UNC Charlotte, the William States Lee College of Engineering, and EPIC are committed to the safety of our students, faculty, and staff and are following safety protocols recommended by the University of North Carolina system. This includes any work currently being conducted in our labs. Photos used in this newsletter were either taken before COVID19 or with safety measures in place.

Message from Dr. Mazzola
As we lifted off the runway at the Rock Hill general aviation airport heading North on a breezy, overcast morning, there before us, about 15 miles dead ahead, was Charlotte Douglas International airport. CLT is the engine of economic growth for the Charlotte metropolitan area, and indeed the entire Carolinas region. But I had no plans to fly over CLT that September day. Instead, Andrew LeClair, an EPIC research engineer, and I were participating in the Tour de York - Part Deux, a flying parade of private airplanes from around our metro area. You can watch a cool video of the event at www.facebook.com/flyrockhill. The event helped remind me that our metro area is blessed with excellent aviation infrastructure, which is more than just a busy international airport. A strong local and state economy needs infrastructure like Rock Hill’s airport and the Stanly County/Albemarle airport, where I home base my Piper Arrow. Our first article reflects that EPIC is part of a team that keeps our transportation infrastructure modern and affordable.

EPIC provides energy audit of CLT
EPIC staff recently completed an energy audit at the Charlotte Douglas International Airport. The team from EPIC, which was led by Associate Director Dr. Robert Cox and Research Manager Dr. Ben Futrell, worked with airport operations staff to determine a number of concrete opportunities for energy reduction through improved controls. Airport staff are working to implement many of the recommendations and work to create a more energy-efficient and comfortable space for passengers.

Special Projects update
QM Power
The EPIC Special Projects Team is excited to kickoff a new accelerated research and development project with QM Power in October. The EPIC team, led by Assistant Director of Research for Special Projects Jim Gafford and Assistant Director of Research for Energy Management Dr. Madhav Manjrekar, are investigating the capabilities of new advanced industrial motor drive topologies in a collaborative effort with QM Power. These motor drive topologies are expected to deliver both a performance and cost advantage over existing commercially available technologies. This new project comes on the heels of the successful conclusion of a previous motor drive research effort which resulted in the experimental validation of motor and motor drive models. The new project will build upon the knowledge and experience gained to deliver actionable results at an accelerated pace.

ORNL
EPIC is also engaged in the development of advanced capabilities in grid-tied inverters in a research effort sponsored by US DOE Oak Ridge National Laboratory. The study led by EPIC faculty member Dr. Babak Parkideh and assisted by EPIC professional research engineers is designing, fabricating, and evaluated three-phase grid-tied inverters with integrated sensing and control capabilities to improve performance, reliability, and interoperability of advanced power electronics in utility applications.

Hyperion
Working with Hyperion Technologies Group, Inc., EPIC is completing the final design and evaluation of high power density multi-functional power electronic inverters intended for mobile micro-grid applications. The inverter prototype has world class power density for multi-kilowatt class DC-AC inverters operating at 208 VAC. The hardware and control system are designed and tested to deliver bi-directional power flow capability with both grid-tied and stand-alone functionality. The inverter has been evaluated to perform as design from both fixed DC sources as well as large format Lithium-ion battery (LiFePO4).
US DOE Awards EPIC
EPIC has received a $500,000 award from the U.S. Department of Energy’s (DOE) Office of Fossil Energy (FE) and the National Energy Technology Laboratory (NETL). In addition to EPIC, project participants include Lehigh University (ERC and ATLSS), Customized Energy Solutions, Ltd. and Air Products and Chemicals, Inc. UNC Charlotte’s Dr. Nenad Sarunac is the lead principal investigator for the project.

Titled *Technoeconomic and Deployment Analysis of Fossil Fuel-Based Power Generation with Integrated Energy Storage*, the research will analyze four energy storage options and six sub-options, and determine their impact on the operation and economics of a representative coal-fired power plant. A coal-fired steam plant was selected for the analysis because it may provide the greatest benefits from the integration of energy storage and can be used as a foundation for other fossil fuel facilities. The savings due to the integrated energy storage resulting from improved operating efficiency, improved system reliability, reduced carbon dioxide and other pollutant emissions, lower operating costs, more efficient plant participation in frequency control, and increased participation in the ancillary services market will be considered.

EPIC podcast adds more episodes
EPIC has launched the podcast, *Peak Demand!* Each episode will treat listeners to an in-depth conversation with energy experts, students, and UNC Charlotte faculty about policies, technologies, and trends in energy. Check it out at [peak-demand.com](http://peak-demand.com) or look for us on Spotify, Apple Podcasts, and Google Podcasts.

*Smells Like Teen Spirit: Innovation and Entrepreneurship in Energy*
This is episode two in a two-part series on innovation and entrepreneurship. Rob, Christina, and Jim talk with Josh Cox and Peter O’Connor with Oxit on their entrepreneurial journey and how their willingness to take a less traditional approach has allowed them to find success.

*Hard Day’s Night: Innovation and Entrepreneurship in Energy*
This is episode one in a two-part series on innovation and entrepreneurship. Rob, Christina, and Jim talk with Ryan Rutledge with Joules Accelerator on what he sees happening in the energy space as it relates to fostering new ideas.

