



## about CURENT

A collaboration between academia, industry, and national laboratories, CURENT is a National Science Foundation (NSF) Engineering Research Center. Jointly supported by NSF and the Department of Energy, the center is led by the University of Tennessee, Knoxville.

### Domestic partner institutions include:

- Northeastern University
- Rensselaer Polytechnic Institute
- Tuskegee University

### International partners include:

- University of Waterloo
- National Technical University of Athens
- Tsinghua University

## The CURENT Vision

- A nation-wide or continent-wide transmission grid that is fully monitored and dynamically controlled in real-time for high efficiency, high reliability, low cost, better accommodation of renewable energy sources, full utilization of energy storage, and accommodation of responsive load.
- A new generation of electric power and energy systems engineering leaders with global perspectives and diverse backgrounds.

**CURENT** is designing the nation's future electric power transmission system for greater efficiency, higher reliability, lower cost and better accommodation of renewable sources

*with the help of our partner institutions:*

Northeastern



Rensselaer

TUSKEGEE



THE UNIVERSITY of TENNESSEE **UT**  
KNOXVILLE

Department of Electrical Engineering & Computer Science

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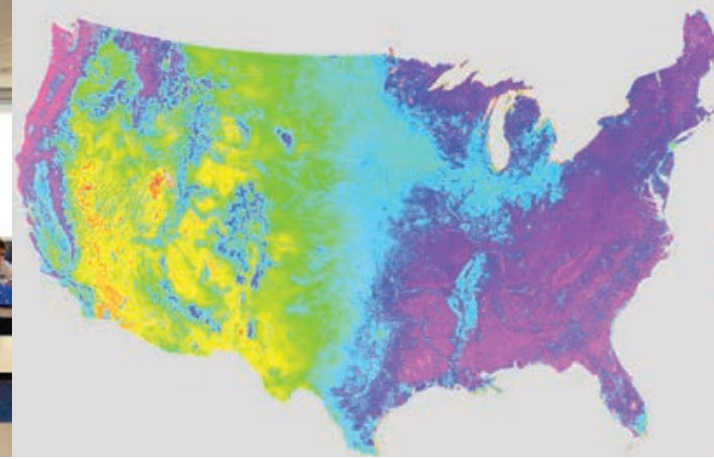
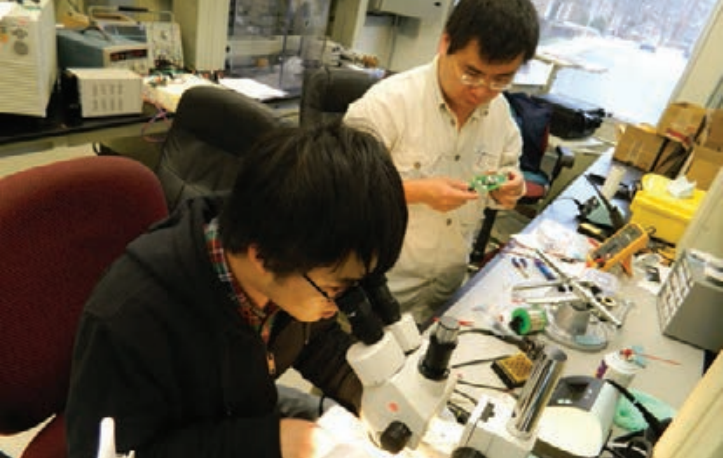


# CURENT

Center for Ultra-wide-area Resilient  
Electric Energy Transmission Networks

an  
Engineering  
Research  
Center

at THE UNIVERSITY of TENNESSEE **UT**  
KNOXVILLE



## research

Perhaps the most important technical challenge facing our nation over the next several decades is how to address societal energy needs without heavy reliance on fossil fuels. Electric power system transmission infrastructure must play a critical role in any viable solution.

Research at CURENT focuses on:

- Developing new technologies to utilize advancements in power grid wide-area measurement and communication to allow coordinated action on a continental ultra-wide scale.
- Redesigning the control and information structure so it is less hierarchical and can replace, at all levels of the power grid, traditional inflexible operations strategies and facilitate the integration of intermittent renewables.
- Drawing on today's high performance computing capability to realize large-scale and faster than real-time dynamic simulation for predictive control (and fast response) to ensure secure and reliable operation.
- Allowing full use of generation and transmission assets across the interconnected system by incorporating high speed power electronics based controllers.
- Developing advanced power electronic interfaces with wind and solar farms and bulk energy storage and associated controls for high penetration of renewable resources.

## facilities

CURENT primarily operates in the recently-opened Min H. Kao Building. A Hardware Testbed, Large-scale System Testbed, FNET monitoring and visualization lab, as well as general power systems and power electronics lab facilities make up the 16,000 square feet of space that were dedicated from the College of Engineering. CURENT labs have high-power feeds to accommodate any special power needs. New communications and video-conferencing technology facilitate collaboration with partner institutions and industry members.

## industry & innovation

Industrial Partners are integral to CURENT's research program. The center links engineering research to technological innovation through sustained partnerships with industry. This close collaboration helps stimulate technology transfer into commercial products and start-up companies.

Membership in CURENT provides our Industrial Partners with opportunities for collaboration in research, education programs, and product development. Industrial Partners are intimately involved in research plans through posing engineering problems to faculty and students. Membership benefits include, but are not limited to, the following:

- Ability to leverage NSF/DOE funding and influence the center research and education directions.
- Interaction with a cross-disciplinary pool of experts.
- Privileged access to graduate and undergraduate students.
- Annual center conferences and periodic web-based seminars for early dissemination of research outcomes.
- Opportunity to network and exchange ideas with other industry members.
- Preferential intellectual property rights.

Selected Industrial Partnership representatives serve as members of the Industrial Advisory Board (IAB) that advises the Center on strategic plans, research projects, research implementation, annual funding, and other resource allocations for CURENT and its research thrusts.

## education & outreach

Goals:

- Attract and retain diverse students to engineering.
- Construct an education infrastructure that will train a new interdisciplinary, creative, and adaptable generation of engineers.
- Inspire pre-college and university students to pursue an engineering career.

CURENT offers several programs for both pre-college and university students:

### Pre-college Program

- Research Experience for Teachers (RET)
- Young Scholars Program (for high school students)
- Middle and high school summer programs
- Parents' Night
- Lab tours and field trips

### University Program

- Research Experience for Undergraduates (REU)
  - 8-week summer program, or
  - Academic year program
- Undergraduate concentration
- Senior research projects
- Graduate certificate and fellowships
- Student Leadership Council

CURENT encourages the participation of underrepresented minorities, women, and people with disabilities.

