March 2024

Throughout the month of March the entire team has been diligently working as we approach the second half of the spring semester. The team has been manufacturing components to make sure that the car is finished for competition in June. We also had our fair share of events that we lead or partook in. We are eagerly awaiting showing you all our finished 2023-24 car.
Hello Nittany Motorsports Supporters,

As always the Nittany Motorsports crew has been hard at work developing our next competitor. This past month has been the most exciting yet.

TEO Pro Car has been a great help to the team this season. TEO specializes in building dirt-modified chassis. When we reached out to ask for their help in producing our chassis they were very excited to participate in the project. After sending the team at TEO our CAD files they cut our tubing and got it shipped to us in less than a week. In the coming week, the team is planning to weld the chassis and we will finally see the biggest milestone in our season.

A few weeks ago the team participated in our 2nd annual DEI workshop. We have seen great results from our workshops. The team has given leadership overwhelmingly positive feedback regarding our workshops.

Thank You,
Joel VanSkiver, Team President
**Events**

**DEI WORKSHOP**
This month we hosted our annual DEI workshop in our soon to be workspace, the Engineering Services Building. In this workshop we talked about surface level and deep level diversity, an overview of biases and how they can be present in the team, and how DEI impacts NMS. We had over 90 members attend which speaks to the importance and impact of DEI on the team. We want to thank Outreach member, Alexa Jordan, for organizing and administering the workshop. If you have more specific questions about the workshop please contact our Outreach Lead!

**FORMAL**
This month we hosted our annual formal. Like last year it was a joint formal with other engineering clubs and we were delighted to have been a part of it. It was hosted at Basement and was a great bonding experience for us as a team. It also was great for members to make connections with other engineering clubs with whom we will be sharing a workspace throughout the coming years.

**NET IMPACT CONFERENCE**
We were invited to join and speak at Net Impact’s Student Sustainability Conference. There we attended a panel where they discussed sustainability and how students can get involved in that through their careers. We then were able to speak with attendees about sustainability in the automotive industry with regard to electric vehicle development. Thank you to Net Impact for having us!

**SHOP MOVE OUT/CLEANUP 1**
This was the first day we had purely dedicated to cleaning up our shop before we move out and into ESB. We worked to prepare the shop to move all the important items we will need over to our new shop.
Aerodynamics

Aerodynamics has been busy on finalizing designs for the last few busy manufacturing phase weeks. Body panels and aero covers have been designed and will be made jointly with the chassis subsystem. Undertray and diffuser designs are underway, hoping to be done midway through next month. The rear wing is being finalized and assembled, and foam molds are being prepared for CNC milling. The next month will be an exciting one as the majority of the aero package will come together and actually be mounted to the car!

Chassis

Chassis this month has been all about finishing projects. We recently finalized our firewall design as well as body panels and are looking to order parts. We are also working on finally manufacturing the chassis. Our jig for the tube frame was CNC’ed and put together as well as working on making tooling for a rib stiffener for the hood. Our final chassis design has been sent to get tubes notched and we are eagerly awaiting the delivery so we can get started on welding.
Controls, Brakes, and Safety  

March has been a very busy month for manufacturing! We are making great progress with all projects in CBS. The month has not been without its obstacles as we are trying new manufacturing techniques with the brand-new machines in the EDI building! We have a target date of April 11th to finish ALL manufacturing for the subsystem. We have lots of milling to do on the pedal tray, but then should be ready for final assembly. Our steering column is being very methodical when manufacturing to keep everything perfectly aligned. Lastly, our SBR subgroup has finalized their plans to smooth out new rotor material and will be ready to waterjet the final design soon, taking our braking system to new heights!

Drivetrain

It is with much excitement that drivetrain reports that we have finished the design of the entire drivetrain system. After many setbacks, we were able to make a design of the system that properly integrates with all other subsystems. We have been working extremely hard all year to reach this milestone. One of our main design criteria was ease of manufacturability. We are happy to report that all mounts are planar, which will allow for water jet cutting of all the mounting components! We hope to have the mounts finished within the next 2 weeks so that they can be installed on the chassis as soon as it is completed. I just want to give a massive shoutout to everyone on Drivetrain who has put in countless hours to get to this point. The subsystem wouldn't be able to function without the never-ending dedication of every single member! While this is a massive milestone for us, we are now ready to move on to the manufacturing and design binder preparation. We hope to have manufacturing finished within the next two weeks, allowing the final two weeks of the semester to be dedicated to design binder prep. Drivetrain is right on track!
Finance

