AUTOMATED CLEANING PATH OPTIMIZATION ALGORITHM

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PROPRIETARY & CONFIDENTIAL

NaviFloor Robotics, Inc.

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1. OVERVIEW AND SCOPE

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1. This document describes the proprietary Automated Cleaning Path Optimi

2. The Algorithm encompasses the computational methods, mathematical mo

2. TECHNICAL SPECIFICATIONS

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1. Core Components

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Dynamic path planning engine utilizing modified A* algorithm

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Real-time surface condition analysis module

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Multi-sensor fusion processing framework

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Adaptive coverage pattern generator

Obstacle avoidance system with predictive modeling

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2. Input Parameters

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LiDAR point cloud data (minimum 16-channel)

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Surface texture classification metrics

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Real-time friction coefficient measurements

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Environmental condition sensors data

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Historical cleaning effectiveness data

3. Output Specifications

- Optimized cleaning path vectors
- Surface-specific speed and pressure adjustments
- Coverage verification mapping
- Performance metrics and efficiency calculations

3. INTELLECTUAL PROPERTY PROTECTION

- 1. Patent Status

U.S. Patent Application No. 17/234,567 (pending)

- PCT International Application PCT/US2023/012345

- European Patent Application EP23456789.0

- 2. Trade Secret Protection

The Algorithm includes proprietary methods and implementations that are maintained as trade secrets, including:

- Surface classification neural network architecture

- Terrain adaptation coefficients

Path optimization weighting functions

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Performance prediction models

4. IMPLEMENTATION REQUIREMENTS

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1. