**Partial Discharge (PD) Detection Project Plan**

**Main Objective:**

* Using machine learning methods to detect Partial Discharge signal and trying to do the PD classification. The plan may change during the process.

**Background:**

* PD is defined as “A localized electrical discharge that only partially bridges the insulation between conductors and which can or cannot occur adjacent to a conductor.” The detection of PD can help to indicate the real source of the defect.
* PD often occur at high voltage and their occurrence are related to electrical signal phase. As a result, a PRPD (Phase Resolved Partial Discharge) pattern diagram is widely analyzed to identify different types of PD.

**Approaches:**

* In this project, we will try to interpret the PRPD diagram as an image. One approach is to use Convolutional Neural Network (CNN). The image array will be used as input to train the CNN. The advantages of this approach are it doesn’t need any expert knowledge and feature extraction process.
* Alternatively, using traditional method such as Support Vector Machine with image feature extraction is also feasible. In addition, this approach will take less time to classify PD. As a result, I will research and try out this approach as well.
* Another direction is to interpret the PRPD diagram as a graph with traditional machine learning method to achieve the classification of PD. We will be using graph theory to interpret the PRPD diagram. For example, the (x,y) coordinates will be regarded as nodes. There are some references and papers working on this direction, so I will research on this and compare the pros and cons with the image interpretation direction.

**Weekly Plan (2022-2023 Semester 1):**

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| Time | Content |
| 9.12 – 9.16 (week 6) | PD background comprehensive and Image feature extraction research |
| 9.19 – 9.23 (week 7) | PD background comprehensive and Image feature extraction research |
| 9.26 – 9.30 (recess week) | Try on CNN approaches and record result |
| 10.3 – 10.7 (week 8) | Try on CNN approaches and record result |
| 10.10 – 10.14 (week 9) | Research on how to do SVM with image feature extraction |
| 10.17 – 10.21 (week 10) | Research on how to do SVM with image feature extraction |
| 10.24 – 10.28 (week 11) | Implement the SVM approaches with new feature extraction |
| 10.31 – 11.4 (week 12) | Implement the SVM approaches with new feature extraction |
| 11.7 – 11.11 (week 13) | Organize Interim report |