CEPS Research Newsletter

FALL, 2025

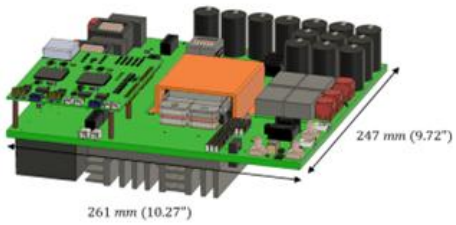
College Research Website: https://www.uakron.edu/engineering/research/
College Eight Focus Areas: https://www.uakron.edu/engineering/research/areas/
College Research Centers: https://www.uakron.edu/engineering/research/centers

Message from the Dean's Office

Greetings… this is the second research newsletter, and we hope this becomes a tradition going forward. There is a lot to report as this was a busy summer. The research strategy is now starting to pay off: we have centers that are becoming viable, and the directors have started to lead the development of large proposals. This summer we submitted > $45M worth of pre/full proposals (NSF MRSEC, NASA ULI, etc.). More significantly, we now have a Graduate Program Strategy Group (GPSG) that was assembled and will focus on three areas: *International Recruiting, Domestic Recruiting, and Enriched Graduate Experience*. The objective is for the increase in research funding and graduate population to converge within 1-2 years. Please stay tuned for updates on these initiatives and information on how you can get involved. This year, we will focus more on BME, Civil, Innovation, Education, etc. in addition to our existing initiatives.

Research Highlight

High Bandwidth Light Weight Modular GaN-Based Utility Interactive DC Emulator



As electrical systems become more complex, the importance of understanding subsystem interactions is crucial to guarantee the system can meet the performance objectives and to ensure system resilience and stability during transient events. Integrating subsystem components early in the development process allows for efficient detection and correction of destabilizing interactions. This is where hardware-in-the-loop (HIL) with Direct Current Emulator (DCE) can provide the necessary tools to facilitate early integration of subsystem components into the overall system architecture by utilizing real-time models coupled with emulator hardware to represent unavailable hardware components.

To fulfill the requirements of a DCE for HIL applications, our project, supported by the Ohio Federal Research Network, has been developing a modular and scalable high-bandwidth bidirectional DCE. This system utilizes a novel parallel interleaved Gallium Nitride (GaN) based DC/DC Dual Active Bridge (DAB) converter topology, as the foundational building block of the DCE. This building block incorporates Zero Voltage Switching (ZVS) operations to minimize switching losses and employs high-performance control algorithms to achieve the required levels of real-time performance and model fidelity with the DCE. It can dynamically source or sink 10 kW by connecting three 5 kW inverters to a 208 V AC source.

The project is led by the Center for Advanced Vehicles and Automotive Systems at the University of Akron and involves collaboration with federal, industry, and academic partners, including the Air Force Research Laboratory, NASA Glenn Research Center, Case Western Reserve University, and PCKA.

Major Opportunities

Please go to **Grants.gov** and then Search Funding Opportunities. You can put in different filters: categories, agencies, max $ amounts, etc. https://simpler.grants.gov/search?utm_source=Grants.gov. Below are some examples based on large grant opportunities:

1. **NSF Translation to Practice (TTP-Explore, Translate and Partner):** Use-inspired research, translational activities and partnerships that turn scientific discoveries into real-world solutions. Up to $5M, Closing: Jan 20, 2026. https://www.nsf.gov/funding/opportunities/nsf-ttp-national-science-foundation-translation-practice,.
2. **Joint Center of Excellence for Advanced Materials Research**, Research on composites for aerospace, FAA-COE-JAMS, Up to $20M, https://simpler.grants.gov/opportunity/5cbcf015-ea67-4e2d-ba06-d129fcb90301
3. **Scholarships in STEM Network,** NSF, Deadline: Aug 13, 2026, $3-$15M, https://simpler.grants.gov/opportunity/e0c28f69-bc32-4e66-877b-5f775e5089f3
4. **FAA Aviation Research Grants, DOT-FAA, Deadline: Sept 2027,** Aircraft safety, human factors, etc., Up to $6M, https://simpler.grants.gov/opportunity/721d5c2c-af72-4c33-8ce6-013b1e8ad59b
5. **Major Research Instrumentation Program,** NSF, Up to $4M, Closing: Nov 16, 2026, https://simpler.grants.gov/opportunity/847cbfa3-7f00-4b91-bd69-e0b7f5c676f3
6. **BRAIN Initiative: Theories, Models and Methods for Analysis of Complex Data from the Brain**, NIH, Feb 05, 2026, https://www.grants.gov/search-results-detail/359068

Dr. Ajay Mahajan, Associate Dean for Research, majay@uakron.edu

Laura Fisher, College Program Specialist, Research fisher1@uakron.edu