POLAR NAVIGATION SAFETY PROTOCOL PATENT

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ABSTRACT

A system and method for autonomous mobile robot navigation in extre
environments, comprising a temperature-hardened sensor array, cold
processing unit, and proprietary safety protocols for operation in sub-z

conditions. The invention enables reliable robotic navigation and collis

avoidance in environments below -30 C while maintaining operational

standards.

TECHNICAL FIELD

[0001] The present invention relates to autonomous mobile robot navi

systems, specifically addressing safety protocols and hardware config

for operation in extreme cold environments including industrial freezer

storage facilities, and temperature-controlled warehouses.

BACKGROUND

[0002] Conventional autonomous mobile robots face significant opera

challenges in sub-zero environments, including sensor degradation, b

performance issues, and navigation inaccuracies. Existing solutions fa

adequately address the unique safety requirements of cold-environme

[0003] Prior art solutions typically employ standard navigation protoco
designed for ambient temperature environments, leading to reduced r
and increased safety risks when deployed in extreme cold conditions.

SUMMARY OF THE INVENTION

[0004] The present invention provides a novel approach to autonomou
in extreme cold environments through:

a) Temperature-hardened sensor arrays utilizing proprietary BlueCore
technology

b) Cold-resistant processing units with thermal management systems

c) Adaptive safety protocols responding to environmental temperature

d) Redundant collision avoidance systems optimized for cold-weather

DETAILED DESCRIPTION

Sensor Array Configuration

[0005] The invention comprises a multi-modal sensor array including:

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Thermally-protected LiDAR sensors

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Temperature-compensated infrared cameras

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Ultrasonic sensors with cold-resistant housings

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Proprietary thermal management system

Processing Unit Specifications

[0006] The cold-resistant processing unit features:

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Operating temperature range: -40 C to +50 C

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Redundant processing cores

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Self-diagnostic capabilities

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Real-time temperature monitoring and compensation

Safety Protocol Implementation

[0007] The navigation safety protocol implements:

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Dynamic speed adjustment based on environmental conditions

Enhanced stopping distance calculations for cold surfaces

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Multi-layer collision prevention algorithms

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Emergency shutdown procedures specific to cold environments

CLAIMS

A method for autonomous mobile robot navigation in sub-zero enviror

a) Deploying temperature-hardened sensor arrays

b) Implementing cold-environment safety protocols

c) Utilizing thermal management systems

d) Maintaining operational safety standards below -30 C

The method of claim 1, wherein the safety protocols include:

a) Real-time temperature monitoring

b) Adaptive navigation parameters

c) Enhanced collision avoidance measures

d) Emergency response procedures

A system for implementing the method of claim 1, comprising:

a) BlueCore(TM) processing unit

b) Multi-modal sensor array

c) Thermal management components

d) Safety protocol software suite

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GOVERNMENT INTERESTS

[0008] This invention was made without government support.

PRIOR ART REFERENCES

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US Patent 10,XXX,XXX

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US Patent Application 2020/XXXXXXX

EP Patent 3,XXX,XXX

DRAWINGS

[0009] FIG. 1 illustrates the sensor array configuration

[0010] FIG. 2 shows the thermal management system layout

[0011] FIG. 3 depicts the safety protocol decision tree

[0012] FIG. 4 presents performance data in various temperature cond

CERTIFICATION

I hereby certify that this patent document accurately represents the in

as claimed and meets all requirements for patent submission under 3

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