

Fault detection in Ion Pumps at the European XFEL

Friday 8 December 2023 12:48 (12 minutes)

Large-scale scientific facilities like European XFEL are complex and include multiple subsystems that work in coordination to generate high-quality scientific output. Any fault within such a subsystem can result into downtime for the entire facility, with a significant impact in the scientific output. It is therefore, fundamental to detect problems or unexpected behaviour in components well in advance, allowing for timely interventions and efficient maintenance planning, instead of unplanned activities which stress support personnel. However, monitoring a large number of process variables is often too complex for human observation, which struggle to discern hidden anomalies. The usage of machine learning and data-driven techniques can be instrumental in extracting invaluable insights. We present a case-study, in which faulty patterns in ion pump pressure data are identified. We explore Support Vector Machines (SVM) and Convolutional Neural Networks (CNN) to classify data obtained from multiple ion pumps installed at European XFEL.

Primary author: MAJID, Amna (Eur.XFEL (European XFEL))

Co-authors: FERREIRA DE LIMA, Danilo Enoque (Eur.XFEL (European XFEL)); GELISIO, Luca (European XFEL)

Presenter: MAJID, Amna (Eur.XFEL (European XFEL))

Session Classification: Session II