



# EVENT GUIDE



## 6th Annual Industry Conference & **NSF/DOE Site Visit**

November 14-17, 2017  
Knoxville, TN



a National Science Foundation &  
Department of Energy  
Engineering Research Center



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Northeastern



Rensselaer



TUSKEGEE

# curent's **VISION**

**CURENT** envisions a nation-wide or continent-wide transmission grid that is fully monitored and dynamically (real-time) controlled for high efficiency, high reliability, low cost, better accommodation of renewable sources, full utilization of storage, and responsive load.

A companion component of this vision is to educate a new generation of electric power and energy systems engineering leaders with a global perspective coming from diverse backgrounds.

## **ABOUT CURENT**

**CURENT** was established by a grant from the National Science Foundation and the Department of Energy in August 2011 under the prestigious Engineering Research Program (ERC). CURENT is the first ERC awarded to the University of Tennessee (UTK), the first ERC headquartered in Tennessee and the only ERC focused on large-scale power systems.

**The Center** occupies over 16,000 sq. ft. of lab space in one of UT's newest facilities, the Min H. Kao Electrical Engineering & Computer Science Building. Partner Institutions are Northeastern University (NEU), Rensselaer Polytechnic Institute (RPI) and Tuskegee University (TU).

**Additionally**, the CURENT industry consortium has over 35 members consisting of electric utilities, ISOs/RTOs, vendors, service groups, national labs and research consortia.



# general info

The 6th Annual Industry Conference & NSF/DOE Site Visit is at the **Hilton** (501 W. Church Avenue, 37902) in downtown Knoxville and at the **Min H. Kao Building** (1520 Middle Drive, 37996) on Nov. 14-17, 2017.

## LOCATIONS

Invited Presentations, Technical Paper Sessions and Research Thrust Overviews will all be held at the **Hilton** in the **Salons A, B, & C**. Lab Tours will be at the **Min H. Kao Building** on the **University of Tennessee** campus. Breakfast and lunch will in the **Hilton** in **Salons D & E**. The Industry & Faculty Dinner Meeting will be in the **Hiawasee Room** at the **Hilton**.

## PARKING

Hotel garage parking will be covered by CURENT. Bring your parking ticket to the registration desk to receive a parking card. Please note that parking cards can be erased by cell phones and credit cards so keep your parking card away from these items.

Parking at UTK for the lab tour is not recommended, although campus parking is available at Vol Hall Parking Garage at 1545 White Avenue, 37919. We recommend that people walk the short walk to the Min H. Kao building for the lab tour or catch a ride with one of our shuttle vans.

## TRANSPORTATION

Recommended taxi service:

- A Plus Cab - 865.970.0016

## INTERNET INFORMATION

**Hilton**

- network: **HILTONCONFERENCE**
- user name: **HILTONCONFERENCE**
- No password needed

**Min H. Kao Building**

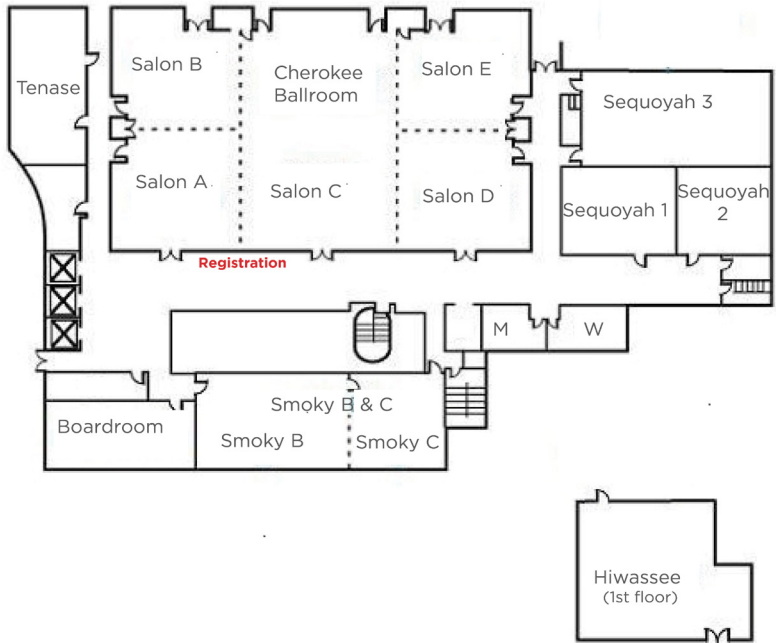
- network: **ut-visitor** (no password is needed, your browser will prompt you to enter your email address to register. If not, visit **guest.utk.edu** to log in.)

## EVENT CONTACT

Please contact Wendy Smith at 865.805.0792 or 865.974.9707 if any issues arise.

# hotel map

## Hilton Conference Center - Main Floor



The conference is on the second floor. From the lobby, go up the stairs or take the elevators to the 2nd floor.

The presentations and discussions take place mostly in Salons A, B & C. Breakfast and lunch will be served buffet style and the dining area will be in Salons D & E.

## Event Info

Registration is in the mezzanine Lobby outside Salons A, B & C on the 2nd floor. The conference rooms are accessed through the doors in the mezzanine.

# agenda

## Industry Conference - Tuesday, Nov. 14<sup>th</sup>

Downtown Hilton

7:00-8:00am Registration & Breakfast

### Salons A, B & C

8:00-8:15 Opening & Welcome

8:15-12:00 Invited Speakers

8:15-8:45 ***Situational Awareness Signals in Grid Frequency***

Terry Bilke, Consulting Advisor,  
Midcontinent ISO (MISO)

8:45-9:15 ***Total Industrial Awareness: is it Physical or Cyber?***

Sterling Rooke, Director-Elect ISA  
Communications Division, Brixon, Inc.

9:15-9:45 ***Navy Application of Silicon Carbide (SiC) Wide Bandgap (WBG) Semiconductors Enabling Future Power and Energy Systems***

CAPT Lynn J. Petersen USN (ret), Program  
Officer, Office of Naval Research

9:45-10:00 Break

10:00-10:30 ***California Environmental Initiatives and Electricity Industry Transformation***

Joseph Yan, Principal Manager of Price  
Forecasting & Modeling,  
Southern California Edison

10:30-11:00 ***Power Electronics for Resilient Distributed Generation Grids***

Allen Hefner, DOE Technology Manager,  
DOE/NIST

11:00-11:30 ***Applied Research Projects and Programs at NRECA***

Venkat Banunarayanan, Associate Director -  
Distributed Generation, Business & Technology  
Strategies, NRECA

11:30-12:00 ***Advanced Software Tools for Enhancing Power System Reliability and Resiliency***

Marianna Vaiman, Executive Vice President,  
V&R Energy

### Salons D & E

12:00-1:00 Lunch



## Tuesday, Nov. 15<sup>th</sup> (cont.)

1:00-4:00 Technical Paper Presentations (Parallel Sessions)

