of the vehicle will ultimately be. Additionally, we are investigating several methods of collecting sensor data for being able to quickly tune the vehicle.

Outreach

Our Outreach Lead for this year is Becca Baker! She is a fifth-year studying Industrial Engineering and this will be her fifth year on the team.

June was a very exciting month for outreach! We were able to paint our livery design that we planned out and we went to competition! We posted content on our Instagram and Tik Tok pages each day and took pictures and videos the entire time. Lastly, our merchandise was a hit throughout the week! It was a blast to help our team show off the incredible work done all year. This upcoming year we have something very exciting to announce- we will be changing our team name to Nittany Motorsports! This was decided by the whole team as we transition to a more established EV competitor. Logo changes and name changes will be sweeping the social media and website very soon- be on the lookout! The next newsletter may look different, but we're still the same dedicated team you've read about. We appreciate all of your support throughout the year and we look forward to working with you throughout the coming years!

Suspension

Our Suspension Lead for this year is Robby Bahnsen! He is a fifth-year studying Mechanical Engineering and this will be his third year on the team.
The suspension was completely ready to go for competition aside from the sway bars which didn’t quite make it on our 2023 car due to time and manufacturing constraints. We were able to get one day of testing in to adjust spring rates and damper settings. The alignment still needed to be refined a little bit when we got to competition, but aside from that the car was ready to go! Driver feedback for the car was overall positive, so we were looking forward to seeing how the car would perform at competition with some alignment changes done.

When arrived at competition, there were three main tasks that needed to do: adjust the car alignment, mount the new tires we bought, present our design to our designated suspension design judge, and get some testing in before dynamic events and make adjustments accordingly. Overall, presenting our design went well, and we ended up getting 12 points out of 25, which is above average. In the end, we sadly were not able to see how our suspension performed in the dynamic events due to not passing tech (mainly due to time constraints), but everyone on the team put in a great effort throughout the whole year, and we’re truly amazed by our accomplishments! We tried to keep our design fairly simple and fool-proof and in the end, it held up and performed the way that it was supposed to during testing. We are certainly going to be looking forward to this year and seeing what extra developments we can do to make the car perform better and boost creativity in our design. We’re hosting meetings throughout the summer with our returning members to work through design ideas and research for our next car!
Our Systems Integration Lead this year is Josh Kaleida! He is a fourth-year Mechanical Engineering student and this will be his fourth year on the team.

With competition coming to an end, so does the first year of the new Systems Integration position. This position has created a lasting impact on both our design and overall team dynamic for the better. We successfully completed our first fully electric vehicle with a full monocoque on a 1-year design cycle! While we didn’t get to compete in the dynamic events, the year was still a huge success for Systems Integration. As for competition, several systems were put in place to better integrate the subsystems of the car to create a single machine—PSR23 "Marcia". Things like standardizing bolts, hosting combined meetings, hosting design reviews, etc. helped align our subsystems in a way not present before. All of these ideas will be carried through to next year as a standard for our design process.

In addition, several suggestions and team goals were given to us by the design judges. First, the design judges want the team to focus on building a points machine. This means creating designs to maximize the points gained in every event. Also, the design judges emphasized documentation. One method to implement this is a procedure for creating a PowerPoint to show the entire design process for a part. These two main goals are just the start of what I hope to be another successful year for the Penn State Formula Racing Team—soon to be Nittany Motorsports.
Sponsorships

Thank you to our sponsors for the year thus far:
- Altair, Altium, BEST Center, Calspan Tire Research Facility, MasterCAM, Penn State Department of Mechanical Engineering, Penn State Engineering & Entrepreneurship Program, Penn State Engineering Undergraduate Program, Penn State Institute of Energy and the Environment, Rapid Harness, Rock West Composites, SimScale, Stackpole Engineering, The Piper Group, Uline, and VI-Grade

We are looking forward to your continued support!

Acknowledgements

We would like to take the time to acknowledge the following groups:
- Our Graduated Seniors - We wish you the best of luck in your future endeavors!
- The Learning Factory Staff
- The FAME Lab Staff
- The Larson Transportation Institute

And thank you to all others who have provided us with constant support throughout our switch to electric! We are looking forward to the next year of car development!

Contact Us

Interested in joining or sponsorship opportunities? Please contact our team administration below or keep updated with our social media.

Joel VanSkiver, Team Captain: jpv5295@psu.edu

Becca Baker, Outreach Lead: rab6214@psu.edu

Zac Allen, Finance Lead: zwa5059@psu.edu

Instagram & TikTok: @nittanymotorsports
Facebook: Nittany Motorsports
Website: https://sites.psu.edu/pennstateracing/