*Modern Love: Resilience and Grid Modernization Policy*
In this episode, EPIC’s Rob Cox talks with Autumn Proudlove, senior manager of Policy Research for N.C. Clean Energy Technology Center about today’s meaning of resilience and grid modernization. Christina Kopitopoulou and Jim Gafford also navigate the sometimes confusing energy acronym landscape.

*An EPIC Message in a Bottle: Keeping the lights on during a pandemic*
Host Rob Cox talks with SOS Intl’s Rocky Sease about how utilities are working to keep the lights on during a pandemic. Jim Gafford and Christina Kopitopoulou discuss current issues in the world of energy.

*Coming up*
Soon the team will discuss challenges of the energy transition in California; and the need for energy storage.

Pole Volt charging ahead
EPIC continues to work on the development of Pole Volt, a solution for curbside EV charging in dense urban environments. In summer 2020, the EPIC team deployed two units on the main campus. These units are expected to open to the public in November 2020. The team has developed a cloud-based solution for charge management, and the architecture will be discussed on an upcoming Microsoft Azure webinar. The project is supported by the Department of Energy, and is focused on determining if retrofit charging solutions placed onto street lamps can reduce the cost of installing EV charging infrastructure in urban environments. EPIC is working with Centralina Council of Governments, Eaton, and Duke Energy on this project.

VOLT lighting the way for engineers of tomorrow
EPIC is excited to support VOLT on their effort to provide students in low-income schools opportunities for hands-on STEAM learning experiences.

As UNC Charlotte’s power and energy student organization, VOLT’s mission is to empower the power and energy professionals of tomorrow by offering them opportunities to broaden their horizons and enhance their skills today. They are committed to engaging in community service activities that help build the next generation of power and energy professionals.
VOLT has focused its efforts to ensure students won’t lose the hands-on STEAM learning experiences that shaped the career path of VOLT members. Their goal is to give students a butterfly kit so they can still have a hands-on experience in their own homes.

Donate today to ensure the availability of experiential learning opportunities by helping VOLT provide STEAM kits for the students in Title 1 schools so that EACH STUDENT could take a kit home and experience the joy of discovery.

This is a huge undertaking and we ask for you help to get our youngest future engineers engaged and excited about science. Any amount can help! DONATE here.

**EPIC Affiliates news**

**Welcome new member YVI Labs**
YVI Labs is a knowledge-based startup, focused on the simulation of dynamic systems and in particular electric power systems. YVI Labs is creating a friendly and welcoming environment where many different disciplines can exploit their strengths and expertise to take over real-time solution software. They make software faster, detached form hardware, and accessible everywhere.

YVI-Photon++, currently in development, is running faster every day, being tested by world-class professionals at EPIC at the UNC Charlotte, and has an upcoming release date.

**Affiliates participate in energy panel discussion**
In a partnership event with the Career Center, EPIC Affiliates will participate in an Energy Panel Discussion and will feature engineers from Framatome, Pike Engineering, and Siemens for a discussion on their engineering journey and career, careers in the energy industry, and valuable skills for engineers in the industry. This virtual event is intended to be highly interactive with questions from the audience. The event is open to students through Hire-A-Niner and takes place on Oct. 14th at 12:00PM.

**CAPER update**
CAPER's 2020 Fall Meeting "Integrated Resource Planning - A Changing Landscape" will take place virtually Nov. 10-11, 2020 and hosted by Clemson University. Registration is $99 and is free to students.

Please mark your calendars to hear from top industry and university speakers within the energy field of engineering. Attendee participation in breakout group sessions is highly recommended in preparation for CAPER's annual proposal solicitation.

**UNC System Board of Governors member visits EPIC**
On September 8, Mark Holton, member of the UNC system Board of Governors and the liaison of that Board with UNC Charlotte paid a visit to EPIC. Dr. Mike Mazzola provided an overview of the work taking place at EPIC and our private and public partnerships. Mr. Holton visited the Duke Energy Smart Grid Lab and the High Bay Lab. He was also given a demonstration of the Pole Volt project by student Alex Miller, an undergraduate research assistant on this project.

**EPIC in the News**

**Small Bites and Insights**
Venturprise

EPIC Affiliates Program Manager, Christina Kopitopoulou was a featured guest on Ventureprise’s first Small Bites and Insights: Graduate Research, Programs, and Projects. Ventureprise is the Innovation and Entrepreneur Center for UNC Charlotte. In this episode faculty, staff, and students discussed opportunities and on-campus resources available to students.

**Upcoming Events**

**Electrification Virtual Summit**
EPRI’s Electrification Virtual Summit - a forum for industry stakeholders to reconnect and continue work on the adoption of end-use electrification solutions. Much more than a series of webinars, the Electrification Virtual Summit, being held October 19-23, will offer opportunities for extended networking, interactive sessions, and educational and informational exchanges. Be sure to stop by EPIC’s virtual booth!

**CAPER Fall Meeting**
Hear top industry and university speakers within the energy field of engineering at CAPER’s Fall Meeting, being held Nov. 10-11. The meeting topic is Integrated Resource Planning - A Changing Landscape.
About EPIC: The Energy Production and Infrastructure Center (EPIC) at UNC Charlotte, serves as a state-of-the-art research center that provides education and applied research opportunities to students with energy-related interests. Our industry-education partnerships unite students, faculty and industrial partners to collaborate on interdisciplinary research and learning.