

# WISCONSIN

FORMULA SAE *Racing*



## A Year in Review

Eighteen months ago, six motivated engineering students at Wisconsin Racing launched its first ever venture into the development and creation of an all-wheel drive electric racecar. To bring their electric dreams to life, a team of passionate and talented engineers was assembled to face the challenges before them: develop an electric powertrain from the ground up, establish a comprehensive sponsor base, and build two cars in one year. From the early stages of whiteboarding, through months of design and analysis, to an exhausting season of precision manufacturing, we have come a long way from our humble beginnings. A team of thirty dedicated members rose to meet every challenge, and together with over seventy awesome sponsors, we developed the first American all-wheel drive electric Formula SAE vehicle.

We knew our architecture was ambitious from the beginning, but with hard work, dedication, and many sleepless nights, we were able to bring our electric racecar to life.

Each week throughout the year held new problems to solve, and many of them pushed us to the limits of our knowledge and capabilities. Burning midnight oil in the Engineering Centers Building in Madison, we worked through each problem diligently, efficiently, and as a cohesive team.

On April 29<sup>th</sup>, Wisconsin Racing unveiled two Formula SAE vehicles for the first time ever. Both the combustion and electric cars, built on one-year cycles, were almost entirely new designs. Looking forward, the team now has a solid foundation to build upon in the coming years.

### This Year's Achievements

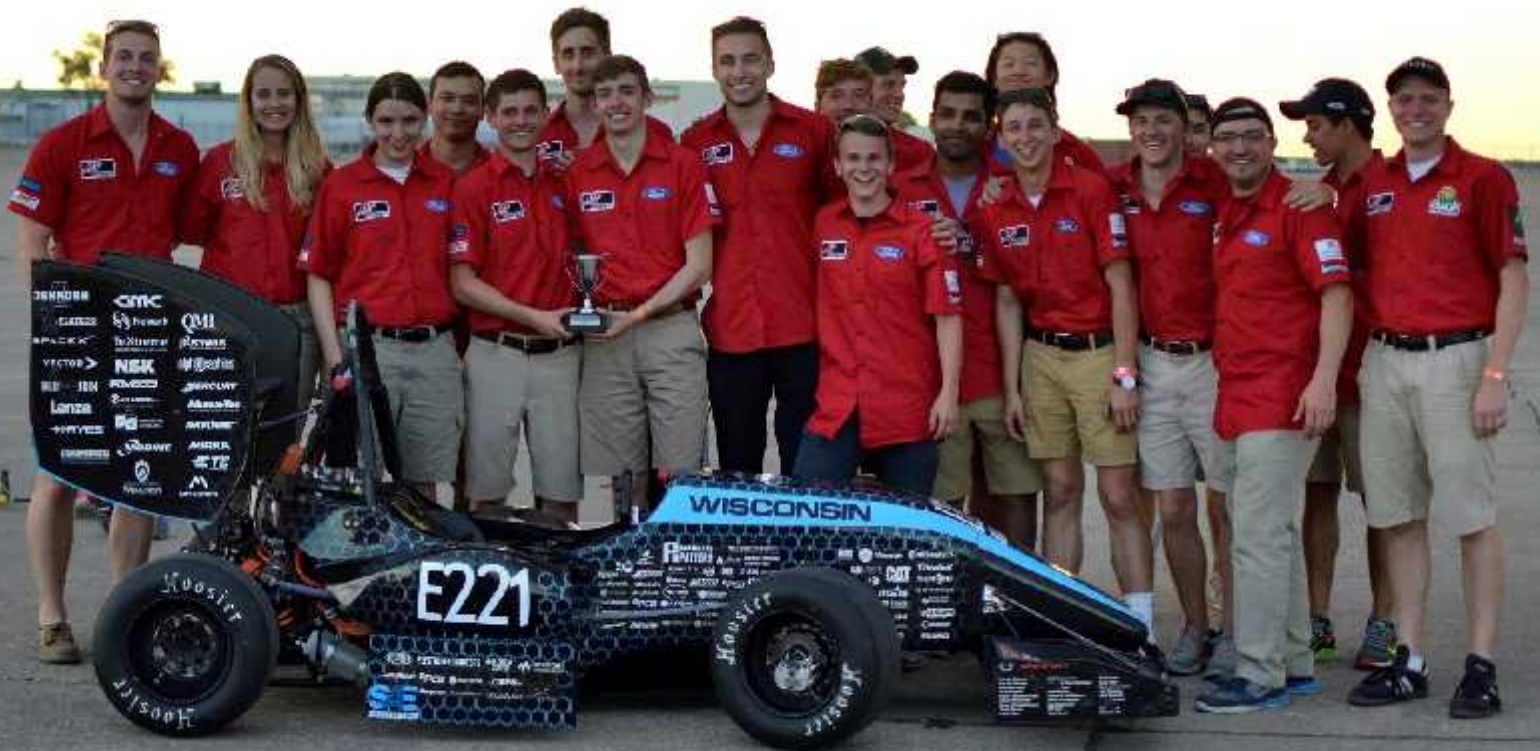
- ✓ Torque vectoring and traction control
- ✓ Carbon fiber monocoque
- ✓ Genetically optimized aerodynamics
- ✓ Servo-actuated antiroll
- ✓ In-hub motor systems, including planetary transmissions and custom inverted quad-piston brake calipers
- ✓ Dual stage rear transmission
- ✓ Twelve custom PCBs with three embedded systems
- ✓ Carbon fiber steering wheel with custom LCD display
- ✓ Custom high voltage battery pack



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## Lincoln 2017

After a successful testing season during which the WR-217e ran over sixty-five miles with all-wheel drive, Wisconsin Racing arrived in Lincoln, Nebraska to compete in Formula SAE Electric alongside twenty other teams.

Even after careful preparation before competition, going through electrical technical inspection for the first time was an arduous process for the team. After two days of inspectors looking over every part of the vehicle and requesting minor changes, E221 had all its technical inspection stickers and was officially one of about ten electric cars to pass.

Unfortunately, due to the additional time we needed to get through technical inspection and a malfunction in the battery cooling system, E221 was unable to compete in the dynamic events.

Even so, the team forged on, making its way to Design Finals where over sixty industry professionals had the opportunity to grill the teams with the three best-designed cars about both their design process and their fundamental understanding of engineering principles. Wisconsin Racing showed up very well-prepared for the event, with binders full of our design documentation (recorded routinely throughout the year) and data from on-track testing to validate our designs.

The judges were impressed by all we had accomplished in our first year, and we were able to showcase what made our car unique. The feedback from the judges was very positive, with one judge referring to our custom brakes as "the best design [he] had ever seen at a student competition." Our novel traction control and torque vectoring systems garnered a lot of positive attention as well.

Despite not being able to compete in dynamic events, after an exhausting five days at competition Wisconsin finished strong, taking third place in the Business Presentation, first place in Electric Vehicle Design (trophy pictured above), and eighth place overall. We have published our design documentation on [wisconsinracing.org](http://wisconsinracing.org) with the hope that more teams will join us in Lincoln next year. On Wisconsin!



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