### Salons A & B

#### **Power System Modeling and Estimation (1:00-2:10)**

*Session Chair:*

*Hanoch Lev-Ari, NEU*

**1:00-1:10**

*Robust Transformer Tap Estimation*

**Yuzhang Lin, NEU**

**1:10-1:20**

*Tracking Three Phase Untransposed Transmission Line Parameters Using Synchronized Measurements*

**Pengxiang Ren, NEU**

**1:20-1:30**

*A Fast and Robust Linear State Estimator for Very Large Scale Interconnected Power Grids*

**Chenxi Xu, NEU**

**1:30-1:40**

*An Optimal Thévenin Equivalent Estimation Method and its Application to the Voltage Stability Analysis of a Wind Hub*

**Daniel Douglas, RPI**

**1:40-1:50**

*Stochastic Power System Simulation Using the Adomian Decomposition Method*

**Nan Duan, UTK**

**1:50-2:00**

*Hybrid Genetic Algorithm based Sensor Placement for Distribution System State Estimation*

**Jiaojiao Dong, UTK**

**2:00-2:10**

*Hybrid Power System State Estimation with Time Stamping, Communication Irregularities and Co-simulation*

**Vanja Švenda, TFU**

### Salon C

#### **Power Electronics and Renewable Energy (1:00-2:10)**

*Session Chair:*

*Kennedy Aganah, TU*

**1:00-1:10**

*Dead-Time Optimization for SiC Based VSI Using Online Condition Monitoring*

**Jacob Dyer, UTK**

**1:10-1:20**

*Investigation of Power Electronics Systems at Cryogenic Temperatures*

**Handong Gui, UTK**

**1:20-1:30**

*Characterization and Modeling of a SiC MOSFET's Turn-off Overvoltage*

**Wen Zhang, UTK**

**1:30-1:40**

*Impact of DC Fault in Multi-terminal DC Grid on Connected AC System Stability*

**Shuoting Zhang, UTK**

**1:40-1:50**

*A Game Theoretic Approach for Automated PID Controller Parameter Tuning*

**Cristopher Luciano, TU**

**1:50-2:00**

*Battery Chemistry Identification for a Multi-Chemistry Battery Energy Storage System*

**Mitchell Smith, UTK**

**2:00-2:10**

*Improving Grid Stability Using HVDC Controls*

**Lakshmi Sundaresh, UTK**

2:10-2:40

Break

# agenda

## Tuesday, Nov. 15<sup>th</sup> (cont.)

### Salons A & B

#### **Power System Control (2:40-4:00)**

*Session Chair:*  
*Hector Pulgar, UTK*

**2:40-2:50**  
*Wide-Area Automatic  
Generation Control between  
Control Regions with High  
Renewable Penetration*  
**Christoph Lackner, RPI**

**2:50:3:00**  
*A Hybrid Dynamic Demand  
Control Strategy for Power  
System Frequency Regulation*  
**Qingxin Shi, UTK**

**3:00-3:10**  
*Oscillation Energy Based  
Sensitivity Analysis and Control  
for Multi-Mode Oscillation  
Systems*  
**Horacio Silva Saravia, UTK**

**3:10-3:20**  
*Control Allocation for Wide Area  
Coordinated Damping*  
**M. Ehsan Raoufat, UTK**

**3:20:3:30**  
*Hybrid Controller for Wind  
Turbine Generators to Ensure  
Adequate Frequency Response  
in Power Networks*  
**Yichen Zhang, UTK**

**3:30-3:40**  
*Nonlinear Modal Decoupling and  
Control to Prevent Wide-Area  
Stability Problems*  
**Bin Wang, UTK**

**3:50-4:00**  
*Control and Limit Enforcements  
for VSC Multi-Terminal HVDC in  
Newton Power Flow*  
**Hantao Cui, UTK**

### Salon C

#### **Power Electronics and Renewable Energy (2:40-4:00)**

*Session Chair:*  
*Meng Wang, RPI*

**2:40-2:50**  
*Real-Time Event Identification  
Through Low-Dimensional  
Subspace Characterization of  
High-Dimensional Synchrophasor  
Data*  
**Wenting Li, UTK**

**2:50:3:00**  
*Impact of High PV Penetration on  
the InterArea Oscillations in the  
U.S. Eastern Interconnection*  
**Shutang You, UTK**

**3:00-3:10**  
*Development of Fast Response  
Synchrophasor*  
**Jiecheng Zhou, UTK**

**3:10-3:20**  
*Source Location Identification of  
Power Grid Electromechanical  
Disturbance Using Computational  
Intelligence Techniques*  
**Yi Cui, UTK**

**3:20:3:30**  
*Power Grid Monitoring on Mobile  
Platform*  
**Wenxuan (Will) Yao, UTK**

**3:30-3:40**  
*Integrating a Multi-Microgrid  
System into Real-Time Balancing  
Market: Problem Formulation and  
Solution Technique*  
**Yan Du, UTK**

**3:50-4:00**  
*Multi-Objective Optimal Reactive  
Power Dispatch Using Modified  
Game Theory*  
**Walid Al Misba, TU**



# agenda

## Salons D & E

4:00-5:00 Industry & Student Mixer

## Hiwassee

6:30-9:00 Industry and Faculty Dinner Meeting

## *Industry Conference Adjourned*

## **NSF/DOE Site Visit - Wednesday, Nov. 15<sup>th</sup>**

### Downtown Hilton

7:00-8:00am Registration & Breakfast

## Salons A, B & C

8:00-8:20 **Welcome Remarks - *Dr. John Zomchick, Interim Provost; Kevin Tomsovic, Center Director; Yichen Zhang, Student Chair; Deans Introduction; Site Visit Team (SVT) Introduction***

8:20-9:00 **CURRENT Overview**  
*Kevin Tomsovic, Center Director*

9:00-11:45 **Research Thrust Overviews**

9:00-9:25 Monitoring Thrust Overview  
*Yilu Liu, Deputy Director & Thrust Leader*

9:25-9:50 Monitoring Thrust Overview  
*Ali Abur, NEU Campus Director & Thrust Leader*

9:50-10:05 Break

10:05-10:30 Control Thrust Overview  
*Joe Chow, RPI Campus Director & Thrust Leader*

10:30-10:55 Actuation Thrust Overview  
*Fred Wang, Technical Director & Thrust Leader*

10:55-11:45 CURENT Engineered Systems Overview  
*Leon Tolbert, Thrust Leader*

11:45-12:30 **Concurrent Sessions**

<u>Sequoyah 1</u>	:	<u>Salons A, B &amp; C</u>	:	<u>Boardroom</u>
Site Visit Team	:	Industry Feedback	:	Dean's
Private Session	:	Session	:	Meeting

## Salons D & E

12:30-1:30 Lunch

## Salons A, B & C

1:30-2:00 Innovation and Industry Collaboration Program Overview, *Lisa Beard, Industry Liaison Officer*



# agenda

2:00-3:00 SVT Private Session with Industry

[Move to Min H. Kao](#)

