POLAR NAVIGATION ALGORITHM V2.1 PATENT DOCUMENTATION

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Patent Application No.: US 16/842,391

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Assignee: Polar Dynamics Robotics, Inc.

1. TECHNICAL FIELD

The present invention relates to navigation systems for autonomous m
(AMRs) operating in extreme cold environments, specifically concerni
and systems for maintaining precise positional accuracy in

temperature-controlled facilities operating at or below -30 C.

2. BACKGROUND

2.1 Prior Art Limitations

Conventional AMR navigation systems experience significant degrada

extreme cold environments due to:

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Sensor performance deterioration below -20 C

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Battery capacity reduction affecting computational resources

-

Signal interference from frost accumulation

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Mechanical constraints on moving components

2.2 Technical Problem

The invention addresses the critical need for reliable autonomous nav
sub-zero industrial environments where traditional SLAM (Simultaneo
Localization and Mapping) algorithms fail to maintain acceptable accu
levels.

3. INVENTION SUMMARY

3.1 Core Innovation

The Polar Navigation Algorithm v2.1 comprises a novel approach to a
navigation incorporating:

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Temperature-compensated sensor fusion

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Adaptive computational load management

- Proprietary cold-environment calibration protocols
- Real-time environmental condition monitoring

3.2 Technical Advantages

The invention delivers:

- Operational reliability at temperatures down to -40 C
- Position accuracy within 2cm at full operational speed
- 97% reduction in navigation errors compared to standard systems
- 60% improvement in computational efficiency

4. DETAILED DESCRIPTION

4.1 System Architecture

The navigation system consists of:

Primary sensor array with thermal compensation

Secondary validation sensors

Environmental monitoring subsystem

Core processing unit with adaptive resource allocation

Proprietary BlueCore(TM) integration layer

4.2 Algorithm Components

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NavigationCore {
```

SensorFusion = f(T , humidity, frostindex)

PathPlanning = adaptivecompute(availablepower)

PositionValidation = dualreference(primary, secondary)

ErrorCorrection = continuouscalibration(envconditions)

}

```

### 4.3 Implementation Methods

The system employs:

-

Distributed sensor processing

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Multi-threaded validation protocols

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```

Dynamic resource allocation

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Environmental condition compensation

5. CLAIMS

A method for autonomous navigation in sub-zero environments compr

a) Temperature-compensated sensor fusion

b) Adaptive computational resource management

c) Environmental condition monitoring

d) Real-time calibration adjustments

The method of Claim 1, wherein temperature compensation includes:

a) Sensor performance scaling

b) Power consumption optimization

c) Frost accumulation compensation

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

[Claims 3-20 intentionally omitted for brevity]

6. INTELLECTUAL PROPERTY RIGHTS

6.1 Ownership

All intellectual property rights, including but not limited to patents, trad
secrets, and related improvements described herein are owned exclu
Polar Dynamics Robotics, Inc.

6.2 Confidentiality

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7. CERTIFICATION

The undersigned hereby certifies that:

They are authorized representatives of Polar Dynamics Robotics, Inc.

The information contained herein is true and accurate

This invention represents novel and non-obvious advancement in the

8. EXECUTION

POLAR DYNAMICS ROBOTICS, INC.

By:

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Date: March 15, 2021

9. LEGAL NOTICES

9.1 Patent Pending

This invention is patent pending. All rights reserved. Any unauthorized reproduction, or implementation of the described technology may result action.

9.2 Jurisdiction

This patent documentation shall be governed by and construed in acc

United States patent law and the laws of the State of Delaware.

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