PATENT SPECIFICATION

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UNITED STATES PATENT APPLICATION NO. 16/78

Title: SYSTEM AND METHOD FOR EXTREME WEATHER COMMU

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ABSTRACT

A system and method for maintaining reliable communication betwee mobile robots operating in extreme cold weather conditions. The syst a multi-layered communication architecture utilizing temperature-hard transceivers, redundant mesh networking protocols, and adaptive sig processing algorithms specifically designed for sub-zero environment invention enables consistent robot-to-robot and robot-to-infrastructure communication in temperatures as low as -40 C while maintaining pos accuracy within 1.5cm.

BACKGROUND OF THE INVENTION

[0001] Autonomous mobile robots operating in cold storage and indus environments face unique challenges in maintaining reliable wireless communication. Traditional communication systems experience signif degradation in extreme cold, including signal attenuation, component and reduced battery performance.

[0002] Existing solutions have failed to adequately address the combi challenges of signal interference from ice crystallization, reduced semiconductor performance in sub-zero temperatures, and the need f reliable data transmission in mission-critical industrial applications.

SUMMARY OF THE INVENTION

[0003] The present invention provides a novel approach to maintainin

communication in extreme cold environments through:

- Temperature-compensated signal processing
- Self-healing mesh network architecture
- Cold-resistant hardware components
- Adaptive power management
- Real-time environmental monitoring and adjustment

DETAILED DESCRIPTION

[0004] System Architecture

The system comprises three primary components:

BlueCore(TM) Communication Module

- Temperature-hardened transceiver array
- Proprietary signal processing unit
- Environmental monitoring sensors
- Backup power system

Mesh Network Infrastructure

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Redundant node configuration

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Auto-routing capabilities

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Load balancing algorithms

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Failure detection and recovery

Central Control System

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Network management interface

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Performance monitoring

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System diagnostics

- Remote configuration capabilities

[0005] Signal Processing

The system employs novel signal processing techniques including:

- Adaptive frequency modulation based on temperature conditions
- Dynamic power adjustment algorithms
- Error correction optimized for cold-weather interference patterns
- Real-time signal quality monitoring and adjustment

[0006] Hardware Specifications

Key hardware components are rated for operation between -40 C and

including:

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Custom-designed circuit boards with thermal compensation

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Cold-resistant battery systems

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Reinforced antenna arrays

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Temperature-stable oscillators

CLAIMS

A system for maintaining communication between autonomous robots

a) A temperature-hardened communication module;

b) A self-healing mesh network architecture;

c) Environmental monitoring sensors;

d) Adaptive signal processing algorithms.

The system of claim 1, wherein the communication module maintains

The system of claim 1, wherein the mesh network automatically recon

A method for maintaining robot-to-robot communication in cold storag

a) Monitoring environmental conditions;

b) Adjusting signal parameters based on temperature;

c) Implementing redundant communication paths;

d) Managing power consumption based on conditions.

[Claims 5-20 omitted for brevity]

DRAWINGS

[Reference is made to accompanying drawings Figures 1-8]

DECLARATION AND POWER OF ATTORNEY

I hereby declare that I believe I am the original inventor of the subject
which is claimed and for which a patent is sought; that I have reviewe
understand the contents of the above-identified specification, includin
claims; and that I acknowledge the duty to disclose to the Office all
information known to me to be material to patentability as defined in 3
1.56.

Dated: March 15, 2022

Inventor Signatures:

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ASSIGNMENT

The inventors hereby assign all right, title, and interest in this patent

application to Polar Dynamics Robotics, Inc., a Delaware corporation.

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