3:15-6:00 Lab Tour & Poster Session

*Day One NSF/DOE Site Visit Adjourned*

## **NSF/DOE Site Visit - Thursday, Nov. 16<sup>th</sup>**

Downtown Hilton

7:45-8:15am **Concurrent Events**

<u><a href="#">Salons D &amp; E</a></u>	:	<u><a href="#">Sequoyah 3</a></u>
SVT and University	:	Faculty
Officials' Breakfast	:	Breakfast

[Salons D & E](#)

8:15-9:00 **SVT & University Officials Meeting**

[Salons A, B & C](#)

9:00-9:45 **Diversity and Culture of Inclusivity, *Chien-fei Chen, Director of Education & Diversity***

9:45-10:15 **Infrastructure, *Kevin Tomsovic, Center Director***

10:15-10:30 Break

10:30-11:00 **Sustainability Plan, *Kevin Tomsovic, Center Director***

11:00-11:45 **University Education, *Daniel Costinett, Co-Director of Education & Diversity***

11:45-1:00 **Concurrent Events**

<u><a href="#">Smoky B &amp; C</a></u>	:	<u><a href="#">Salons D &amp; E</a></u>
SVT and SAB	:	General Group
Private Lunch	:	Lunch

1:00-1:30 **Concurrent Sessions**

<u><a href="#">Sequoyah 1</a></u>	:	<u><a href="#">Salons A, B &amp; C</a></u>
SVT Private	:	Student / Faculty
Session	:	Session

[Salons A, B & C](#)

1:30-2:15 **Pre-College Education, *Chien-fei Chen, Director of Education & Diversity***

2:15-3:00 **SVT/Student Private Session**

# agenda

3:00-3:15 Break

## Sequoiah 1

3:15-4:15 SVT Executive Session

4:15-4:45 SVT Question Presentation

*Day Two NSF/DOE Site Visit Adjourned*

## **Site Visit - Friday, Nov. 17<sup>th</sup>**

Downtown Hilton

7:30-8:00am **Concurrent Events**

Sequoiah 3

SVT

Breakfast



Sequoiah 2

Faculty

Breakfast

## Sequoiah 3

8:00-9:00 Question Response Session

9:00-5:00 SVT Report Writing

5:00 SVT Departure

*Site Visit Adjourned*



*Dr. Liu, students and attendees at a previous Site Visit*

# speakers

*We are proud to welcome the following speakers to this conference.*

## **Terry Bilke**

*Consulting Advisor  
Midcontinent ISO (MISO)*

Terry Bilke is a Consulting Advisor in the Compliance Services department at the Midcontinent ISO (MISO). His primary job responsibilities involve engagement in the NERC standards and compliance processes, as well as supporting staff on operating topics. He is former chair of the NERC Compliance and Certification Committee, the NERC Resources Subcommittee, and the NASPI Operations Implementation Task Team. He is also a member of the NERC Reliability Issues Steering Committee. He has over 40 years of power system operations and maintenance experience, 16 years of these was as a transmission and balancing authority operator. Terry received his PhD in Quality Systems from Indiana State University, his MSME from Colorado State University, and his MBA from the University of Wisconsin-Whitewater. He is an adjunct professor in Bismarck State College's system operator degree program.



## **Sterling Rooke**

*Founder Brixon, Inc., and Director-Elect ISA Communications  
Division  
Brixon, Inc.*



Sterling Rooke is the Founder of Brixon, Inc., and Director-Elect Communications Division (2018-2019) for the International Society for Automation. Brixon is focused on sensor systems that secure key cyber terrain through the fusion of sensor derived physical measurements and information system analytics. Mr. Rooke is also the CEO of X8, a government contracting company focused on cybersecurity, and systems engineering. As incoming Director of the ISA Communications Division, Mr. Rooke regularly interfaces with a variety of industrial control and automation experts to better standards and best practices. He is active in IEEE, and serves as Chair of the Washington, DC area IEEE Instrumentation and Measurement Society Chapter. On a part-time basis, he is an Air Force Reservist and Cyberspace Operations Officer. Mr. Rooke will soon serve the Defense Innovation Unit Experimental (DIUx); "The Pentagon's Innovation Experiment" where his focus will be on accelerating commercial technologies to the U.S. military. Mr. Rooke received his Engineering Ph.D. from the University of Maryland College Park in 2015.

# speakers

## **CAPT Lynn Petersen, USN (ret.)**

*Program Officer  
Office of Naval Research*



Mr. Petersen graduated from the United States Naval Academy in Annapolis, MD with a BS in Mathematics in 1986 and was commissioned an Ensign in the United States Navy. Selected for lateral transfer to the Engineering Duty Officer program, he received a MSME from the Naval Postgraduate School in Monterey, CA in 1994. Following Active Duty, he was employed by the Naval Surface Warfare Center, Carderock Division, in Annapolis, MD as an Electrical Engineer. In May 2006, he was hired by the Office of Naval Research (ONR), serving as the ONR S&T rep to the Electric Ships Office, PMS 320. He was recalled to Active Duty in November 2008 with assignment as the Deputy Director, Electric Ships Office, PMS 320 and was there from 2008-2012. He was promoted to the rank of Captain in 2009.

From 2012-2014, he was the Navy's Director for Systems Engineering in the Deputy Assistant Secretary of the Navy (DASN) office for Research, Development, Test and Evaluation (RDT&E). In 2016, Mr. Petersen retired from the military following 30 years of service in the Navy.

Following his service at DASN (RDT&E), Mr. Petersen now serves as a Program Officer at ONR, leading basic research in power electronics, electromagnetism, and adaptive controls and applied research in machinery controls, Silicon Carbide (SiC) Wide Bandgap (WBG) semiconductor applications and Medium Voltage Direct Current (MVDC) power distribution systems.

Married to Alena, they have two adult children. He is a member of IEEE, ASNE and the MRS. He and his wife are active in their church and singing.

## Joseph Yan

*Principal Manager of Price Forecasting & Modeling  
Southern California Edison (SCE)*

Joseph Yan is the Principle Manager of Price Forecasting and Modeling at Southern California Edison (SCE). For the past decade, he has led the strategy development of SCE's generation portfolios to optimize the value of these resources and reduce the cost of serving its customers. He has also actively engaged in California electricity market stakeholder processes representing SCE and has made extraordinary contributions to the development of the ISO markets. His research interests include operation research, optimization, unit commitment/scheduling and transaction evaluation, and optimal simultaneous auction in deregulated ISO/RTO markets. Joseph Yan holds a PhD in Electrical and Systems Engineering from the University of Connecticut.



