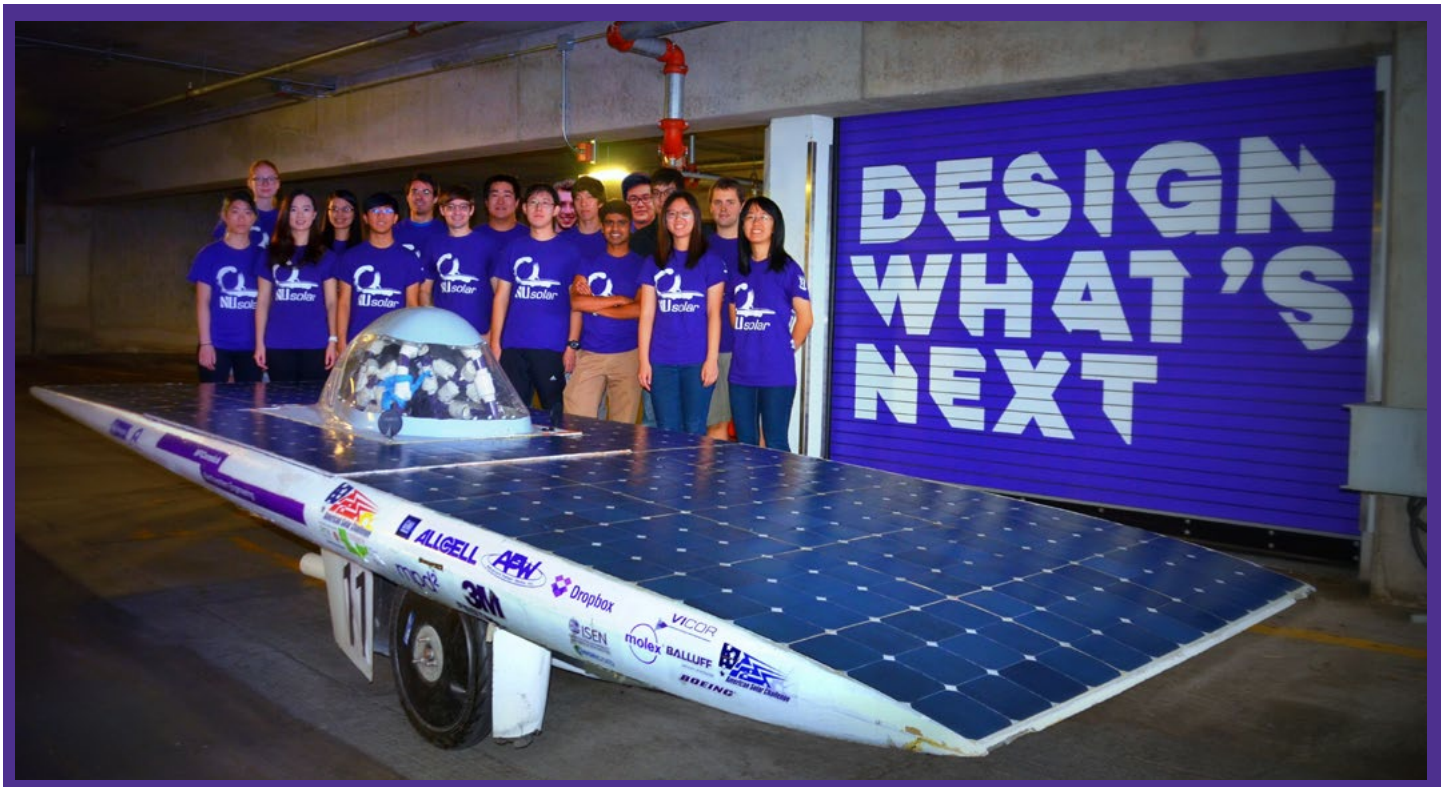
NU solar

Driven by Innovation, Fueled by the Sun

Fall Quarter Newsletter, September - December 2016



Northwestern Solar Car Team 2016-2017

Year in review

by Alexander Martin,Project Manager

2016 has come to an end, and looking back I've realized it's been a very busy year. In January we were a young team, looking forward to testing SC6 and putting the final touches on the design of our seventh car. By the end of May, the new frame had taken shape on the welding table in the autobay. In July, we finally made it to FSGP 2016 in Pittsburgh, PA.

