IITB-Monash Research Academy

Indian Institute of Technology Bombay | MONASH University

An Indian-Australian research partnership

Project Title:	**Cybersecurity of Wind Power Plant**	
Project Number	**IMURA1256**	
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IITB Department:		

Research Clusters:

Highlight which of the Academy's CLUSTERS this project will address?
*(Please nominate JUST **one.** For more information, see www.iitbmonash.org)*

1	*Material Science/Engineering (including Nano, Metallurgy)*
2	***Energy, Green Chem, Chemistry, Catalysis, Reaction Eng***
3	*Math, CFD, Modelling, Manufacturing*
4	***CSE, IT, Optimisation, Data, Sensors, Systems, Signal Processing, Control***
5	*Earth Sciences and Civil Engineering (Geo, Water, Climate)*
6	*Bio, Stem Cells, Bio Chem, Pharma, Food*
7	*Semi-Conductors, Optics, Photonics, Networks, Telecomm, Power Eng*
8	*HSS, Design, Management*

Research Themes:

Highlight which of the Academy's Theme(s) this project will address?
(Feel free to nominate more than one. For more information, see www.iitbmonash.org)

1	***Artificial Intelligence and Advanced Computational Modelling***
2	*Circular Economy*
3	***Clean Energy***
4	*Health Sciences*
5	*Smart Materials*
6	***Sustainable Societies***
7	*Infrastructure*

The research problem

Renewable energy is being integrated rapidly with ambitious targets of renewable energy integration set at national/regional level. Wind power is one of the front runners among available renewable energy sources. However, as the penetration of renewable generation increases, the impact on power system dynamics is becoming increasingly apparent and will become a more integral part of system planning and renewables integration studies. One such emerging, yet critical impact is cybersecurity risk. With the rise of digital and quantum technologies power system including in wind farms has introduced significant cybersecurity risks. These risks could potentially lead to system disruptions, data breaches, and even physical damage to critical infrastructure. This project aims to assess the cybersecurity landscape of wind farms and propose effective measures to safeguard these critical assets from cyber quantum threats.

Project aims

The project aims to:

1. Identify key cybersecurity risks in wind turbine generator (WTG) and wind power plant (WPP)
2. Literature and market survey of cybersecurity standards and cybersecurity attacks as well as quantum-vulnerable systems on power system with focus on WPPs and WTGs
3. Propose technical countermeasures/solutions for cybersecurity of WTG and WPP
4. Develop key recommendations/interventions/guidelines for response to cybersecurity attacks to WTG and WPP including recovery from cybersecurity attack, transition to quantum-safe mechanisms, and continuous monitoring.
5. Develop a quantum-safe cybersecurity framework for WTGs and WPPs

What is expected of the student when at IITB and when at Monash?

Highlight how the project will gain from the students stay at IITB and at Monash

Expected outcomes

Highlight the expected outcomes of the project

The expected outcomes are:

- A report on major cybersecurity risks and quantum-vulnerabilities in wind turbine generator (WTG) and wind power plant (WPP)
- Guidelines for response to cybersecurity attacks to WTG and WPP including recovery from cybersecurity attack and continuous monitoring.
- Technical solutions and practical transition-to-quantum-safe frameworks for cybersecurity of WTG and WPP including risk mitigation strategies, monitoring tools, and response protocols.
- A quantum-safe cybersecurity framework for WTGs and WPPs

Capabilities and Degrees Required

A highly motivated applicant with background in Electrical Power engineering/IT/Computer Science and strong commitment to quality research. Master's in electrical power or computer science or related area is preferred, however, an outstanding undergraduate applicant will also be considered.

Necessary Courses

Name three tentative courses relevant to the project that the student should complete during his/her coursework at IITB (the student will require to secure 8 point in these courses)

Potential Collaborators

Please visit the IITB website www.iitb.ac.in OR Monash Website www.monash.edu to highlight some potential collaborators that would be best suited for the area of research you are intending to float.

Select up to **(4)** keywords from the Academy's approved keyword list **(available at http://www.iitbmonash.org/becoming-a-research-supervisor/)** relating to this project to make it easier for the students to apply.