

# Incipient Fault Detection Using Waveform Analysis

<b>Project type:</b>	<input checked="" type="checkbox"/> Semester project	<input checked="" type="checkbox"/> MSc thesis	<input checked="" type="checkbox"/> Internship
<b>Project responsible (email):</b>	<a href="mailto:mayank.nagendran@zaphiro.ch">mayank.nagendran@zaphiro.ch</a>		
<b>Project description and objectives:</b>			
<p>This project focuses on identifying incipient faults in power systems through detailed waveform analysis. Incipient faults are low magnitude, developing anomalies that may precede permanent faults. Early identification can significantly improve system reliability and reduce maintenance costs. The project aims to investigate state-of-the-art methods waveforms for detecting such conditions, and propose an improved detection technique, and validate its effectiveness through simulations.</p>			
<b>Tasks:</b>			
<p>Semester Project:</p> <ul style="list-style-type: none"> <li>• Perform a literature survey on waveform-based incipient fault detection methods in both transmission and distribution systems.</li> <li>• Identify key challenges and gaps in existing techniques.</li> <li>• Develop an algorithm to detect and characterize incipient faults</li> </ul> <p>Thesis will also include:</p> <ul style="list-style-type: none"> <li>• Implement the algorithm in MATLAB or Python.</li> <li>• Validate the proposed method through simulation studies and performance assessment.</li> <li>• Validate the developed method through case studies in Power Factory and evaluate the performance.</li> </ul>			
<b>Required skills:</b>			
<ul style="list-style-type: none"> <li>• Background in electrical or power systems engineering.</li> <li>• Knowledge of power system protection and fault analysis.</li> <li>• Experience with MATLAB or Python,</li> <li>• Experience with DIgSilent Power Factory is a bonus.</li> <li>• Strong analytical, problem-solving, and debugging skills.</li> <li>• Ability to understand technical literature and produce clear technical reports.</li> </ul>			
<b>Other benefits and/or compensation:</b>			
Depending on the final project type, scope and deliverables, Zaphiro may consider providing additional adequate compensation.			
<b>About Zaphiro:</b>			
<p>Zaphiro is an innovative smart grid company based in Lausanne, Switzerland, and Milan, Italy, that was founded in 2017 as a spin-off from EPFL and is backed by well renowned international groups such as ABB and CDP Ventures.</p> <p>Our product, SynchroGuard, is the first distribution grid monitoring &amp; automation system based on D-PMU (Distribution-Phasor Measurement Unit) technology, specifically designed to easily retrofit distribution substations and integrate with existing control room solutions (e.g., SCADA, DMS). SynchroGuard helps utilities increase grid observability, particularly in presence of high DER penetration, and improve grid resiliency by reducing the impact of blackouts on their consumers.</p>			