**Managing Hardware Projects**

As mentioned on the other pages, I managed the hardware projects for both the horn and lights PCB, HAL, and our battery protection system, BPS. HAL was designated as a new member project, where I worked with 2 new electrical engineers on the team to iteratively design and update the board based off of design issues from the previous year. This was a fantastic opportunity to help new college students learn more about PCB design and electrical engineering as they are working through introductory classes like their first Circuits class. I also enjoyed being in a mentor position to help them if they ever had any general questions on the team. If you would like to learn more about the technical changes with HAL, please take a look at its individual page on my portfolio.

When managing BPS, I was in charge of creating a new revision for Headnode and maintaining the Moduleboard project. Both of these boards are essential for running our car and maintaining the safety of our driver and passenger, so I took a great role of responsibility with this job. Since the board is more technical, we did not have any new members on this project with me so I assumed both a leadership and technical role with BPS. This meant that I would conduct design changes on Headnode while also advising how we should address upcoming issues as the hardware leader for this project. If you would like to learn more about the technical side of BPS, please look into my Headnode Rev 1 or Headnode Rev 2 pages.

**FSGP/ASC 2022**

For solar car, there are two different types of races that you can participate in. Every year, the formula sun grand prix, or FSGP, is hosted, while every other year the American Solar Challenge, or ASC, occurs. FSGP consists of a track race which also doubles as a qualifying event for the second race, ASC. To race at FSGP, we had to go through multiple scrutineering panels with officials to prove our car meets regulations surrounding requirements including our battery protection system, driver egress, and dynamic driving. This year, I was one of four drivers that participated in both races. This meant I was very involved in the scrutineering and admission process before our first race started. I had to get a ballast bag so that my overall seat weight was 180 pounds, practice egressing out of the car under a set amount of time, and also pass multiple dynamics tests performing slalom and figure eight maneuvers around cones. The scrutineering process took a total of 3 days, which involved lots of preparation on the car both mechanically and electrically. After we passed everything on the third day, we were ready to go out to the race track.

The track race was in Topeka, Kansas at the Heartland Motorsports Park. Similar to scrutineering, the track event lasted three days. To qualify as a team to proceed to the next race, our team had to finish 80 laps in one day, or 120 laps across two days. As a driver, I had to personally drive at least 21 laps so that I could qualify and drive in the next race, ASC. On the first day, our first driver accrued 25 laps before we were facing our first car troubles. This was a suspected issue for a while with our electrical system, so we took the car out of the hot pit to fix it for around 2 hours. After that time, we were back on the track with a couple of hours left in the day. I was neither a driver or passenger the first day, but our second driver was able to get around 15 laps towards her personal qualification. We ended up only getting around 40 laps on our first day, so we broke even for the two-day qualification. The next day, I was able to be our first driver. In one burst without any breaks, I was able to complete 25 laps in the morning and qualify as a driver. After that, we rotated in the two other drivers to get their personal laps and qualify. By this time, we had around 50 laps completed, and were getting close to hitting the 80 laps to qualify. While things weren't very exciting during this time, that was a good thing, since it meant the car was working as expected. As the day ended, we racked up 90 laps. Last year at the track event, we were only able to complete 20 laps for the entire three days, so our team was very happy about this. For the third day, we completed another 80 laps and had a similar process of switching out drivers every 1 to 2 hours.

ASC stands for the American Solar Challenge, and is the more traditional racing style that you might see from a solar car competition. Instead of racing on a track with only solar cars, you race across the Oregon trail on real roads to see how efficient and far your team can get with solar power. Since we qualified this year, we were able to start the race with other teams in Independence, Missouri. After driving nearly 20 miles, we were facing serious motor controller issues that led us unable to drive any further outside of Independence. We did stay to reach the first checkpoint to discuss our options with race officials and other teams, but had no luck. Motors and motor controllers are a gray area for the team, and we did not want to risk anyone’s safety, so we decided to call the second race there. It was still a great experience to be a part of the caravan process and be a driver during this time though.

**Librarian**

While most of my librarian work was done with creating our new parts catalogue system, I still did lots of Librarian work in the Fall of 2021 too. My main focus was creating a new standardized parts library for our boards to use, since a lot of the older boards use old parts that are not included in the shared list of today. The benefit of making a new library was that it was now trimmed down much more, making it easier to both organize the parts physically, and order them online since more boards would have a standardized resistor or MOSFET. I have heard that the library is a success from other hardware managers, especially when they need to create a smaller board or project from this year, since it is much more straightforward in finding what you need. I am hoping other managers and projects will work to integrate this library in the future, but now they at least have the option to.

Another one of my jobs was to clean up and standardize our GitHub repositories for our hardware projects. Since this was managed and organized person to person on each project, it was very difficult to find documentation, bill of materials, and the actual schematic of the PCBs at times. As you will see in the GitHub links on my page, each repository is now organized at the root level with a folder for a BOM, project, documentation, and Gerber file. While this may have seemed redundant at the start of the Fall, this made it incredibly easy to organize documentation or part orders for the 2022 races that I previously mentioned. This was something I personally struggled to find across our different PCB's the previous race cycle, so it was another one of my primary goals as I was exiting the librarian role.