## Venkat Banunarayanan

*Associate Director, Distributed Generation, Business &  
Technology Strategies  
NRECA*



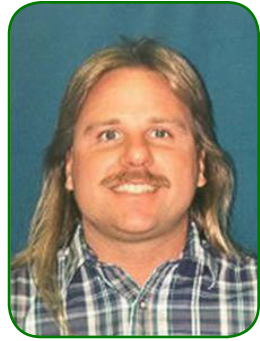
Venkat Banunarayanan is the Associate Director of Distributed Energy at NRECA-Business and Technology Strategies. He has nineteen years' experience in leading and executing energy-related projects involving power system analysis, renewables integration, techno-economic feasibility and benefit-cost studies. At NRECA, his role is to lead the build-out of tools and resources for cooperatives to address opportunities in Distributed

Energy Resources, and to enable strategic partnerships that help electric cooperatives meet their members' expectations for affordable, reliable electric power. Mr. Banunarayanan holds a PhD in Electrical Engineering, a MBA in Finance and has worked previously at the U.S. Department of Energy, ICF International, and General Electric.

## Allen Hefner

*DOE Technology Manager  
DOE/NIST*

Dr. Allen Hefner is a fellow of the IEEE and has worked with NIST for 35 years on advanced power semiconductor devices and applications. He has also worked with the NIST Smart Grid effort to coordinate development of standards for advanced applications of DER and microgrids. Dr Hefner is currently serving as the DOE Technology Manager for Wide Bandgap Power Electronics programs including the PowerAmerica Institute, Next Generation Electric Machines, and the Wide Bandgap Traineeship programs.



## Marianna Vaiman

*Executive Vice President  
V&R Energy*

Ms. Vaiman is Executive Vice President of V&R Energy with over 25 years of experience in the electric utility industry. Her areas of expertise include power system stability, optimization, and control; analysis of cascading outages; state estimation; and use of synchrophasor measurements for enhanced situational awareness. She holds BS and MS in EE from Moscow University of Transportation Engineering in Moscow, Russia.



Ms. Vaiman presently manages V&R Energy's Smart Grid portfolio. She is responsible for software development of Physical and Operational Margins (POM) Suite of Applications and Region Of Stability Existence (ROSE) software. She also leads consulting and R&D activities at V&R Energy. She has authored over thirty papers devoted to the issues of power system stability and control.

She is a member of NERC Modeling Working Group (MWG) and NERC Synchrophasor Measurement Subcommittee (SMS).

Ms. Vaiman is active in the North American Synchrophasor Initiative (NASPI) and IEEE PES communities. She is NASPI Volunteer of the Year - 2016 and NASPI Control Room Solutions Task Team Most Valuable Player - 2016.

She is the Chair of PMU Subgroup of IEEE PES Cascading Failure Working Group (CFWG). Marianna is a part of PES Policy Technical Support Task Force leading two areas: (1) IEEE PES Next Generation Energy Educational Initiative and (2) cooperation between IEEE PES and North American Transmission Forum (NATF).

# lab tour and poster session

## Welcome

The 2017 Lab Tour and Poster Session will be held in the laboratories on the 1<sup>st</sup> and 4<sup>th</sup> floors of the Min Kao Building. Rooms are indicated by signs beside each lab.

As you tour the labs, feel free to use your QR Code Reader on your Smart Phone to scan the bottom corner of each poster. The QR Code will send you to the CURENT website where the poster is stored.



Sample QR Code

QR Code Readers can be downloaded for free from most App Stores. Popular QR Code readers include “QR Droid” for Android Devices and “QR Reader for iPhone” for Apple Devices.

## Poster Locations

1 <sup>st</sup> Floor Atrium . . . . .	1 <sup>st</sup> Floor Entrance
High Power Electronics Lab . . . . .	Room 117
Hardware Testbed Control and Build Lab. . . . .	Room 101 & 101A
Power Electronics Lab . . . . .	Room 125
Visualization Room . . . . .	Room 124
Multipurpose Conference Room . . . . .	Room 121
FNET Lab . . . . .	Room 402

## Features

Posters can be viewed electronically by scanning the QR Code on the individual posters or by going to the CURENT website (below). Posters are grouped by content on the website.

The posters in the lab tour are grouped by content. The posters within each room should belong to one to two content themes but occasionally a poster will not be grouped with similar content due to room space or the author working in multiple content areas. The content areas have been given the following abbreviations:

TB	Testbeds
HV	HVDC, FACTS and Renewable Energy
CV	Power Converter Design and Control
DV	Power Electronic Devices and Components
CT	Power System Control & Operaton
MT	Power System Monitoring
ME	Power System Modeling & Estimation
ED	Education Posters

<http://curent.utk.edu/research/conferences/2017-site-visit/>



# lab tour and poster session

## **Min Kao Room 117** **Modeling & Estimation; Control & Operation;** **HVDC, FACTS & Renewable Energy;** **and Devices & Components**

- HV2 **Jingxin Wang** - A DC Controller for Continuous Variable Series Reactors (CVSRs)
- HV1 **Gan Chun** - DC Controller Design and Test for a Full-Scale 115 kV/1500 A Continuous Variable Series Reactor
- DV5 **Xingxuan Huang** - Characterization of 3rd Generation 10 kV SiC MOSFET with Anti-parallel JBS Diode
- ME13 **Bin Wang** - A Method to Locate the Source of Forced Oscillations Based on Linearized Model and System Measurements
- ME12 **Bin Wang** - A Time-Power Series and Padé Approximants Based Semi-Analytical Approach for Power System Simulation
- ME11 **Bin Wang** - Nonlinear Modal Decoupling Based Analysis and Monitoring of Wide-Area Stability Problems
- ME18 **Xuemeng Zhang** - Measurement-based Methods for Model Reduction of Large Power Systems
- ME2 **Jiaojiao Dong** - Hybrid Genetic Algorithm based Sensor Placement for Distribution System State Estimation
- ME4 **Nan Duan** - Stochastic Power System Simulation Using the Adomian Decomposition Method
- ME14 **Yajun Wang** - Estimating Inertia Distribution to Enhance Power System Dynamics
- ME10 **Vanja Svenda** - Hybrid Power System State Estimator with Irregular Sampling
- CT21 **Wenjie Han** - Application of Ultra-Local Models in Automatic Generation Control with Co-Simulation of Communication Delay
- CT20 **Siqi Wang** - A comprehensive frequency control framework for wind turbine generators to improve frequency response
- CT2 **Richard Bisson** - Power Peaking with SMRs to Support Deep Penetration of Renewable Energy Sources
- DV6 **Shiqi Ji** - Switch Characterization for 10 kV / 20 A Silicon Carbide (SiC) MOSFETs

# lab tour and poster session

## Min Kao Room 101 Testbeds and HVDC, FACTS & Renewable Energy

- TB4 **Yiwei Ma** - Virtual Synchronous Generator Control of Full Converter Wind Turbines with Short Term Energy Storage
- TB5 **Yiwei Ma** - A Smart and Flexible Microgrid with a Low-cost Scalable Open-source Controller
- TB9 **Jingxin Wang** - Development, Control, and Demonstration of a Hardware Testbed for Power System Emulation
- HV3 **Shuyao Wang** - A Review of Control Methods for Inertia Emulation in MTDC Transmission System
- TB7 **Mitchell Smith** - Battery Chemistry Identification for a Multi-Chemistry Battery Energy Storage System
- TB8 **Mitchell Smith** - Development and Analysis of an Energy Storage Sizing Tool for Residential Deployment
- HV4 **Shuoting Zhang** - Three-Phase Short-Circuit Fault Implementation in Converter Based Transmission Line Emulator
- TB12 **Shuoting Zhang** - Impact of DC Fault in Multi-terminal DC Grid on Connected AC System Stability
- TB6 **Mark Nakmali** - Thyristor controlled series capacitor and thyristor controlled series reactor for line impedance emulation



