# VICEROY NORTHWEST INSTITUTE FOR CYBERSECURITY EDUCATION AND RESEARCH

## CySER Virtual Seminar

**Muhammad Ismail**
**Tennessee Technological University**
*Emerging Technologies for Cyber-Physical Power System Security*
**Mar. 4, 2025, 1:10 – 2 PM Pacific**

Team Link: **Click here to join the meeting**
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## Abstract:

As cyber threats targeting power systems grow more sophisticated, emerging technologies offer new opportunities to strengthen security. In this talk, we first explore how artificial intelligence (AI) can enhance intrusion detection for cyber-physical power systems. We discuss the development of a cyber-physical testbed, the creation of comprehensive datasets, and intrusion detection systems that leverage cyber-physical fusion to improve attack detection. In the second part of the talk, we shift to quantum technologies, exploring how the classical cyber layer of a power system can be upgraded to support semi-quantum key distribution. We examine the strategic deployment of quantum servers and fiber links to ensure a target key generation rate, offering insights into the transition toward quantum-secure power grids. By bridging AI-driven cyber-physical security with quantum-enhanced cryptographic resilience, this seminar highlights innovative approaches to safeguarding modern power systems against evolving threats.

## Bio:

Muhammad Ismail is the Director of the Cybersecurity Education, Research, and Outreach Center (CEROC) and Associate Professor of Computer Science at Tennessee Tech University. As the Principal Investigator (PI) for over $10 million in grants and Senior Personnel in an additional $10 million grant, Dr. Ismail specializes in the applications of AI and quantum information science in cybersecurity, with a focus on critical infrastructure and cyber-physical systems. Dr. Ismail oversees a dynamic research team of 23 students, comprising 12 Ph.D., 4 M.Sc., and 7 undergraduates, and has mentored numerous alumni, including 6 Ph.D. and 9 M.Sc. graduates. His team led the development of several cyber-physical testbeds at Tennessee Tech for power systems, smart manufacturing, and unmanned aerial vehicles. Dr. Ismail has co-authored more than 200 peer-reviewed publications, garnering over 4,500 citations, with an h-index of 38. His work has received seven best paper awards at international and IEEE conferences. He served as an associate editor for IEEE Internet-of-Things Journal and IEEE Transactions on Vehicular Technology and currently contributes to IEEE's Task Force on Quantum Computing in Power Systems.

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