

Initial Plan - Security and Vulnerability In Grid Management

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Module Title – Individual Project

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Project Description

Grid solutions' software is a niche market with only a few companies in the world that offer software and hardware solutions for the monitoring, control, and distribution of the electrical power system such as ABB, SIEMENS, GE, OSI, Schneider Electric etc. These companies offer solutions such as Energy Management Systems, Distribution Management Solutions, Supervisory Control and Data Acquisition (SCADA) systems, Grid Analytics, Wide Area Management Systems etc. Most countries in the world use these services for their energy grid, those that do not, are either building the infrastructure needed to have one or are bidding to have one in place.

While there is plenty of research related to smart grid, very little is about security in wide-area management. For this project's purpose, I will be focusing on Wide Area Management Systems (WAMS). WAMS leverage synchronised high-resolution data from phasor measurement units (PMUs) to monitor and improve the performance of transmission and distribution networks. WAMS provides readings and insights which can reveal information about stability, system security and efficiency, enabling Operators, Analysts and Planners to respond rapidly, accurately, and appropriately to system conditions. WAMS are transforming how power systems are operated around the world by utilising time-synchronised, high-resolution measurements of the electricity system.

The aim is to explore the security and vulnerability of data transfer and storage, the impact of moving from traditional UI to open-source online interface, security and exposure of the software solution and propose a possible solution.

Project Aims and Objectives

This project explores the security and vulnerability in the data transfer, storage, and the impact of moving from traditional UI to open-source online interface. This research is also aimed at looking into the security and vulnerability of the WAMS software solution and propose a possible solution. On the technical side, I will be carrying out an analysis of the software. The research is in two section

- Security in the grid management system (WAMS)
 - Introduction to WAMS
 - WAMS components
 - Data storage (physical and cloud servers)
 - WAMS Software & User interface
- The vulnerability of the WAMS by analysing the software using a pen-testing tool. However, this depends on getting access to the WAMS software from the companies. If it is not possible to get the software, then I have to create a simulation of the process.

Work Plan

- Start the project - February.
 - Send request of WAMS trial software to companies such as GE, Siemens, ABB and OSI
 - Arrange meeting with the companies that responds
- Research - February to March
 - Security in grid management systems
 - WAMS components and data storage
 - Data transfer in synchrophasor
 - Meeting with supervisor to discuss progress.
 - Find a suitable pen testing software for the analysis.
 - Start the literature review.
 - Explain the research method used.
- Analysis – March to April
 - Run analysis on the grid management software without data set.
 - Meeting with supervisor to discuss any issue encountered or alternatives.
 - Run analysis on the grid management software with data set.
 - Compile the result of the analysis.
 - Meeting with supervisor to discuss any issue.
- Report - April to May
 - Introduction to the project
 - Finish literature review
 - Meeting with supervisor
 - Finish the methodology used in the research.
 - Document the result of the analysis.
 - Meeting with supervisor
 - Explain the result and their implications.
 - Write the conclusion of the project.

Contingency plan

Due to this research's content, the analysing section of the activity plan listed above is subjected to having software from one or three of the companies to carry out analyses on the software. Alternatively, I will be creating a simulation on how the process (design and implementation)works to cover this project's technical aspect which will be around 4 to 5weeks as indicated in the project plan below.

legend describing the charting follows.

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