*A student checks the testbed equipment in Min Kao 101*

# lab tour and poster session

## Min Kao Room 101 A Testbeds and Modeling & Estimation

- ME7 **Authur Mouco** - A Robust State Estimator for Power Systems With HVDC Components
- ME5 **Yuzhang Lin** - Efficient Identification of Multiple Bad Data
- ME6 **Yuzhang Lin** - Robust Transformer Tap Estimation
- ME15 **Chenxi Xu** - A Fast and Robust Linear State Estimator for Very Large Scale Interconnected Power Grids
- ME16 **Chenxi Xu** - Robust Linear State Estimation Using Multi-level Power System Models with Different Partitions
- ME17 **Chenxi Xu** - Robust State Estimation via Network Partitioning
- ME9 **Pengxiang Ren** - Tracking Three Phase Untransposed Transmission Line Parameters Using Synchronized Measurements
- ME8 **Ahmet Oner** - Improving Resiliency of Power Grids during Extreme Events
- TB11 **Qiwei Zhang** - Integration Of Griddyn In Large Scale Testbed Through Data Streaming
- TB2 **Hantao Cui** - Control and Limit Enforcements for VSC Multi-Terminal HVDC in Newton Power Flow
- TB1 **Hantao Cui** - Cyber-Physical Testbed for Power System Wide-Area Measurement-Based Control Using Open-Source Software

### Please note:

- The above poster numbers correspond with the lab maps at the end of this section.
- Posters can be viewed on your USB Drive.
- Posters can be viewed by scanning the QRC code on the poster
- Posters can be viewed on the site visit webpage <http://curent.utk.edu/research/conferences/2017-site-visit/>

# lab tour and poster session

## Min Kao Room 125 Power Electronics

- CV6 **Ling Jiang** - A Single-stage 6.78 MHz Transmitter for Wireless Power Transfer Applications
- CV1 **Saeed Anwar** - Operating Mode Transition Control of a SiC Integrated DC-DC Powertrain Charger for Evs
- CV16 **Zhe Yang** - GaN-Based PV Inverter Design
- DV7 **Paige Williford** - Voltage and Current Margin Reduction for Gan FETs in a Hard-Switching Converter
- DV12 **Craig Timms** - Fast and reliable drive of parallel high current 1.7kV SiC MOSFETs for high frequency hard switching applications
- CV4 **Jacob Dyer** - Dead-time Optimization for SiC Based VSI Using Online Condition Monitoring
- CV11 **Kamal Sabi** - Noise Mitigation in High Frequency Dual Current Programmed Mode Control GaN Based ZVS Inverter
- DV2 **Spencer Cochran** - GaN-Based Synchronous Rectifier with Reduced THD for 6.78 MHz WPT Applications
- CV2 **Jared Baxter** - Investigation of High Mileage Operation of Electric Vehicle Drivetrains for Si and SiC Devices
- CV5 **Andrew Foote** - SMART Mobility: Speed Dependent Optimal Sizing and Placement of Dynamic Wireless Charging Tracks
- CV12 **Jingjing Sun** - GaN-based High Efficiency, High Density 3 kW AC-DC Converter for Data Center Power Supply
- CV10 **Jiahao Niu** - Paralleled Operation of Multiple Three-phase Three-Level Active Neutral Point Clamping Inverters
- CV3 **Ruirui Chen** - High Efficiency High Density Cryogenically Cooled Inverter for Electric Aircraft Applications
- DV4 **Handong Gui** - Investigation of Power Semiconductor Devices at Cryogenic Temperatures
- DV10 **Jie Li** - Wireless Power Transfer System-level Optimization
- DV3 **Jordan Gamble** - Modeling High Current Integrated Power Converters
- DV9 **Maeve Lawniczak** - Hybrid Switched-Capacitor DC-DC Converter for Data Center Power Supply
- DV1 **Doug Boulter** - GaN-based VRM converter for Data Center Applications
- CV18 **Chongwen Zhao** - A Phase-Shift Dual-Frequency Selective Harmonic Elimination for Electrosurgical Supply
- DV14 **Wen Zhang** - Review on Current Measurement Techniques for Wind Bandgap Device Dynamic Characterization

# lab tour and poster session

- DV13 **Wen Zhang** – Characterization and Modeling of a SiC MOS-FET's Turn-off Overvoltage
- DV8 **Edward Jones** – A Fast Overcurrent Protection Scheme for GaN GITs
- DV11 **Jordan Sangid** – GaN-Based Class-D Audio Amplifier
- CV15 **Gang Wang** – Equation-Free System-Level Modeling and Analysis of Series Resonant DC/DC Converters
- CV8 **Ahmed Benozir** – Switched-Multi-Source Inverter Topology for Distributed DC Sources
- CV9 **Cristopher Luciano** – A Game Theoretic Approach for Automated PID Controller Parameter Tuning
- CV14 **Ignacio Vieto** – On DQ-Frame Impedance of Voltage Source Converters
- CV13 **Ignacio Vieto** – Frequency-Domain Coupling in Two-Level VSC Small-Signal Dynamics
- CV7 **Bo Liu** – A Sampling Scheme for Three-phase High Switching Frequency and Speed Converter

## 1st Floor Lobby Undergraduate Research

- ED1 **Kellen Oleksak** – Real-Time Data Acquisition Streaming and Control Interface for ePHASORSim
- ED2 **David Dixon** – Dynamic Transmission Network Behavior for DER Power Systems
- ED3 **Yicheng Li** – Mobile UGA (Universal Grid Analyzer)
- ED4 **Phum Pham, Larry Marshall** – Smart Home Energy Management System
- ED5 **Alex Bolinsky** – Device Characterization of Solar Inverters
- ED6 **Jessica Wert** – Power System Analyses
- ED7 **Natalie Bogda, Roy Tan, Brian Lundell, Faiza Islam** – Big Data and Disasters: Exploring residents' attitudes toward utility companies during Hurricane Irma and Harvey using Twitter data.
- ED8 **Quillen Blalock** – Inductor Design: Geometric Optimization
- ED9 **Ian Steenstra** – PV Device & Smart Grid Educational Program
- ED10 **Ian Steenstra** – PV Device & Weather Data Collection

