

# Applying intelligent multi-agents to reduce false alarms in wind turbine monitoring systems

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## Abstract-

This study proposes a method for improving the capability of a data-driven multi-agent system (MAS) to perform condition monitoring and fault detection in industrial processes. To mitigate the false fault-detection alarms, a co-operation strategy among software agents is proposed because it performs better than the individual agents. Few steps transform this method into a valuable procedure for improving diagnostic certainty. First, a failure mode and effects analysis are performed to select physical monitoring signals of the industrial process that allow agents to collaborate via shared signals. Next, several artificial neural network (ANN) models are generated based on the normal behavior operation conditions of various industrial subsystems equipped with monitoring sensors. Thereafter, the agents use the ANN-based expected behavior models to prevent false alarms by continuously monitoring the measurement samples of physical signals that deviate from normal behavior. Finally, this method is applied to a wind turbine. The system and tests use actual data from a wind farm in Spain. The results show that the collaboration among agents facilitates the effective detection of faults and can significantly reduce false alarms, indicating a notable advancement in the industrial maintenance and monitoring strategy.

**Index Terms-** multi-agent systems (MAS); artificial neural networks (ANN); false alarm problem; condition monitoring; wind turbines

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