

PATENT SPECIFICATION

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BLUECORE(TM) SYSTEM ARCHITECTURE

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ABSTRACT

A system architecture for autonomous mobile robots operating in extreme environments, comprising a thermally-isolated navigation core, distributed

temperature sensors, and an adaptive power management system capable of maintaining operational stability in sub-zero conditions.

BACKGROUND OF THE INVENTION

[001] This invention relates to autonomous mobile robot systems designed for operation in extreme temperature environments, particularly sub-zero settings such as cold storage warehouses and freezer facilities.

[002] Conventional autonomous mobile robots face significant operational challenges in cold environments, including reduced battery performance, compromised sensor functionality, and mechanical stress on components. Existing solutions fail to adequately address these challenges in a comprehensive manner.

SUMMARY OF THE INVENTION

[003] The BlueCore(TM) System Architecture provides a novel approach to

extreme condition robotics through a multi-layered thermal management system that is fully integrated with core navigational and operational components.

[004] The invention comprises:

- a) A thermally-isolated central processing unit
- b) Distributed temperature monitoring network
- c) Adaptive power management system
- d) Cold-resistant sensor array
- e) Thermal compensation algorithms

DETAILED DESCRIPTION

[005] The BlueCore(TM) architecture employs a proprietary thermal isolation chamber (TIC) housing critical navigation and processing components. The system maintains optimal operating temperatures through:

[006] 1.3 Active thermal regulation using phase-change materials

[007] 2. Multi-layer insulation system with vacuum-sealed barriers

[008] 3. Smart heat distribution network

[009] 4. Redundant temperature monitoring

[010] 5. Predictive thermal management

[011] The distributed sensor network includes:

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Temperature sensors (accuracy 0.1 C)

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Humidity monitors

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Pressure sensors

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Motion detection array

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Proximity sensors

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LiDAR systems modified for cold environments

CLAIMS

A system for autonomous mobile robot operation in sub-zero environments

a) A thermally-isolated processing core maintaining internal temperatures between

10 C and 30 C while operating in ambient temperatures down to -40 C

b) An adaptive power management system incorporating cold-resistant power management technology

c) A distributed sensor network with thermal compensation

d) Real-time environmental monitoring and adjustment capabilities

The system of claim 1, wherein the thermal isolation chamber comprises

- a) Multiple layers of vacuum-sealed insulation
- b) Phase-change material heat reservoirs
- c) Active thermal management controls
- d) Redundant temperature monitoring systems

The system of claim 1, further comprising machine learning algorithms

- a) Predictive thermal management
- b) Power optimization
- c) Navigation adjustment based on environmental conditions
- d) Component stress monitoring

DRAWINGS

[012] Figure 1: System Architecture Overview

[013] Figure 2: Thermal Isolation Chamber Cross-section

[014] Figure 3: Sensor Distribution Diagram

[015] Figure 4: Power Management Flow

[016] Figure 5: Control System Architecture

INVENTORS

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LEGAL REPRESENTATION

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GOVERNMENT RIGHTS

[017] This invention was made without government support.

PRIOR ART REFERENCES

US Patent 10,234,567

US Patent 10,456,789

US Patent 10,789,012

EP Patent 3,456,789

FIELD OF INVENTION

[018] International Patent Classification (IPC):

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B25J 9/16 (Program-controlled manipulators)

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G05D 1/02 (Autonomous navigation systems)

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H02J 7/00 (Circuit arrangements for battery charging)

The foregoing description of various embodiments of the invention has been presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed.

[END OF PATENT SPECIFICATION]

