Energy Systems Innovation Center (ESIC) Update

Fall 2021 ESIC REP Meeting

Mani V. Venkatasubramanian
Director, ESIC
WSU Power Program

- Power Professorship program since 1973
- Energy Systems Innovation Center since 2012
- Educating leaders in industry
- Partnering with industry and government
- Significant & sustained impact
- Premier power program
Vision
Leading the transition to affordable, sustainable and resilient electric power systems

Mission
Collaborative research, education, and outreach to solve challenges for modern power systems
ESIC Power Faculty

Mani Venkatasubramanian, Director, Boeing Distinguished Professor
Anjan Bose, Regents Professor, Distinguished Professor in Power Engineering
Noel Schulz, Schweitzer Endowed Professor
Robert Olsen, Professor Emeritus
Saeed Lotfifard, Associate Professor
Anamika Dubey, Assistant Professor
Ahmed Abu-Hajar, Clinical Associate Professor
Javier Guerrero, Clinical Assistant Professor
Shuzeng Xie, Clinical Assistant Professor
Anurag Srivastava, Research Professor
Josue Campos Do Prado, Assistant Professor
Hang Gao, Assistant Professor
Henry Huang, Research Professor
Kevin Schneider, Research Professor
## ESIC Faculty in Allied Disciplines

### Electrical Engineering
- Sandip Roy – Dynamic Networks
- Pat Pedrow – High Voltage
- Hang Gao – WSU Vancouver
- Xinghui Zhao – WSU Vancouver

### Civil & Environmental Engineering
- Michael Wolcott – Sustainable Infrastructures
- Jennifer Adam – Water and Storage
- John Petrie – Impact of Hydro Operations
- Ji Yun Lee – Infrastructure resilience

### Chemical Engineering
- Su Ha – Fuel Cells

### Mechanical & Materials Engineering
- Jacob Leachman – Hydrogen/Nuclear
- Dustin McLarty – Energy Storage
- Grant Norton – Nanotechnology
- Soumik Banerjee – Solar Cells, Batteries
- Yuehe Lin – Batteries

### Computer Science
- Partha Pande – Network-on-Chip
- Behrooz Shirazi – Pervasive Computing
- Diane Cook – Smart Home/Environments
- Jana Doppa – Machine Learning
- Assefaw Gebremedhin – Data science
- Ananth Kalyanaraman – Computing

### Architecture
- Todd Beyreuther – Integrated Design

### Economics
- Alan Love – Electricity Markets

### Communication
- Amanda Boyd – Risk Communication

### Liberal Arts
- Paul Whitney – Cognitive Behavior
- Christine Horne – Social Norms
ESIC Staff

Jeannine Burke – Manager
Linda Howell – Industry Relations Coordinator
Darlene Miller – Fiscal Assistant
Samantha Ulam – Communications Assistant
Ongoing faculty search for three positions: (Assistant/Associate/Full Professor level)

- Power electronics
- Cybersecurity
- Power systems including AI/ML applications
• Dr. Noel Schulz elected to Washington State Academy of Sciences
• Dr. Anjan Bose received Cigre Medal
• Dr. Noel Schulz and Mr. Jeff Dagle appointed as AGI Co-Directors
• Dr. Kevin Schneider named PNNL Lab Fellow
• Dr. Anamika Dubey received VCEA Junior Faculty Research Award
• UI Assist project named key achievement of US-India energy partnership
• New $1.5M DoD Cybersecurity Research and Teaching Institute (CySER) to be led by WSU.
Ph.D. Students: 30

M.S.: 2 (Thesis) + 3 (Non-Thesis)

Seniors taking power electives: 35
Research Expenditures

$M


2.06 3.1 3.6 2.85 3 4.2 4.2 4.1 4.3 3.3

$M


2.06 3.1 3.6 2.85 3 4.2 4.2 4.1 4.3 3.3
ESIC Thrust Areas

1) Microgrids and IBRs
2) Reliability and Resilience
3) Grid Edge/Privacy/Cybersecurity
4) AI and ML Applications
5) Workforce 2.0
ESIC Outreach

• Technical conferences: WPRC, ESIC Summit, and Hands-on-relay school
• ESIC Seminars (weekly)
• ESIC Scholarships
• Leadership in professional societies
• Technology transfer – start-up companies and technology licensing
• Collaboration with centers, e.g. AGI, PSERC, CHARGE.
ESIC Memberships

• ESIC Power Education Partnership (PEP)
  ▪ Supporting power engineering education

• ESIC Research Excellence Partnership (REP)
  ▪ Promoting research collaborations
ESIC REP Membership

- ESIC Research Excellence Partnership (REP)
- Annual Membership: $15K
- Benefits - Access to ESIC research:
  - Research collaborations
  - ESIC weekly seminars
  - Project catalog/announcements
  - Research reports and papers on secure website
  - Invitation to be project advisors
  - Tutorials by faculty experts
  - ESIC Summit
  - Dedicated industry liaison
  - Seed projects at no overhead (no deliverables)
ESIC REP Membership

ESIC REP Members
2020-21
ESIC PEP Membership

• ESIC Power Education Partnership (PEP)
• Annual Membership: Varies
• Benefits – Support Power Engineering Education
  • Practicum *(Planning meeting on November 3, 2021)*
  • Support for Internships/Jobs
  • Power Curriculum Feedback
  • Free booths at Fall Career Expo and IEEE Career Fair
  • Professional Development Hours for ESIC weekly seminars
  • Optional Tutorials by Faculty Experts
  • Dedicated Industry Liaison
Support for Power Engineering Education

- Travel support for Practicum
- Power teaching lab support
- Student travel support for attending power conferences and for field trips
- ESIC PEP Scholarships
Professional Science Masters (PSM) in Electrical Power Engineering (EPE)

- Online degree program offered by ESIC
- Combination of Electrical Engineering and Engineering Management courses
- Students from all over the world
Educational Innovation

- Excellence in fundamentals of power engineering
- Mentoring, face to face
- Understanding of present and future of power engineering
- Forward looking curriculum for the future industry environment
- Hands-on-training in lab courses
- Leadership, teamwork, and project management skills
- Experience from Internships/Practicum
- Strong industry engagement in senior design projects
ESIC Power Curriculum Plans

• Pullman, Everett and Bremerton – consistency among the three programs

• All power lecture courses to be shared among the three campuses

• Access to similar teaching labs at all three campuses – New lab resources needed for Bremerton and Everett
ESIC Lab Support


• Protection Labs: State-of-the-art lab in Pullman, Bremerton and Everett – in plans

• PSE Renewables Lab – Pullman (2010)

• Power Electronics Lab – Pullman, Everett, Bremerton – in plans