Finance has continued to work hard throughout March to make sure everything financially related to the running of a race team has gone as smoothly as possible. We have been hard at work reconnecting with past sponsors, connecting with current sponsors, and reaching out to possible new sponsors. The team has also been working with all of the members in the team to make sure everyone is up to date on the resources within the team that have to do with the finance subsystem. We have continued to work on competition-related stuff such as the business presentation and cost report. We look forward to continuing to work on these things and presenting them in the upcoming months. Finance looks forward to continuing working towards our goals as we look towards the end of the spring semester and competing at competition this summer!

High Voltage Electronics

This month, we completed manufacturing our battery and set up our test bench. Our battery is 99% done and just needs a few loose ends tied up. Our test bench consists of the battery, inverter/motor controller, and motor. We are looking to do some PID tuning to get our motor controller to respond better to our driver and deliver more power. We are currently working on a system to increase the sample rate of our HV battery so that we can see system transients in the single microsecond range. We have also been heavily focusing on the wiring harness and making sure our Rapid Harness software is up to date, as well as our physical layup. We have successfully gotten CAN communication working between our two major PCBs and are working to integrate the rest of the electronics into the system. Next month, the last of the school year, we hope to mount all of our components into the chassis and get a running car!
Low Voltage Electronics

Lots to talk about since last month's update regarding the status of the subsystem. Starting with the big news, we have gotten the orders in for version two of the front and rear primary PCBs and have tested all of their features. Only a few modifications needed to be done on the rear board for it to work fully. The front board is in a testable state as well but requires at least one final revision of the board to be vehicle-ready. Additionally, other boards such as the high voltage indicator have been tested and modified to successfully work correctly and will be finalized in this next board revision.

Aside from that, we were able to connect both of the boards to the first existing version of the wiring harness establish communication between the two boards, and power the front board from the rear as well! From there, we have been able to test a variety of software features including receiving sensor data from the sensor directly, transmitting the sensor data through the data bus, and receiving the sensor values from the data bus and storing them on a different board.

Finally, regarding the wireless data transfer, we were able to connect to the board wirelessly and are close to transporting data from the rear board to a website that one of the members has set up to begin doing data analysis. We are looking to extend this wireless interaction ability in the future.

Outreach

This past month has been a busy one for us over in outreach. The month started with finalizing the merch designs and progress towards the store has been made. This month also had our DEI Workshop. The workshop was planned by the amazing Alexa Jordan and was held over at ESB. The workshop had high attendance and focused on making the team a more diverse and inclusive place for members now and in the future. If you want to learn more, head back to page 3. Check us out @Nittany Motorsports on Instagram, TikTok, LinkedIn, Facebook, and YouTube for team content.
Suspension

Down in suspension, work has been extremely productive in the month of March. During our spring break, we were able to manufacture our roll/heave shock bases and tops with room for extra testing and redundancy. The ball joint holders were also designed and machined along with the control arms and their corresponding inserts. We would like to sincerely thank the FAME Lab and the Learning Factory for allowing us to use their facilities during spring break.

Systems Integration

This month, Systems Integration has been hard at work setting up the team for the final stretch of the semester. A series of workshops have been planned for cleaning and moving out of our old shop space and into the new space the team will occupy for the foreseeable future. Another design review is also in the works with many alumni from around the country coming back to help the team improve our static event score. That review is scheduled on 4/14 from 12 pm-2 pm. Over the past month, my Systems Hardware Integration Team has also been meeting weekly to discuss the integration of each subsystem into the chassis. A lot needs to happen in the coming weeks to get this car ready for competition, but the team is on the right track to getting there in time.
Sponsorships

Thank you to our sponsors for the year thus far:
- Altair, Altium, BEST Center, Calspan Tire Research Facility, Hyper Racing, 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, Remington Industries, Rock West Composites, SimScale, Stackpole Engineering, The Piper Group, Uline, Tenneco, and VI-Grade

We are looking forward to your continued support!

Acknowledgments

We would like to take the time to acknowledge the following groups:
- The Learning Factory Staff
- The FAME Lab Staff
- The Larson Transportation Institute
- Stadium Clean-Up Staff and Coordinators
- PSU Homecoming

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

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