This was the first time at the race for most of our members, and it was both exhilarating and exhausting. Together we weathered a flat trailer tire, a torrential rainstorm of epic proportions, and several late nights working with the car's electrical system splayed out on our hotel beds. But it was all worth it when we got the car out on the track.

This fall, we continued to assemble the new car and trained our newest members in composites and welding, while at the same time successfully crowd-funding $13,500 for new motors that will move the team forward for the next 10 years.

There's still a lot of work ahead of us, but I am proud of this team and where they are headed. We look forward to taking SC6 to the race one last time for FSGP 2017. And for the new car, we aim to make it as robust and reliable as possible. We want our team to have even more confidence in our collective ability to design and build quality solar powered vehicles.

Lastly, none of this would be possible without our sponsors. We want to give a big thank you to Ford, Altec, 3M, Boeing, and DENSO for supporting our team this quarter, and also to all the friends and family who donated to our Catalyzer. You are helping to build the leading sustainability-minded engineers of tomorrow.

The New Faces of 2016-2017 Part 1

Akash Borde (CE/ChemE '19)

Hometown: Iowa City, IA

Idea Career: Something in clean energy, or developing new sources of energy in industry.

Interests: Technology, machine learning, running (I finished the Chicago Marathon in my personal goal of 3hrs 26min).

Why did you join NUsolar?

It's a real engineering project where I actually get to construct something non-trivial. It's also very related to clean energy and it gives you hands-on experience. The other people who joined Solar are also very motivated people who are willing to give up 10 hours of their week. I wanted to join that kind of team.

What are you working on now?

Telemetry systems for SC6 and 7.

What have you learned so far?

A lot of Eagle (circuit diagramming), new coding skills like working with SQL databases, Visual Basic, etc. I also learned more about the power conversion from the solar array to the batteries, and how all the different components work and interface.

What you would like to do in the future in NUsolar?

I would like to work on making the entire car's systems more efficient, especially through some kind of machine learning system that analyzes the car's motion and provides the driver real time optimization info.

What do you do in your free time?

Re-purposing old things and 3D printing.

Jonathan Chan (CS '20)

Hometown: Hong Kong, China

Idea Career: Software engineer

Interests: I like programming, swimming and running for exercise. Right now I'm trying to teach myself clarinet and mobile app/web development. I'm working on an app that tracks how many classes you've skipped, and gives you warnings and summary of your "skips" throughout the quarter.

Why did you join NUsolar?

Just so I can work on a project with others. There was a Robotics club in HS that I didn't get a chance to join. Solar car is a good combo of hardware and software efforts.

What are you working on now?

Telemetry systems for SC6 and 7.

What have you learned so far?

Programming in Visual Basic, how a telemetry system is supposed to work, and how different components fit together. I also learned about the CAN bus, which is a communications network used in actual cars.

What you would like to do in the future in NUsolar?

I don't have a particular part of the car that I want to work on, I'm willing to go wherever I'm needed, learning as I go.

What do you do in your free time?

Netflix: Black Mirror - dark, cynical sci-fi (you know, it's the election season and all that), exercise, play clarinet and piano, and coding.

Ieva Stakvileviciute (ME/MADE '20)

Hometown: Siauliai, Lithuania

Ideal Career: Engineer at Tesla

Interests: Design, boxing, cool gadgets, physics, and global politics.

Why did you join NUsolar?

My interests in sustainable development and cars coincided in this team.

What are you working on now?

A composite materials rack for the mechanical team to make the carbon fiber layup process easier.

What have you learned so far?

GrabCAD, Solidworks, and how to unload a solar car from the team trailer.

What you would like to do in the future in NUsolar?

I would like to work on the design of the aerodynamic shape of the car.

What do you do in your free time?

I enjoy anime, playing the flute, cooking, and freelance social marketing.

Get your NUsolar Jackets!

This year we made NUsolar jackets available for purchase to team members, now we can offer these same jackets to you! These are high-quality Dickies jackets in S, M, and L. Contact us at team@nusolar.org to get yours!