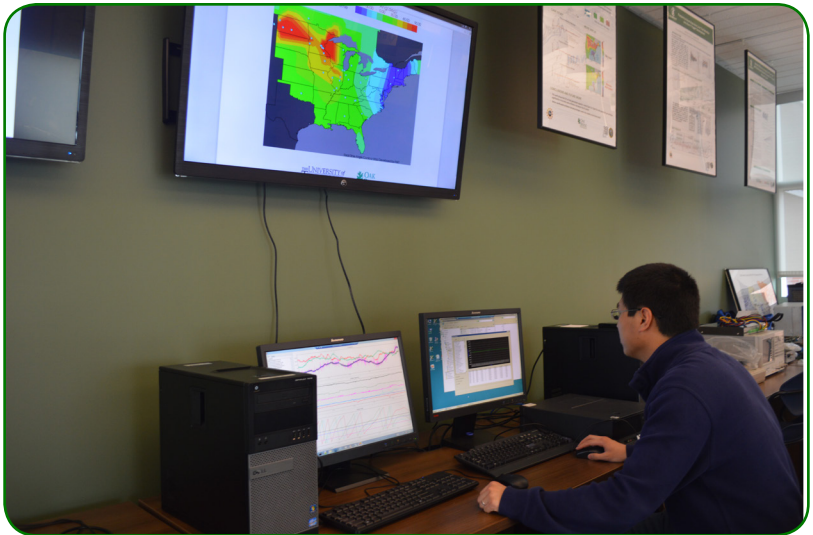
# lab tour and poster session

## Min Kao Room 121 Control & Operation and Modeling & Estimation

- ME3 **Daniel Douglas** - An Optimal Thévenin Equivalent Estimation Method and its Application to the Voltage Stability Analysis of a Wind Hub
- ME1 **Stephen M. Burchett** - Analysis of Renewable Generation on Academic NYISO System Model
- CT10 **Christoph Lackner** - Wide-Area Automatic Generation Control between Control Regions with High Renewable Penetration
- CT17 **Lakshmi Sundaresh** - Improving grid stability using HVDC controls
- CT18 **Zhiyong Yuan** - Frequency Control Capability of VSC-HVDC for Large Power Systems
- CT27 **Shaofei Shen** - Adaptive Relay Setting Strategy for Microgrid with Dynamic Boundary
- CT26 **Yi Zhao** - Adaptive wide-area damping controller using measurement-driven transfer function
- CT16 **Horacio Silva Saravia** - Online Energy-based wide-area coordinating control for system oscillations in the WECC
- CT1 **Md Arifin Arif** - A Stochastic Game Framework for Reactive Power Reserve Optimization and Voltage Profile Improvement
- CT4 **Md Fahim F Chowdhury** - Coalitional Integration of Wind Turbines via Cooperative Energy Trading In Distributed Power System
- CT11 **Walid Al Misba** - Multi-Objective Optimal Reactive Power Dispatch using Modified Game Theory
- CT24 **Yichen Zhang** - Hybrid Controller for Wind Turbine Generators to Ensure Adequate Frequency Response in Power Networks
- CT25 **Yichen Zhang** - Provision for Guaranteed Inertial Response in Diesel-Wind System using Model Reference Control
- CT12 **M. Ehsan Raoufat** - Control Allocation for Wide Area Coordinated Damping
- MT7 **M. Ehsan Raoufat** - Event Analysis of Pulse-Reclosers in Distribution Systems
- CT19 **Fatima Taousser** - Stability of Power Systems with Intermittent Information Transmissions
- CT8 **Weihong Huang** - Optimal Allocation of Dynamic Var Sources Using the Voronoi Diagram Method Integrating Linear Programming

# lab tour and poster session

- CT7 **Junjian Qi** - Optimal Placement of Dynamic Var Sources by Using Empirical Controllability Covariance
- CT23 **Yongli Zhu** - Damping Control for a Target Oscillation Mode Using Battery Energy Storage
- CT3 **Chien-fei Chen** - Social-Psychological Factors and Their Effect on Smart Home Appliances Adoption
- CT13 **Qingxin Shi** - A Hybrid Dynamic Demand Control Strategy for Power System Frequency Regulation
- CT14 **Qingxin Shi** - Dynamic Demand Control for System Frequency Regulation: Concept Review, Algorithm Comparison, and Future Vision
- CT15 **Qingxin Shi** - Passive Filter Installation for Harmonic Mitigation in Residential Distribution Systems
- CT22 **Xiaojing Xu** - The Influences of Social-Psychological Variables on Intention to Use HEMS: A Comparison between New York and Tokyo
- CT9 **Xiao Kou** - PQ Curve Based Voltage Stability Analysis Considering Wind Power
- CT5 **Yan Du** - Integrating a Multi-microgrid System into Real-time Balancing Market: Problem Formulation and Solution Technique
- CT6 **Wei Feng** - Impact of Neutral Current on Concentric Cable Overloading



*A student working on research in the FNet Lab*

# lab tour and poster session

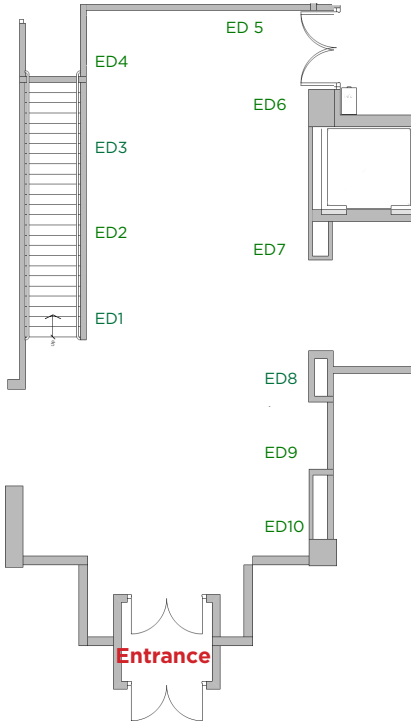
## Min Kao 402 Power Systems

- MT11 **Ling Wu** - Multiple Linear Regression Based Disturbance Magnitude Estimations for Bulk Power Systems
- MT1 **Yi Cui** - Study of Variability Metrics for Solar Irradiance and Photovoltaic Output
- MT3 **Yi Cui** - Inter-area Oscillation Statistical Analysis of the U.S. Eastern Interconnection
- MT2 **Yi Cui** - Source Location Identification of Power Grid Electromechanical Disturbance Using Computational Intelligence Techniques
- MT9 **Weikang Wang** - Development of an Adaptive Performance Monitoring System for PDCs across FNET/GridEye System
- MT10 **Wenxuan Yao** - Power Grid Monitoring on Mobile Platform
- MT6 **Wenting Li** - Real-time Event Identification through Low-dimensional Subspace Characterization of High-dimensional Synchrophasor Data
- MT8 **Manashi Roy** - Online Data Monitoring And Display Of A Grid Connected Solar Power System And Electric Vehicle Charging Station
- MT15 **Yao Zhang** - Impacts of Power Grid Frequency Deviation on Time Error of Synchronous Electric Clock and Worldwide Power System Practices on Time Error Correction
- MT12 **Shutang You** - Study of Wind and PV Active Power Control in U.S. Power Grids
- MT13 **Shutang You** - Impact of High PV Penetration on the Inter-Area Oscillations in the U.S. Eastern Interconnection
- MT14 **Shutang You** - Non-Invasive Identification of Inertia Distribution Change in High Renewable Systems
- MT16 **Jiecheng Zhao** - Development of Fast Response Synchrophasor
- MT5 **Fuhua Li** - Transient analysis on transformer winding with floating conductor
- MT4 **Chengcheng Li** - Cyber-Physical Security and Multiple Event Analysis on HTB
- MT17 **Albraa Bahour** - Data Analytics for Privacy in Smart Grids

