SOURCE CODE REGISTRATION CERTIFICATE

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SUB-ZERO NAVIGATION SOFTWARE PLATFORM

Registration No. SC-2023-PDR-0142

FILED WITH THE U.S. COPYRIGHT OFFICE

Registration Date: November 15, 2023

Effective Date of Registration: November 15, 2023

1. IDENTIFICATION OF REGISTERED WORK

1. **Title of Work**: "Sub-Zero Navigation Software Platform v4.2.1" (t

2. **Alternative Titles**:

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BlueCore(TM) Navigation System

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PDR Cold Environment Navigation Platform

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Sub-Zero AMR Control Software

3. **Nature of Authorship**:

Computer program comprising source code, algorithms, and related d

for autonomous mobile robot navigation in extreme cold environments

2. AUTHOR INFORMATION

1. **Corporate Author**:

Polar Dynamics Robotics, Inc.

Delaware Corporation

EIN: 82-4731590

2. **Contributing Authors**:

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Development Team Lead: Marcus Chen

-

Principal Software Architects: Dr. James Barrett, Dr. Elena Frost

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Senior Software Engineers: Work made for hire by employees

3. COPYRIGHT CLAIMANT

1. **Claimant**:

Polar Dynamics Robotics, Inc.

4200 Arctic Way, Suite 300

Boston, MA 02110

2. **Transfer Statement**:

By operation of law and written agreement, all rights, title, and interes
the Software have been transferred to Claimant.

4. LIMITATION OF CLAIM

1. **Previously Registered Material**:

This registration excludes previously registered material from Softwar
1.0.0 through 4.1.0 (Registration Numbers SC-2019-PDR-0023 throug
SC-2022-PDR-0139).

2. **New Material Included**:

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Enhanced cold-environment path planning algorithms

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Temperature-adaptive motion control systems

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Updated sensor fusion protocols for sub-zero operations

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Modified power management routines

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New machine learning models for obstacle avoidance

5. TECHNICAL SPECIFICATIONS

1. **Programming Languages**:

Primary: C++17

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Secondary: Python 3.9

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Supporting: CUDA, ROS 2

2. **Source Code Statistics**:

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Total Lines of Code: 847,392

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Core Navigation Modules: 312,456 lines

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Supporting Libraries: 534,936 lines

3. **Development Period**:

March 2023 - October 2023

6. CERTIFICATION

1. The undersigned hereby certifies that:

(a) The information provided in this registration application is correct t
best of the signatory's knowledge;

(b) The Software constitutes an original work of authorship;

(c) The Software has not been published as of the date of this registra

(d) All statements made in this registration application are true and co

7. PRŌPRIETARY NOTICES

1. **Copyright Notice**:

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2. **Trade Secret Notice**:

This Software contains trade secrets and proprietary information of Po
Dynamics Robotics, Inc. Any unauthorized use, disclosure, or reprodu
strictly prohibited.

8. VERIFICATION

The undersigned, being duly authorized to act on behalf of Polar Dyna
Robotics, Inc., hereby verifies that the foregoing statements are true a
accurate.

EXECUTED this 15th day of November, 2023.

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POLAR DYNAMICS ROBOTICS, INC.

**By:** _

Marcus Chen

Chief Technology Officer

ATTESTATION:

**By:** _

Victoria Wells

Chief Financial Officer

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9. FOR COPYRIGHT OFFICE USE ONLY

Registration Decision Date: November 15, 2023

Examiner: [Redacted]

Registration Number: SC-2023-PDR-0142

Effective Date: November 15, 2023

[OFFICIAL SEAL OF THE U.S. COPYRIGHT OFFICE]