TIVE NAVIGATION ALGORITHM FOR AUTONOMOUS FLOOR CLEANING RO

ADAPTIVE NAVIGATION ALGORITHM FOR

PROPRIETARY & CONFIDENTIAL

NaviFloor Robotics, Inc.

Document Version: 3.2

Last Updated: January 11, 2024

1. OVERVIEW AND SCOPE

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1. This document describes the proprietary adaptive navigation algorithm ("A

2. The Algorithm incorporates machine learning models, sensor fusion techn

2. TECHNICAL SPECIFICATIONS

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1. Core Components

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Multi-layer terrain mapping system utilizing LiDAR point cloud data

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Dynamic obstacle avoidance with predictive modeling

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Surface-type classification neural network

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Real-time trajectory optimization engine

Adaptive cleaning pattern generator

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2. Key Features

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Simultaneous Localization and Mapping (SLAM) with accuracy of ±2cm

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Multi-surface adaptation for up to 12 distinct surface types

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Real-time path recalculation at 60Hz

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Energy optimization through intelligent route planning

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Fleet coordination capabilities for up to 50 simultaneous units

3. INTELLECTUAL PROPERTY PROTECTION

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1. Patent Protection

The Algorithm is protected under the following patent applications:

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U.S. Patent Application No. 16/789,432 (filed March 18, 2022)

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PCT Application No. PCT/US2022/028976

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European Patent Application No. EP22786543.2

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Japanese Patent Application No. 2022-157893

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2. Trade Secret Protection

Critical components of the Algorithm, including specific parameter tuning methodologies and machine learning model architectures, are maintained as t secrets under Company's Trade Secret Protection Program (Document ID: TSP-2022-003).

4. LICENSING AND USAGE RIGHTS

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1. The Algorithm is exclusively owned by NaviFloor Robotics, Inc. and may

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2. Current licensing structure:

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Internal use license for Company products

Limited evaluation license for approved partners

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Commercial deployment license for authorized OEMs

5. TECHNICAL IMPLEMENTATION

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1. Software Architecture

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Core algorithm implemented in C++ with CUDA acceleration

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ROS2 integration layer for robot control

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Python-based configuration and testing framework

- Proprietary sensor fusion middleware

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2. Hardware Requirements

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Minimum computing specifications:

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- ARM64 or x86_64 processor at 2.5GHz

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- 8GB RAM

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- Dedicated GPU with 4GB VRAM

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Required sensors:

- 360° LiDAR scanner (minimum 16 channels)
- Depth cameras (minimum 2)
- IMU with 9-axis sensing

6. PERFORMANCE METRICS

- 1. Validated Performance
- 99.8% surface coverage accuracy
- 95% first-pass cleaning effectiveness

Mean time between failures (MTBF): 2,000 hours

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Average path optimization improvement: 23% vs. baseline

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2. Environmental Parameters

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Operating temperature range: -10°C to 45°C

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Humidity tolerance: 10% to 90% non-condensing

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Maximum slope capability: 15 degrees

7. CONFIDENTIALITY AND SECURITY

1. All aspects of the Algorithm are classified as Tier 1 Confidential Informat

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2. Access to Algorithm documentation and source code requires:

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Signed NDA (Form NDA-2023-R2)

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Security clearance level Alpha or higher

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Two-factor authentication for digital access

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Physical access restrictions to development environments

8. CERTIFICATION AND COMPLIANCE

1. The Algorithm has been certified for:

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ISO/IEC 27001:2013 compliance

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CE marking requirements

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UL 1740 Safety Standard for Robots and Robotic Equipment

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RoHS compliance for embedded systems

9. VERSION CONTROL

This document is maintained under version control in the Company's secure

document management system. All modifications must be approved by the C

Technology Officer and Chief Legal Officer.

10. AUTHORIZATION

APPROVED AND ADOPTED by NaviFloor Robotics, Inc.

By:

Dr. Marcus Depth

Chief Technology Officer

Date: January 11, 2024

By:

Elena Kovacs, Ph.D.

Chief Research Officer

Date: January 11, 2024