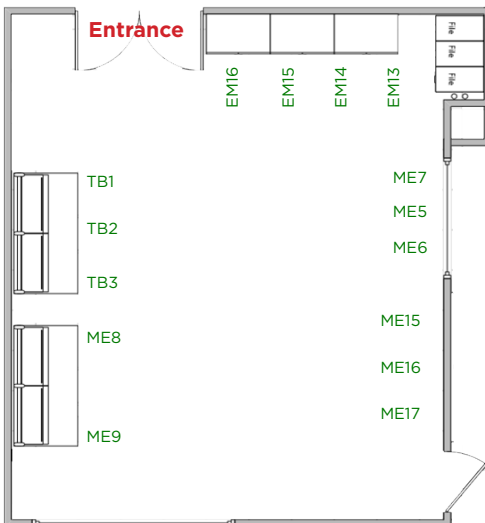


# lab tour and poster session

## 1st Floor Lobby Education Posters

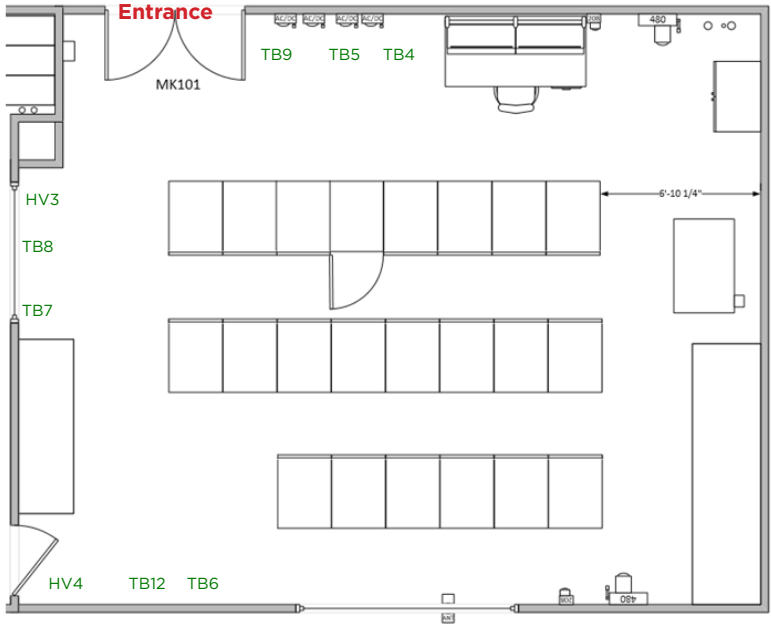


## Min Kao Room 101A Hardware Testbed Control & Build Lab

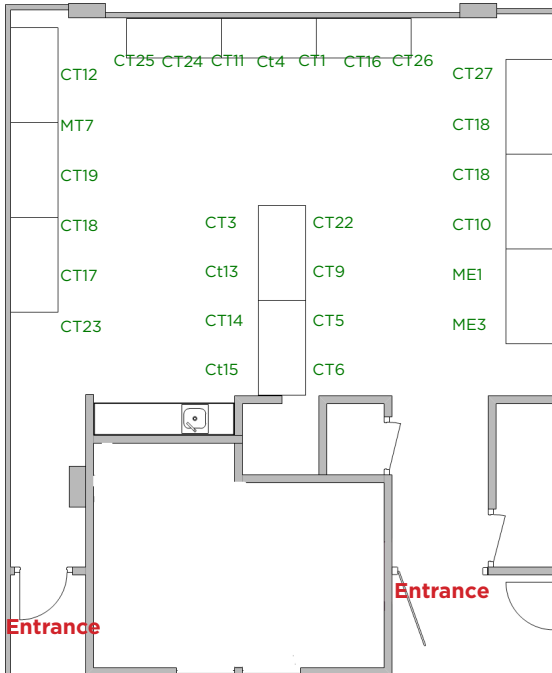


# lab tour and poster session

## Min Kao Room 101 Hardware Testbed Control & Build Lab

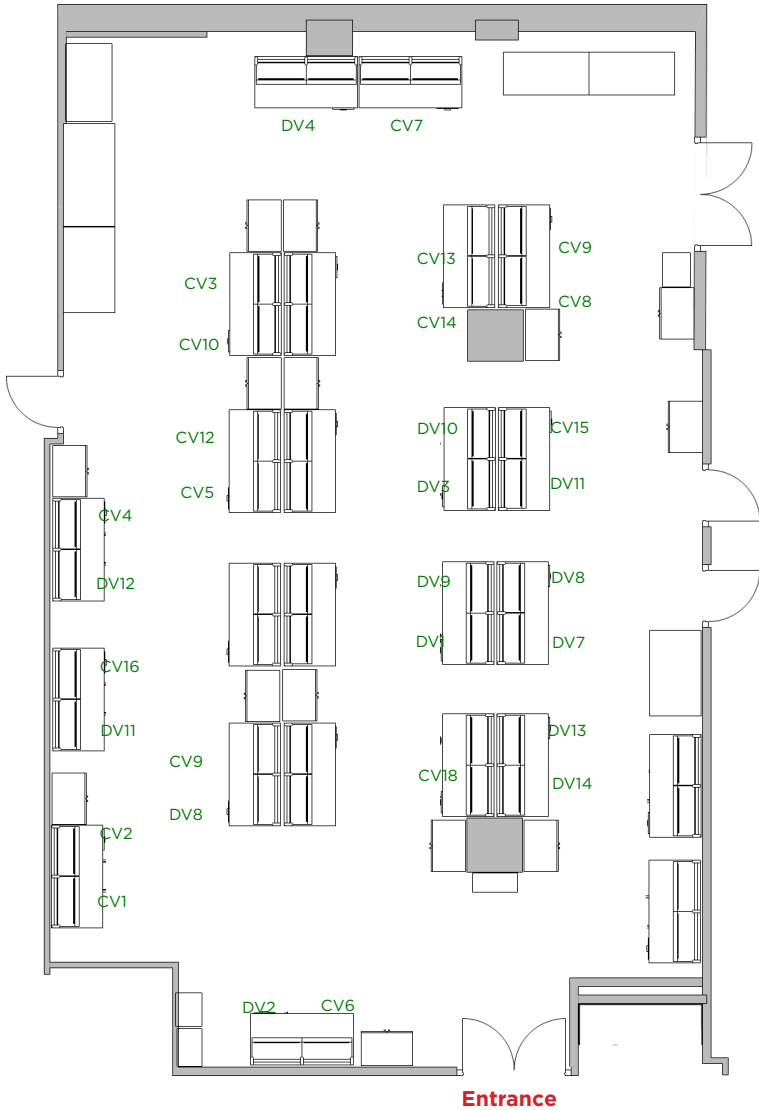


## Min Kao Room 121 Conference Room



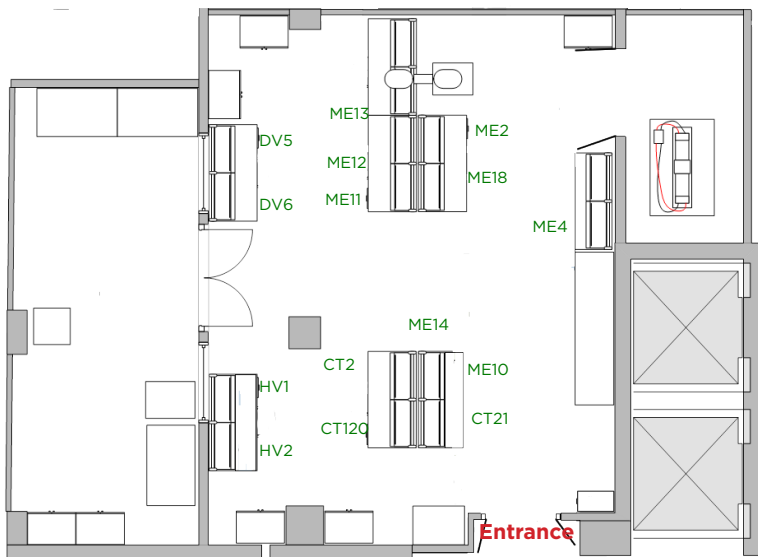
# lab tour and poster session

## Min Kao Room 125 Power Electronics Lab



# lab tour and poster session

## Min Kao Room 117 High Power Electronics Lab



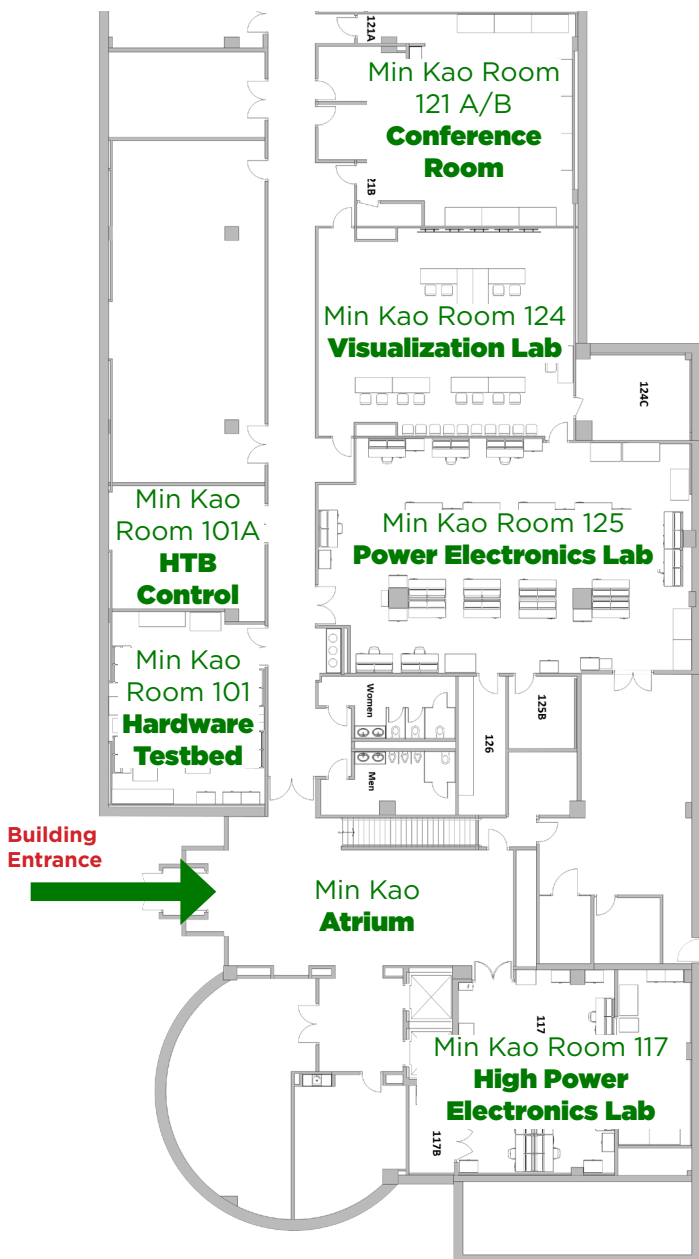
## Min Kao Room 101 FNET Laboratory



# lab tour and poster session

Min H. Kao Building  
Lab Tour

## 1st Floor Overview



# Student leadership

*Yichen and the student co-chairs wish to thank all the committee members and other CURENT students for their time and efforts in preparing for the industry conference and site visit.*

**Yichen Zhang**  
Student Chair



**Coordinating Committees:**

- Overall Student Organization
- Publication
- Lab Tour

**Kamal Sabi**  
Co-Chair



**Coordinating Committees:**

- Poster Printing
- Equipment

**Paige Williford**  
Co-Chair



**Coordinating Committees:**

- Welcome
- Driver

**Abilgail Till**  
Co-Chair



**Coordinating Committees:**

- Notebook Printing
- Registration



**Xiao Kou**  
Publication  
Committee Leader



**Jacob Dyer**  
Lab Tour  
Committee Leader



**Yu Su**  
Poster Printing  
Committee Leader

# student leadership



**Mark Nakmali**  
Equipment  
