

# RESEARCH PROPOSAL FOR PhD Advisory Committee

## Smart Grid Security

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# 1 Introduction

The electrical power grid is a massive interconnected network which delivers electricity from source to consumers and has been a vital energy supply [1]. Most of the world relies on electrical network which is built 50 or 60 years ago. These are inefficient and cannot offer prompt response to the today's urgent global challenges. This poses an imminent need for a low carbon, clean and efficient system. Smart grid will be a necessary enabler for this transition. Smart grid is an intelligent, digitized electrical infrastructure that delivers power to our homes and businesses. The modernization of the existing electrical system has enhanced customers' and utilities' ability to monitor, control, and predict energy use [2]. The smart grid envisioned by engineers and researchers is expected to address major problems including the demand response, dynamic pricing, integration of renewable re-sources and security control [3].

The smart grid concept aims to enhance the electric power grid's security, reliability and efficiency through two-way communication of consumption data and dynamic optimization of electric-system operations, network maintenance, and network planning[4]. The smart grid allows close interaction and inter-operation of the transmission and distribution grid through digital and information technology. Because of this, there is an increased possibility of cyberattacks and cascade failures propagating from one system to another[4].

Smart grid security is of utmost importance to maintain stable and reliable power system operation during the contingency situation when any critical power system component fails [5]. Ensuring a secured smart grid involves with a less possibility of power grid collapse or equipment malfunction. The lack of the proper 'security measures' could lead to a major blackout may occur which can even lead to a cascading failure [5].

## 2 Objectives

In recent years, smart grid security is gaining widespread interest due to its need for smooth and efficient functioning of the smart grid. The past decade has witnessed several cyber-related attacks on the electrical power grid which have raised the question regarding the security vulnerabilities and its significant impact on the critical power system infrastructure[5].

The prime goal of this research work is to propose a novel approach which emphasizes on a combination of run-time enforcement with non-linear system identification to solve smart grid security issues. The main objectives are as follows:-

- To investigate the major applications of run-time enforcement and non-linear system identification
- Develop a run-time enforcement with non-linear system identification algorithm to ensure the security of the smart grid .

### **3 Methodology**

The primary research method for this study is literature review and learning some of the available approaches to mitigate cyber-physical attacks on smart grid.

### **4 Conclusion**

Cyber security is very critical for the reliable and secured operation of a smart grid infrastructure[5].

# Bibliography

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