VehicleGuardian

AI-Enhanced Centralized Online Health Monitoring and Remaining Useful Life Prediction for Vehicle Engine Cooling Systems

Surveillance centralisée de l'état de santé en ligne améliorée par l'IA et prévision de la durée de vie utile restante pour les systèmes de refroidissement des moteurs de véhicules

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## The Invention

Problems:
➤ Vehicle overheating is one of the common causes for breakdowns whilst in traffic.
➤ The current method relies on regular inspection, which requires experienced engineers and wastes manpower.

Solution, Novelty and Impact
➤ The world's first AI-powered centralized online bus engine cooling system health monitoring system has been developed.
➤ Ensemble methods in machine learning for anomaly detection.
➤ Machine learning-based approach for Remaining Useful Life (RUL) prediction.
➤ Provides an early warning before engine cooling system failure.
➤ Enabled predictive maintenance.
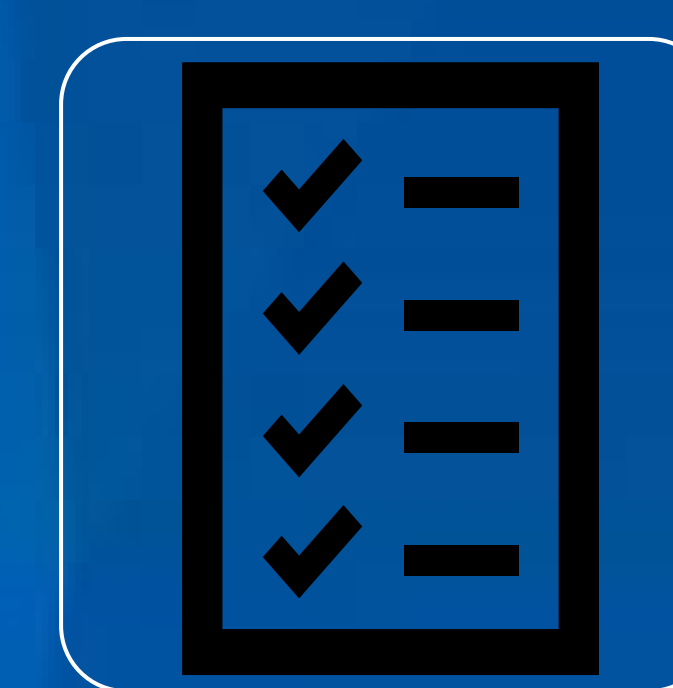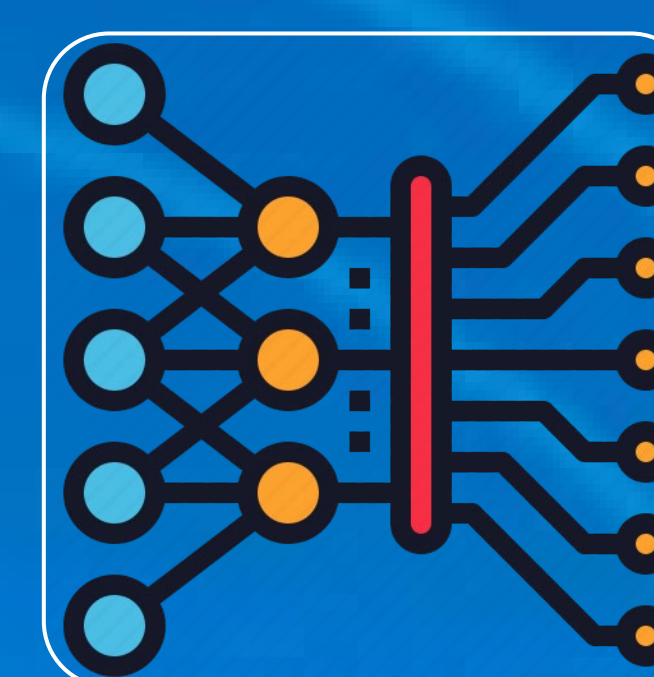
Data Inputs: Cooling Performance Indicators
• Coolant Temperature
• Fuel Rate
• Air Temperature
• Fan Speed
• Engine Turn

AI Methods: PoF + Ensemble of Multiple DDM
• MLP-AE,
• OC-SVM,
• OC-ELM,
• Isolation Forest

Health index classification for RUL prediction

Solution Output:
The world's first centralized online bus engine cooling system health monitoring system

Commercialization:
The system has been installed on 10 Bravo buses in service for monitoring the health condition of the engine cooling system.

Achieved Outcomes:
✓ Reliable detection of anomalies (case studies had been successfully run on 10 buses in current service).
✓ Enhanced management of maintenance schedules and required manpower.

Patent details
Title: System and Method Of Anomaly Detection Of Thermostat in a Vehicle.
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