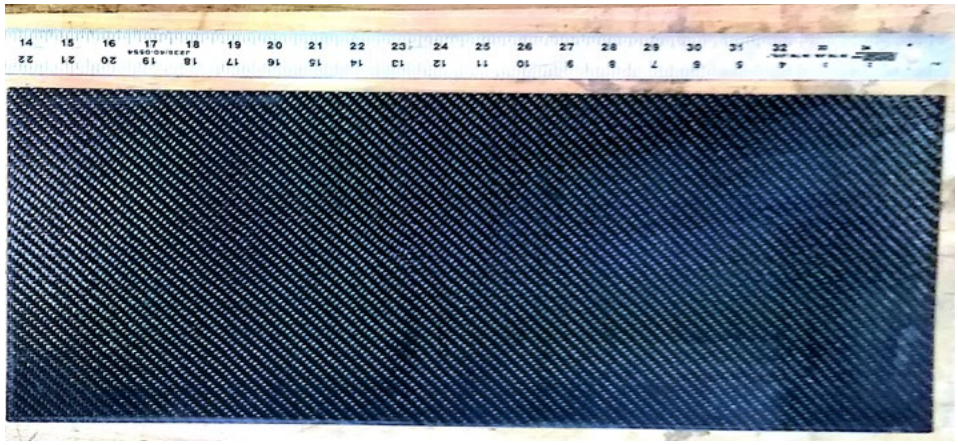
Mechanical Team Projects

The Mechanical Team worked on a number of different projects this quarter. With the help of the NU composites lab, we began training new members to manufacture high quality composites. Carbon fiber panels like the one pictured below (middle left) will be used to create interior paneling for the car.

New members also trained with the welding machines. At right, Crystal Gong (ME '20) is practicing butt welds with two pieces of sheet steel. New members will begin training on the mills and lathes in winter quarter, once they have completed DTC.

At the bottom right, the new a-arm components are arranged in the jig which the team built to position them and prevent warping during the welding process. On the bottom left, two semi-finished a-arms are shown attached to their mounting tabs on the frame.

Special thanks goes to Grover Welding in Chicago, IL for helping us to inspect and repair some of the welds on our frame. They graciously donated some of their time to make sure our next car is safe for the students who will be driving it at the race.



Electrical Team Progress

by Ben Donahue, Electrical Lead

Fall quarter for the Electrical Team was full of new faces, new leaders, bumps in the road, and ultimately a great deal of valuable learning for everyone. In recruitment at the beginning of the quarter we had a number of new team members join, interested in both the software and hardware projects. The first few weeks were focused on introducing these new members to the basics of building solar cars, while returning team members got to work on some of the major projects for the year.

Unfortunately, we had a bit of a nasty surprise when we inspected SC6 in the first week of school. Three of our battery modules had been damaged sometime after the race, and were no longer usable. After safely disposing of the dead batteries, we reconfigured the battery box and battery management system to accommodate the lower voltage.

In parallel, we have been designing a new battery box for the next car. We are making sure we address some of the issues we had with overheating batteries at this past summer's race. With help from the Mechanical Team, we are modeling heat generation and dissipation in our new design to determine the optimal placement of cooling fans.

A couple of our team members have also been working on new temperature sensors for the batteries. Our old system, which involved a number thermistors monitored by multiplexers, was prone to hardware problems and gave us trouble during the 2016 race. The new method uses a chain of sensors connected to each other with a serial bus, and appears that it will be a more robust system.

Finally, the software team has been building a revamped telemetry system to allow the car to communicate valuable data back to the team during the race and testing trip. Everyone was new to this project this year, but after a few informative meetings with our adviser Dana, the team has a good start and is developing a roadmap for success.

Team Calendar

For a full team calendar, visit our website at nusolar.org.

Jan 19 Winter activities fair (Norris)

Late Jan (TBD) Alumni Hangout

Feb 3 - 5 ASC Solar Car Conference in Kansas City.

Mar 18 - 27 Spring Break

Mid April (TBD) Alumni Hangout

July 3 - 8 FSGP 2017!

New Trier HS Visit

NUsolar members had the opportunity to meet with students in the Digital Electronics class at New Trier High School. Members Kerui Tan, Charlie Costakis, and Alexander Martin gave 2 presentations on what NUsolar does and how being on the team has impacted their own STEM education.

Charlie, a recent graduate of New Trier, explained how his experience in the Digital Electronics class got him interested in electrical engineering and how he has been able to carry over what he learned in that class to his work with NUsolar.

Our hope is that this event and others like it will help inspire more high schoolers to pursue careers related to sustainability. If you know a school or organization that would be interested in hosting NUsolar, contact us at outreach@nusolar.org.

Below: Members of the New Trier High School Digital Electronics class watch three NUsolar members give a presentation on how electronics play a big role in the team's activities.

Have questions or comments? Want to get involved? Visit us online:

www.nusolar.org www.youtube.com/user/nusolar www.facebook.com/weracesolarcars