Patent Application for Neural Network Architecture

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UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application Submission

Applicant: Nexus Intelligent Systems, Inc.

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1. TECHNICAL FIELD

1 This patent application relates to an innovative neural network architecture specifically designed for predictive maintenance and diagnostic modeling in industrial automation systems, with particular applicability to complex machinery and infrastructure monitoring environments.

2. BACKGROUND OF THE INVENTION

1 Existing predictive maintenance technologies have demonstrated significant limitations in:

- Real-time signal processing accuracy
- Adaptive learning capabilities
- Cross-domain pattern recognition
- Computational efficiency for large-scale industrial deployments

2 Current machine learning approaches typically require extensive manual feature engineering and suffer from high false-positive rates in anomaly detection scenarios.

3. SUMMARY OF THE INVENTION

1 The present invention introduces a novel neural network architecture characterized by:

- Dynamically adaptive layer reconfiguration
- Probabilistic inference modeling
- Quantum-inspired computational optimization
- Integrated multi-modal sensor fusion capabilities

2 Key Technical Innovations:

- Self-calibrating neural network topology
- Reduced computational overhead
- Enhanced predictive accuracy across diverse industrial environments
- Scalable machine learning infrastructure

4. DETAILED DESCRIPTION

1 Architectural Components

The proposed neural network architecture comprises:

- Adaptive input normalization layer
- Quantum-probabilistic inference modules
- Dynamic feature extraction networks
- Contextual learning optimization engines

2 Operational Methodology

The system operates through a multi-stage processing framework:

a) Sensor data ingestion

b) Probabilistic signal preprocessing

c) Contextual pattern recognition

d) Predictive maintenance recommendation generation

5. CLAIMS

1 The inventors claim:

- A neural network architecture for predictive maintenance
- A method of dynamically reconfiguring machine learning models
- A system for multi-modal sensor data integration and interpretation

6. TECHNICAL SPECIFICATIONS

1 Computational Requirements

- Minimum Processing Capacity: 128 CUDA cores
- Memory Requirement: 32 GB RAM

- Recommended GPU: NVIDIA Tesla V100

2 Sensor Integration Protocols

- Compatible with standard industrial communication protocols
- Support for IoT and edge computing environments
- Real-time data streaming capabilities

7. PATENT DRAWINGS

Detailed technical diagrams illustrating the neural network architecture are incorporated by reference and will be submitted as supplementary materials.

8. LEGAL DISCLAIMERS

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2 Unauthorized reproduction, distribution, or disclosure is strictly prohibited.

9. SIGNATURES

Inventors:

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Executed: January 22, 2024

Location: San Francisco, California

10. CERTIFICATION

The undersigned hereby certifies that the foregoing description and claims represent a genuine and novel technological innovation.