



NEWSLETTER



JANUARY 2026

UNIVERSITY OF WISCONSIN-MADISON

Save the Date! WEMPEC Annual Review May 12-13, 2026

The WEMPEC Annual Review is a yearly 2-day conference for WEMPEC members including presentations on ongoing research, tutorials by the WEMPEC faculty, tours through the labs and poster presentations by students as well as extensive networking opportunities.

Registration will open soon!



Photo from 2025 Annual Review.

University of Wisconsin-Madison
Engineering Hall
1415 Engineering Drive
Madison WI, 53706

**CONGRATS,
DECEMBER
GRADS!**



David Skrovanek (Ludois)
Postdoc: Jan. 2025-Dec. 2025
Skylark Energy Solutions



Shiyang Wang (Ludois)
PhD: Jun. 2021-Dec. 2025
Tesla



Silvia Iordache (Ludois)
MS-R: May 2024-Dec. 2025
Graybar Electric

YOU
DID
IT!

**Winter
break for
WEMPEC**

"I picked up a couple of shifts at the restaurant I help run, renovated a bathroom (painted, put in a new fan/light, put up new wall decor), and replaced a booster fan in our furnace vents."

-Cameron Little
MS-R

"I went to Seattle for family and the ideal climate."

-Elijah Berger
MS-R

"During break, I went on vacation to Florida and spent time with family."

-Cassie Mangiulli
MS-R

"I visited my grandparents and designed/ordered a PCB for my Boston train tracking project! The website for it is also finally live now at [t-time.shop!](https://time.shop/)"

-Alec Marshall
MS-R

"I went to visit my family, friends and girlfriend. We played board games, did jigsaw puzzles, and made homemade pizzas!"

-Patrick Nowakowski
MS-R

CHECK OUT THE LATEST WEMPEC NEWS HERE



EXCLUSIVE: Ludois inducted to National Academy of Inventors



Between winning awards at ECCE, managing C-Motive, and graduating three students, 2025 has been a busy year for Professor Daniel Ludois! But that's not all: Ludois is also one of 185 new inductees into the National Academy of Inventors.

How does an electrostatic motor work?

At a high level, instead of using the force that holds your kid's homework on the refrigerator, we use the force that makes your clothes stick together when they come out of the dryer.

In a normal electric machine, you have a stator and a rotor, and that's also true of an electrostatic motor. But instead of electric currents flowing past each other to create a Lorentz force, we put electric charges on surfaces that attract or repel each other to create torque. The beauty of that is you don't need steel, copper wire or magnets; you can make it all out of plastic and very thin conductors.

How did you know you wanted to become an engineer?

I grew up in a small Wisconsin farm town. My dad was an engineer and my mother's family were farmer-tinkerers — on a farm you have to be able to weld, drill and repair. Everyone in my family is mechanically inclined, but I've always been deeply in love with electricity. By sixth grade, I had wired my tree house for solar power, with lights, ceiling fans, a stereo and an automatic trapdoor.

What advice would you give to inventors seeking inspiration?

Inspiration generally comes from talking with people who have problems and reflecting on those problems. When I was a WEMPEC student, I used the Friday seminars as an opportunity for problem discovery. My best ideas come in quiet moments, when I'm not distracted and it's just me and my thoughts. I'd also say to surround yourself with the best people you can.

Check out these recent WEMPEC publications!

Assessing Power Flow Controllability via Variable Line Reactance

- Power flow controllers (PFCs) adjust effective line reactances to redistribute transmission, improving transmission network utilization amid increased consumption from data centers.
- This paper introduces a framework to quantify network flow controllability, the extent to which line flows can be reshaped through reactance adjustments.
- Analytical results show installing PFCs on all lines enables complete controllability of feasible flow patterns, and demonstrate how controllability varies with the number of PFCs and their reactance adjustment range.

Supercritical Carbon Dioxide (sCO₂)-Cooled Current Source Inverter-based Integrated Motor Drive for MW-scale Electric Aviation Applications

- Wide-bandgap enabled current-source inverter (CSI) has cleaner output voltage waveform, higher fault tolerance, and higher temperature operation capability than conventional voltage source inverters (VSI).
- This paper presents a WBG-enabled CSI for a 2-MW integrated motor drive (IMD) for electric aviation application. The CSI's dc-link inductor and power modules are cooled with supercritical carbon dioxide.
- The proposed CSI-based MW-scale IMD achieves an estimated 97.3% efficiency and 18.1 kW/kg power density.

In-core Cooling for Yokeless and Segmented Armature (YASA) Axial Flux Machines: Analysis and Experimental Validation

- This paper presents a novel in-core cooling method for yokeless and segmented armature (YASA) axial flux machines to address the challenges posed by high temperatures in these machines.
- The proposed cooling resulted in 60% torque capability increase compared to conventional methods.