



Title Proposal in Computational Science

CSEL 303

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BSCS 3A-IS



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Proposed Title	Power Grid Failures Simulation and Blackout Prediction in Laguna
Objectives of the research	<ol style="list-style-type: none">1. To analyze patterns and causes of blackouts in some places in Laguna.2. To simulate real-life scenarios that lead to power grid failures.3. To examine how factors such as weather conditions affect the reliability of power grids.4. To find ways to predict blackouts before they happen.5. To suggest solutions that can help prevent power interruptions.
Research Question(s) (if any) <i>What would you like to find out from the research?</i>	<ol style="list-style-type: none">1. What are the main reasons for blackouts in Laguna?2. How do aging infrastructure, high electricity demand, and extreme weather conditions such as storms and typhoons contribute to power failures?3. Is it possible to predict blackouts before they happen?4. What improvements can be made to the power grid to prevent frequent outages?5. How can residents, businesses and schools better prepare for power failures?
Rationale/Background/ Justification <i>Why have you chosen this topic?</i>	<p>Some places in Laguna such as Calumpang Liliw, Nagcarlan, and Lumban are experiencing unexpected power outages and it is a constant struggle. Schools face classes interruptions, businesses lose revenue, and households are left without basic necessities. These blackouts happen for different reasons, for example, aging infrastructure, high electricity demand, and extreme weather conditions like typhoons that damage power lines. But most of the time, people don't get any warning before the power goes out, making it hard to prepare. This project will simulate different causes of power failures, predict when and where blackouts might happen, and explore ways to prevent them. By having knowledge about the patterns behind power outages, we can come up with solutions to make the electricity supply more stable and reliable.</p>
Methodology <i>How are you going to carry out your research?</i>	<ul style="list-style-type: none">• Nature of Data and Information Since collecting real-time data on power grid failures and infrastructure costs isn't practical, this proposal project will rely mainly on existing data from various sources.• Sources<ol style="list-style-type: none">1. Power Grid Reports – Official reports from local electric cooperatives and distribution companies about past blackouts and system issues.



	<p>2. Government Publications – Data from agencies like the Department of Energy and National Electrification Administration on power regulations, infrastructure, and outage records.</p> <p>3. Weather and Disaster Reports – Historical storm and climate data from PAGASA and other meteorological sources to analyze how extreme weather affects the grid.</p> <p>4. Research Studies – Published articles and case studies on power grid reliability, machine learning for blackout prediction, and disaster impact assessments.</p> <ul style="list-style-type: none">• Data Analysis<ol style="list-style-type: none">1. Data Collection: Gather reports on past blackouts, weather conditions, and power grid issues.2. Simulation: Use Python to create models of different blackout scenarios, such as grid overloading, equipment failure, and storm-related outages.3. Analysis: Study the data to identify blackout trends and warning signs.4. Prediction Model: Apply machine learning to forecast blackout risks based on past occurrences.5. Solution Development: Test different methods, such as improving infrastructure or setting up backup systems, to find effective ways to prevent blackouts.6. Evaluation: Assess the proposed solutions and refine them based on results.• Visualization<ol style="list-style-type: none">1. Statistical and Graphical Analysis – Using statistics and visual analysis to spot trends in blackouts, infrastructure failures, and weather patterns.2. Predictive Modeling – Applying machine learning to identify risk factors and forecast when and where outages might happen.• Present Findings<ol style="list-style-type: none">1. Breaking down why blackouts happen, what the weak points in the system are, and what regulations are in place.2. Looking at how similar regions manage power grid stability and whether their solutions could work here.
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	3. Proposing practical solutions, from infrastructure upgrades to better preparedness strategies for communities, schools, and businesses.
Expected Outcome <i>What is the outcome that you anticipate?</i>	We want to understand why blackouts happen in Calumpang Liliw by identifying key causes like infrastructure problems, high electricity demand, and extreme weather conditions. Using a simulation model, we will predict and analyze blackout risks to find weak points in the power grid. We will base on our analysis and will suggest practical solutions to improve grid stability and study the power failures. At the same time, we aim to raise awareness among residents, schools, and businesses, equipping them with strategies to better prepare for and respond to power failures. In the long run, we want to develop sustainable solutions to make the power supply more reliable and resilient.
References	https://company.meralco.com.ph/taxonomy/term/214 https://newsinfo.inquirer.net/2021645/parts-of-qc-laguna-to-have-power-interruptions-jan-6-8-9 https://www.gmanetwork.com/news/topstories/metro/915201/power-interruptions-in-ncr-laguna-cavite-quezon-bulacan-from-july-31-aug-2/story/