Committee Leader



**Xingxuan Huang**  
Notebook Printing  
Committee Leader



**Yajun Wang**  
Registration  
Committee Leader



**Cody Rooks**  
Welcome  
Committee Leader



**Paige Williford**  
Driver  
Committee Leader



**Denis Osipov**  
Dinner events  
(self-organized)



**Wenxuan Yao**  
Photography  
(self-organized)



*L to R: Abigail, Paige, Kamal and Yichen*

# industry members

**CURRENT** thanks all our industry partners for their support.



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全球能源互联网美国研究院



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# industry members



# acknowledgement



This work was supported primarily by the ERC Program of the National Science Foundation (NSF) and the Department of Energy (DOE) under NSF Award Number EEC-1041877 and the CURENT Industry Partnership Program.

Other US government and industrial sponsors of CURENT research are also gratefully acknowledged.

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**Deputy Director:** Dr. Yilu Liu

**NEU Campus Director:** Dr. Ali Abur

**RPI Campus Director:** Dr. Joe Chow

**TU Campus Director:** Dr. Greg Murphy

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**Technical Director:** Dr. Fred Wang

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**Event Coordinator:** Wendy Smith

**IT Manager:** Ryan Smiley

**Education Coordinator:** Anne Skutnik

**Infrastructure:** Bob Martin

**thank you**

**Thank you for  
attending the  
6th Annual  
Industry Conference  
and NSF/DOE  
Site Visit.**



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