



NEWSLETTER



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UNIVERSITY OF WISCONSIN-MADISON

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WEMPEC Annual Review May 12-13, 2026

Please join us for WEMPEC's 45th Annual Review. Featuring presentations, poster sessions, pre-publication research, networking with students and more!



Congratulations, Professor Sarlioglu!

Professor Bulent Sarlioglu, has been honored as a fellow of the Royal Aeronautical Society.

Read a feature about his background and research below.

What does your induction into the Royal Aeronautical Society mean to you?

Becoming a fellow of the Royal Aeronautical Society means a great deal to me. I worked in the aerospace industry for 11 years before joining academia. I've always loved airplanes – I've always watched them take off, fly, and land. I've admired the engineering behind them: they must be safe and reliable, carrying us from one continent to another. Imagine if there were no airplanes for long-distance travel! We would still use ships. When I worked in the industry, I realized how many people work together to build an aircraft. Aerospace has been a major part of my career, both in industry and at the university. I've contributed to many commercial passenger aircraft by developing electric motors and drives for fans, pumps, and compressors that are flying today.

Cont'd on Page 2

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PAGE 1

What recent research of yours has applications in the aeronautics industry?

One project is the NASA University Leadership Initiative, a joint effort that demonstrates a 1-megawatt, 20,000-RPM integrated motor drive system. WEMPEC designed and tested the 1-megawatt electric machine. Other universities worked on power-electronic drives, cooling systems, and battery systems. We also tested the system at NASA Glenn Research Center.

The main idea behind integrated motor power electronic drives is to minimize the weight and volume of the power electronics and motors, thereby shortening the wiring run between the machine and the power electronics. This increases reliability and reduces common-mode emissions that could otherwise interfere with sensitive aircraft systems such as radars and navigation electronics. We eliminate or reduce a common-mode filter between the motor and the inverter because everything is contained in a single package. The topology allows for joint cooling: we developed a liquid-cooling system that floods the stator windings, and it is now patented.

Our research group spent more than five years on the project, including during the pandemic. The maximum rating of an aircraft generator/starter flying today is 250 kilowatts. Our project was four times as powerful as what is flying today. We worked hard to increase the motor's power density by using state-of-the-art permanent magnets, advanced cooling, and specialized design techniques. Weight in aerospace is critical because every pound of extra weight burns fuel, so our goal was to make this unit as small as possible.

We are continuing another project to develop fault-tolerant motor drives for aerospace applications, where reliability and safety are critical. Jet engines are extremely reliable. Our goal is to make electric motor and power electronics fault-tolerant to match that level of reliability. Instead of using a jet engine, we can use permanent-magnet machines with propellers for electric propulsion of the aircraft, or we can use hybrid systems that combine a jet engine and an electric motor.

I also worked with Lockheed Martin, an aerospace company, analyzing various thermal cooling techniques for electric machines. We are also working with General Electric Aerospace Research on an ARPA-E project to develop a hybrid powertrain for jet engines. My team designed the electric machine for this project.

What are the most exciting things going on in the field?

Electrified propulsion, whether electric or hybrid, is very important, and there is also significant interest in electric vertical takeoff and landing aircraft (EVTOL). In the aerospace industry, we are in exciting times. There's a lot of opportunity for research and development. We need to raise awareness among our students about these new technologies so the next generation of engineers can work with them.

