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Resistance Racing Pulls Up to the Curb With Fresh Ideas

By Haena-Young Lee '20

Every tree flourishes from a tiny seed, every human grows from a couple of cells, and every age-old project team starts from a tight-knit group of passionate students. Unlike other project teams at Cornell, Resistance Racing is relatively new to the scene and so brings a host of unique opportunities to future members. The team was founded in 2014, and is advised by Professor Joe Skovira.

In the past few years, the electric vehicle team worked to build an electric motorcycle to compete in the 2017 E-motor racing series. However, the goal changed to building an ultra-efficient, battery-powered car to compete in the 2018 Shell Eco-Marathon. Held in Detroit, Michigan, the competition takes place from Friday to Sunday, with the first day being practice and the last two days being the actual competition. Teams compete in either the Prototype or the UrbanConcept class. The former focuses purely on efficiency and does not consider ergonomics or driver comfort, while the latter takes practicality into account. The teams are also divded into the Internal Combustion Engine Category or the Electric Mobility Category depending on their energy type. Resistance will compete in the Prototype and Electric Mobility Category for its first year.

The team currently consists of fifteen people in three subteams – Mechanical, Electrical, and Administrative. Members choose their level of commitment in the beginning of the semester by enrolling in between one to four credits, with each credit corresponding to about four hours of commitment per week. Resistance meets weekly as a whole team, spends about three to four hours on Saturdays, and works any additional hours to finish their tasks.

Resistance recruits most heavily in the Fall semester, and usually also in the Spring. In Fall 2017, the team expects to expand to about 25-30 students, so there are lots of opportunities to get hands-on experience in a more intimate setting than other project teams. The group is a great fit for any student interested in the renewable energy industry, automotive industry, and power electronics and embedded systems for ECE majors. And like other project teams, Resistance Racing offers a unique hands-on team experience for students that they wouldn't otherwise experience in a classroom.

So, how to join? David Moy, the Team Manager, imparts some advice on what Resistance is looking for in interested students – "A way to set yourself apart from the rest is to show that you're self-motivated, maybe through a side project like learning AutoCAD, messing around with an Arduino, etc. We want people who have been curious and followed through on that."

Cornell Resistance Racing will be showcasing their hard work in the Project Team Blitz Career Fair, as well as the Project Team Homecoming Showcase in August. Interested students can sign up for the listserve at these events, check out team news and view the application instructions on the team's website at blogs.cornell.edu/resistanceracing, visit their Facebook page at facebook.com/CornellResistance, or send an email to cornellresistance@gmail.com.

RESISTANCE RACING

Emissions & Cleaner Power Systems with Dr. Max Zhang

By Bryan Arroyo-Lopez '19

Over the past decade, public and corporate consciousness of the environment has driven the growth of cleaner energy sources and the need for a deeper understanding of human impact on the enviornment, both of which are of great concern to Dr. Max Zhang's insightful research efforts. Dr. Zhang earned his Ph.D. in Mechanical Engineering from the University of California - Davis in 2004 before joining the Cornell MAE Faculty in 2006, yet he stresses the importance of "fundamental knowledge" - meaning his specific expertise and background are more related to his work in thermal and air quality engineering.

With the U.S. initiative to shift to cleaner power systems, Dr. Zhang's research to develop models and green energy road maps is critical. These models involve simulations of the transportations and transformations of emissions, specifically near highways, and ways to mitigate these effects. Dr. Zhang's work has already helped form laws in California to bar construction of certain new buildings 500ft from a highway, as well as informing the Tompkins County Community on how to pursue a cleaner energy future. Dr. Zhang has made it a staple of his work to involve the community and has even been awarded the Engaged Scholar prize for his experiential focus and community involvement. He enjoys incorporating the community, stating that "[Tompkins] County is different - different for many reasons. There are very engaging people. The more I know, the more I'm impressed. When building a county road map I get the opportunity to meet very interesting people and broaden my research."

Photo Courtesy of Tompkings County Planning Department

Table 1: Percent of 2008 demand that could be met by local energy resources

	Energy Resource	Annual Energy Potential	% of 2008 Electricity Demand[1]	% of 2008 Thermal Demand[2]	% of 2008 Total Energy Demand[3]
Renewable Supply	Wind	2,646 GWh	327%	n/a	63%
	Solar	2,453 GWh	303%	n/a	58%
	Micro-Hydro	726 GWh	90%	n/a	17%
	Biomass	3,626,477 MMBtu	n/a	59%	25%
Demand Reduction	Building Efficiency: Heating Portion	3,350,604 MMBtu	n/a	54%	23%
	Building Efficiency: Electrical Portion	401 GWh	50%	n/a	9%
	New Construction to Code	1,152,880 MMBtu	n/a	19%	n/a

Note: Table showing renewable energy alternatives and demand reudction potential from Tompkins' renewable plan.

Through his consultations and research efforts, Dr. Zhang hopes to see an 80% reduction in emissions from Tompkins County by 2050. The submitted plan, however, is a guiding document to be adopted as the county sees fit. "Obviously it's easy to say, why haven't all these ideas been adopted?, and that's part of the work," Dr. Zhang commented regarding the rate of transfer to cleaner energy sources in the U.S. Under the Obama administration, similar emissions mitigation plans were set forth to improve the Corporate Average Fuel Economy (CAFE) by 2025. Despite the fact that reviews of this proposal are now underway by the current administration which seeks to dismantle programs that harm American job numbers, Dr. Zhang has confidence that America can lead the way in lowering emissions, saying, "I just can't imagine the U.S. — you have all these global companies selling here — having gas guzzler cars in the USA."

Aside from work, Zhang spends his time with his 4-year old, noting the experience of raising a child to be very perspective changing. A movie buff of sorts, Zhang enjoys reading the works of film critics, reflecting, "I tell myself, if I weren't doing this work, I would like to be a movie critic." He enjoys the works of the film luminary Alfred Hitchcock, films like *Rear Window.*

Photo Courtesy of Cornell Sibley School of MAE

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