ROBOT OPERATING SYSTEM (ROS) INTEGRATION MANUAL

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NaviFloor Robotics, Inc.

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Classification: CONFIDENTIAL

1. INTRODUCTION AND SCOPE

1. This Robot Operating System (ROS) Integration Manual ("Manual")

2. This Manual applies to all Company autonomous mobile robots (AM

2. DEFINITIONS

1. "ROS Framework" means the open-source Robot Operating Syster

2. "NS-MANS" means the Company's proprietary NaviFloor Multi-Surf

3. "Integration Components" means all software modules, APIs, and r

3. PROPRIETARY RIGHTS AND LICENSING

1. All Integration Components developed by the Company are protect

2. The ROS Framework components utilized within the Company's sy

4. TECHNICAL INTEGRATION REQUIREMENTS

1. System Architecture Requirements

a) All ROS nodes must implement the Company's secure communica
(NaviSecure(TM))

b) Integration must maintain compatibility with ROS Noetic or newer v

c) All custom messages must follow the Company's standardized mes
format

2. Safety Critical Components

a) Emergency stop functionality must remain independent of ROS lay

b) Redundant safety systems must maintain direct hardware control p

c) Safety-critical functions must implement watchdog timers with maxi
timeout

5. COMPLIANCE AND CERTIFICATION

1. All ROS integrations must maintain compliance with:

a) ISO/TS 15066:2016 for collaborative robots

b) IEC 61508 for functional safety

c) Company's Internal Safety Standard NS-ISS-2023

2. Integration testing and certification must be performed by Company

6. SECURITY PROTOCOLS

1. All ROS nodes must implement:

a) AES-256 encryption for inter-node communication

b) Certificate-based authentication for node registration

c) Secure boot verification for all ROS components

2. Security audit logs must be maintained in accordance with Section

7. PERFORMANCE REQUIREMENTS

1. System Performance Metrics

a) Maximum latency: 50ms for critical path operations

b) Minimum update rate: 100Hz for navigation stack

c) Maximum CPU utilization: 65% under normal operations

2. Error Handling

a) All ROS nodes must implement the Company's standard error reco

b) System must maintain degraded operation capabilities during partia failures

8. MAINTENANCE AND UPDATES

1. Regular maintenance procedures must include:

a) Monthly ROS dependency validation

b) Quarterly security patch applications

c) Semi-annual full system validation

2. Version Control Requirements

a) All ROS packages must use semantic versioning

b) Integration Components must maintain backward compatibility for t
versions

9. LEGAL DISCLAIMERS

1. NO WARRANTY. THIS MANUAL IS PROVIDED "AS IS" WITHOU

2. LIMITATION OF LIABILITY. IN NO EVENT SHALL THE COMPAN

10. EXECUTION AND ACKNOWLEDGMENT

The undersigned acknowledges receipt and understanding of this Ma
to comply with all requirements contained herein.

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NAVIFLOOR ROBOTICS, INC.

**By:** _

Name:

Title:
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Date:

RECIPIENT:

By: _

Name:

Title:

Date:

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