AI-Driven Computational Method Patent Specification

PATENT SPECIFICATION

1. IDENTIFICATION OF INVENTION

1 Title of Invention: Adaptive Machine Learning Predictive Maintenance Algorithm for Industrial Systems

2 Inventors:

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- Michael Chen

- Dr. Alexander Petrov

3 Assignee: Nexus Intelligent Systems, Inc., a Delaware corporation

2. TECHNICAL FIELD

1 This invention relates to an advanced computational method for predictive maintenance utilizing artificial intelligence and machine learning techniques, specifically designed for complex industrial infrastructure and enterprise-scale operational systems.

2 The invention provides a novel algorithmic approach to:

- Anticipate potential equipment failures

- Optimize maintenance scheduling

- Reduce operational downtime

- Minimize maintenance costs through intelligent predictive modeling

3. BACKGROUND OF THE INVENTION

1 Existing Technological Limitations

Traditional predictive maintenance approaches suffer from:

- Static predictive models

- Limited contextual understanding

- High false-positive rates

- Inability to adapt to dynamic operational environments

2 Current Industry Challenges

Industrial sectors including manufacturing, energy, and transportation face significant economic losses due to:

- Unexpected equipment failures

- Inefficient maintenance protocols

- Lack of real-time diagnostic capabilities

4. DETAILED DESCRIPTION OF THE INVENTION

1 Core Algorithmic Architecture

The invention comprises a multi-layered machine learning framework characterized by:

- Adaptive neural network configuration

- Real-time sensor data integration

- Probabilistic failure prediction modeling

- Continuous learning and recalibration mechanisms

2 Technical Components

a) Data Acquisition Layer

- Multi-source sensor input processing

- Standardized data normalization protocols

- High-frequency signal interpretation

b) Predictive Modeling Layer

- Ensemble machine learning algorithms

- Dynamic weight adjustment

- Contextual anomaly detection

c) Decision Support Layer

- Probabilistic failure risk assessment

- Recommended maintenance intervention strategies

- Economic impact simulation

5. CLAIMS

1 Primary Claims

We claim an innovative computational method for:

- Generating predictive maintenance recommendations

- Utilizing adaptive machine learning algorithms

- Processing complex industrial sensor datasets

- Providing real-time operational risk assessments

2 Unique Methodological Claims

- Continuous model self-calibration

- Cross-domain knowledge transfer

- Probabilistic failure prediction with >92% accuracy

6. TECHNICAL SPECIFICATIONS

1 Computational Requirements

- Minimum Processing Power: 128 CPU cores

- Minimum RAM: 512 GB

- Recommended GPU Acceleration: NVIDIA Tesla V100

- Cloud/Edge Computing Compatible

2 Data Processing Capabilities

- Input Bandwidth: 10 Gbps

- Latency: <50 milliseconds

- Concurrent Data Stream Handling: 1000+ simultaneous inputs

7. PATENT LIMITATIONS AND EXCLUSIONS

1 The described method explicitly excludes:

- Manual intervention models

- Static predictive frameworks

- Non-adaptive learning mechanisms

2 Geographical Limitations

Patent protection sought in:

- United States

- European Union

- China

- Japan

8. LEGAL DISCLAIMERS

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9. SIGNATURE BLOCK

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