AUTONOMOUS NAVIGATION TEST RESULTS - ARCTIC CONDITIONS

AUTONOMOUS NAVIGATION TEST RESULTS

Test Protocol Documentation and Performance Analysis

Polar Dynamics Robotics, Inc.

Document Reference: PDR-ANT-2023-142

Date: December 15, 2023

1. EXECUTIVE SUMMARY

This document presents the official test results and performance analy

Polar Dynamics Robotics' BlueCore(TM) Autonomous Navigation Sys

simulated arctic conditions. Testing was conducted at the Advanced C
Environment Testing Facility (ACETF) in accordance with ISO 18495:
for autonomous mobile robots in extreme environments.

2. TEST PARAMETERS

1. **Environmental Conditions**

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Temperature Range: -40 C to -15 C

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Wind Speed Simulation: 0-45 km/h

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Surface Conditions: Ice, Packed Snow, Mixed Terrain

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Visibility: Clear to White-Out Conditions

Testing Duration: 168 hours continuous operation

2. **Test Units**

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Model: PDR-AMR-X350-B

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Quantity: Three (3) production units

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Serial Numbers: X350B-2023-089, X350B-2023-090, X350B-2023-09

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Software Version: BlueCore(TM) v4.2.1

3. NAVIGATION PERFORMANCE METRICS

1. **Path Accuracy**

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Mean Deviation from Programmed Path: 2.3cm

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Maximum Recorded Deviation: 4.8cm

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Standard Deviation: 1.1cm

2. **Obstacle Detection**

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Detection Range: 0.1m to 25m

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False Positive Rate: 0.02%

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False Negative Rate: 0.001%

Response Time: 42ms average

3. **System Reliability**

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Navigation System Uptime: 99.97%

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Sensor Array Performance: 99.99%

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Communication System Stability: 99.98%

4. COLD WEATHER PERFORMANCE

1. **Power Systems**

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- Battery Performance at -40 C: 92% of rated capacity
- Charge Retention: 94% over 24 hours
- Average Power Consumption: 1.2kW/h

2. **Mechanical Systems**

- Drive Train Efficiency: 96%
- Joint Mobility: Full range of motion maintained
- Chassis Integrity: No structural deformation observed

3. **Sensor Performance**

LiDAR Accuracy: 1.2mm at -40 C

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Camera System Function: 100% operational

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Infrared Sensor Range: 98% of rated performance

5. SAFETY COMPLIANCE

1. **Emergency Systems**

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Emergency Stop Function: 100% successful across 500 trials

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Fail-Safe Activation Time: <100ms

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Backup Systems Engagement: 100% reliable

2. **Regulatory Compliance**

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ANSI/RIA R15.06-2012

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ISO 13482:2014

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IEC 61496-1:2020

6. CERTIFICATION AND VALIDATION

The undersigned hereby certify that all tests were conducted in accord
Polar Dynamics Robotics' Standard Operating Procedures and applica
standards. Results documented herein are accurate and complete.

7. LEGAL DISCLAIMERS

1. This document contains confidential and proprietary information be

2. Test results reflect performance under controlled conditions and ma

3. All technical specifications and performance metrics are subject to

8. AUTHENTICATION

Certified by:

/s/ Dr. James Barrett

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Dr. James Barrett

Chief Robotics Officer

Polar Dynamics Robotics, Inc.

Date: December 15, 2023

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Marcus Chen

Chief Technology Officer

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Date: December 15, 2023

Witnessed and Verified by:

/s/ Dr. Katherine Reynolds

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Dr. Katherine Reynolds

Lead Testing Engineer

Advanced Cold Environment Testing Facility

Certification #: ACE-2023-1142

Date: December 15, 2023