Stavanger ESREL SRA-E 2025

Special Session Proposal

Title:

Domain Adaptation Methods for Prognostics and Health Management (PHM) and Predictive Maintenance

Organizer(s):

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Description:

The deployment to industry of Artificial Intelligence-based models for Prognostics and Health Management (PHM) and Predictive Maintenance faces practical challenges like the lack of labelled data (i.e., data recognized as representative of specific, known degradation and fault states), and the variability of operating conditions and system configurations during equipment life. This challenges AI-based models as training and test data do not follow the same distribution, come from the same input feature space (defined by the same signals) and contain the same labels.
Domain Adaptation (DA) can contribute to addressing these challenges by transferring information from a source domain (of training) to another target domain (of testing), overcoming the domain shift, e.g. due to different operating conditions.
This special session accepts contributions on theoretical and practical advancements in DA for prognostics and health management and predictive maintenance. Main topics are (but not limited to):

Methods:

- Adversarial DA
- Weight Transfer
- Feature Space Alignment
- Domain-Invariant Feature Learning
- Self-Training and Pseudo-Labeling
- Contrastive learning for DA
- Multi-Source DA
- Metric-Based DA

Applications

- Signal Validation
- Anomaly Detection
- Fault Diagnostics
- Fault Prognostics
- Predictive Maintenance
- Signal Prediction