

PATENT APPLICATION

United States Patent and Trademark Office

Application No.: 17/482,391

Filing Date: September 15, 2023

Applicant: Summit Digital Solutions, Inc.

Inventors: Michael Chang, Dr. Robert Martinez, James Henderson

EDGE COMPUTING IMPLEMENTATION SYSTEM AND METHOD FOR ENTERPRISE IoT NETWORKS

FIELD OF INVENTION

[0001] The present invention relates generally to distributed computing systems, and more particularly to methods and systems for implementing edge computing architectures in enterprise Internet of Things (IoT) networks with dynamic resource allocation and predictive maintenance capabilities.

BACKGROUND

[0002] Enterprise IoT deployments face significant challenges related to latency, bandwidth consumption, and real-time processing requirements. Traditional cloud-centric architectures cannot adequately address these challenges in industrial and manufacturing environments where millisecond response times are critical.

[0003] Existing solutions fail to provide adequate methods for intelligent workload distribution between edge nodes and cloud resources while maintaining system reliability and security. Furthermore, current implementations lack sophisticated predictive maintenance capabilities that can prevent system failures before they occur.

SUMMARY OF THE INVENTION

[0004] The present invention provides systems and methods for implementing an intelligent edge computing architecture that optimizes resource allocation and enables predictive maintenance in enterprise IoT networks. The invention includes:

- A distributed edge computing framework with dynamic resource allocation

- Machine learning-based predictive maintenance algorithms
- Secure data transmission protocols between edge nodes and cloud infrastructure
- Automated failover and recovery mechanisms
- Real-time analytics processing at the edge

DETAILED DESCRIPTION

[0005] The system comprises multiple edge computing nodes deployed across an enterprise network, each equipped with:

Local processing units capable of executing containerized workloads

Embedded machine learning models for anomaly detection

Secure communication modules with encryption capabilities

Local storage for temporary data retention

Resource monitoring and allocation systems

[0006] The method includes the following steps:

Initial deployment and configuration of edge nodes

Continuous monitoring of system performance metrics

Dynamic workload distribution based on resource availability

Predictive maintenance scheduling using ML algorithms

Automated incident response and recovery procedures

CLAIMS

What is claimed is:

A method for implementing edge computing in enterprise IoT networks, comprising:

- a) deploying distributed edge computing nodes;
- b) implementing machine learning-based predictive maintenance;
- c) establishing secure communication channels;
- d) executing dynamic resource allocation;
- e) performing automated incident response.

The method of claim 1, wherein the predictive maintenance comprises:

- a) collecting real-time performance metrics;
- b) analyzing historical failure patterns;
- c) generating maintenance schedules;
- d) executing preventive actions.

A system for edge computing implementation, comprising:

- a) multiple edge computing nodes;
- b) machine learning processors;
- c) secure communication modules;
- d) resource allocation controllers;
- e) automated recovery systems.

[Claims 4-20 continue with additional technical details]

ABSTRACT

An edge computing implementation system and method for enterprise IoT networks is disclosed. The invention provides intelligent workload distribution and predictive maintenance capabilities through distributed edge computing nodes equipped with machine learning capabilities. The system optimizes resource allocation while maintaining security and reliability in industrial environments.

DRAWINGS

[0007] The patent application includes the following drawings:

- FIG. 1: System Architecture Diagram
- FIG. 2: Edge Node Components
- FIG. 3: Resource Allocation Flowchart
- FIG. 4: Predictive Maintenance Process
- FIG. 5: Security Protocol Implementation

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Signed this 15th day of September, 2023

/s/ Michael Chang

Michael Chang

Chief Technology Officer

Summit Digital Solutions, Inc.

/s/ Dr. Robert Martinez

Dr. Robert Martinez

Chief Innovation Officer

Summit Digital Solutions, Inc.

/s/ James Henderson

James Henderson

Chief Digital Officer

Summit Digital Solutions, Inc.

POWER OF ATTORNEY

The undersigned hereby appoints the registered patent attorneys of WILSON SONSINI GOODRICH & ROSATI, Registration No. 24,531, with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith.

/s/ Dr. Alexandra Reeves

Dr. Alexandra Reeves

Chief Executive Officer

Summit Digital Solutions, Inc.

Date: September 15, 2023