

PATENT APPLICATION

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UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 17/482,391

Filing Date: September 15, 2023

Applicant: Polar Dynamics Robotics, Inc.

TITLE OF INVENTION

BlueCore(TM) Temperature Regulation System for Autonomous Mobile Robots

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Application No. 63/281,549, filed March 22, 2023.

FIELD OF THE INVENTION

[0002] The present invention relates generally to thermal management of autonomous mobile robots, and more particularly to an advanced temperature regulation system for maintaining optimal operating conditions in extreme environments.

BACKGROUND

[0003] Autonomous mobile robots operating in sub-zero environments face significant challenges related to battery performance, sensor reliability, and mechanical system functionality. Existing solutions fail to adequately address the comprehensive thermal management needs of robotic systems in

conditions.

SUMMARY OF THE INVENTION

[0004] The present invention provides a novel temperature regulation system for autonomous mobile robots operating in cold environments. The BlueCore system comprises an integrated network of thermal sensors, active heating elements, and predictive temperature management algorithms that work in concert to maintain optimal operating conditions for critical robot components.

DETAILED DESCRIPTION

[0005] The BlueCore(TM) Temperature Regulation System includes:

- a) A distributed network of precision temperature sensors (minimum 10 sensors) strategically positioned throughout the robot chassis;
- b) Proprietary thermal management algorithms that:

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Monitor real-time temperature data across all sensor nodes

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Predict thermal requirements based on operational parameters

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Optimize power consumption for heating elements

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Maintain temperature-sensitive components within specified ranges

c) Active heating elements comprising:

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Carbon fiber heating matrices integrated into critical component housings

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Variable-output solid-state heating controllers

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Thermally-conductive interface materials

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Multi-zone temperature control capabilities

[0006] The system maintains operating temperatures between -40 C and 60 C, consuming less than 15% of total robot power capacity.

CLAIMS

A temperature regulation system for autonomous mobile robots comprising:

- a) A plurality of distributed temperature sensors;
- b) At least one processor configured to execute thermal management algorithms;
- c) Multiple independently-controlled heating elements;
- d) A power management subsystem for optimizing thermal control energy consumption.

The system of claim 1, wherein the thermal management algorithms:

- a) Process real-time temperature data;
- b) Generate predictive thermal models;
- c) Control heating element activation patterns;
- d) Optimize power utilization across operating zones.

The system of claim 1, further comprising:

- a) Thermal interface materials with conductivity >5 W/mK;
- b) Zone-specific temperature maintenance capabilities;
- c) Fail-safe thermal protection mechanisms.

[Claims 4-20 continued in subsequent filing]

ABSTRACT

A temperature regulation system for autonomous mobile robots opera

extreme cold environments. The system comprises distributed temperature sensors, predictive thermal management algorithms, and active heating elements to maintain optimal operating conditions while minimizing power consumption. This invention enables reliable robot operation in sub-zero environments through intelligent thermal control of critical components.

INVENTORS

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POWER OF ATTORNEY

The undersigned hereby appoints Wilson & Roberts LLP, Registration
to prosecute this application and transact all business in the Patent and
Trademark Office connected therewith.

DECLARATION

I hereby declare that I am the original inventor of the subject matter w
claimed and for which a patent is sought. I have reviewed and unders
contents of this application and acknowledge my duty to disclose infor
material to patentability.

Executed on: September 15, 2023

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Dr. Elena Frost, Ph.D.

CEO & Co-founder

Polar Dynamics Robotics, Inc.

VERIFICATION

State of Delaware

County of Kent

Subscribed and sworn to before me this 15th day of September, 2023

—

Jane Smith

Notary Public

My Commission Expires: 12/31/2025

