

## SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING  
COLLEGE OF DESIGN AND ENGINEERING  
Website: <https://cde.nus.edu.sg/ece>

**Area: Power and Energy Systems (PES)**

**Host: Prof Dipti Srinivasan**

**This seminar is co-organized by GEMS, ECE, NUS and IEEE Power & Energy (PES) Chapter Singapore.**

<b>TOPIC</b>	:	<b>Defending the Digital Grid: Mitigating Cyber-Physical Attacks via System Physics, Machine Learning, and AI</b>
<b>SPEAKER</b>	:	<b>Dr Shantanu Chakrabarty Senior Research Fellow, NUS</b>
<b>DATE</b>	:	<b>Tuesday, 31 March 2026</b>
<b>TIME</b>	:	<b>7:00PM-8:30PM</b>
<b>VENUE</b>	:	<b>E3-06-01, Block E3, National University of Singapore</b>

### ABSTRACT

As power systems transition into highly interconnected, cyber-physical systems, the attack surface for malicious attackers or actors has grown exponentially. This lecture provides a comprehensive overview of the evolving landscape of smart grid cybersecurity, through recently documented research on both vulnerabilities and mitigation strategies.

This lecture will dissect sophisticated cyber-physical attacks targeting power system controls, such as the False Data Injection (FDI) attacks, command injection attacks, and other SCADA system compromises, with an emphasis on how they bypass traditional Bad Data Detection (BDD). Furthermore, we will explore the evolution of defense strategies, which would cover topics such as machine learning based detection, physics informed intrusion detection, and how these schemes are deployable to build an intrusion detection systems for the modern control layer.

Finally, the lecture will highlight the emerging research frontiers, focusing on Artificial Intelligence (AI) and Large Language Models (LLMs). The discussion will cover how AI is weaponized to orchestrate sophisticated attacks, while simultaneously exploring how grid operators can leverage the power of LLMs to fortify the next-generation smart grids, against sophisticated attacks.

### BIOGRAPHY

Dr. Shantanu Chakrabarty is a Senior Research Fellow (SRF) at the Department of Electrical and Computer Engineering at the National University of Singapore (NUS). Holding a Ph.D. in Electrical Engineering from the Indian Institute of Science (IISc) Bangalore, he combines rigorous academic background with industry R&D experience, including his previous tenure as a Senior Research Scientist in Cyber Special Ops at the NCS Group.

His primary research focuses on developing secure, data-driven defense frameworks to protect critical smart grid infrastructure and Operational Technology (OT) against sophisticated cyber-physical threats. Specifically, he conducts research on attack modeling and intrusion detection for transmission system control devices, such as FACTS, to enhance grid resilience during cyber-incidents.

Dr. Chakrabarty has published his methodologies in peer-reviewed journals, including IEEE Transactions on Smart Grid and IEEE Transactions on Power Systems. Actively bridging the gap between theoretical research and applied engineering, he has developed interactive cyber-attack training simulations for industry professionals at the Singtel Cyber Security Institute and co-teaches coursework on Power Systems in NUS.

<https://cde.nus.edu.sg/ece/highlights/events/>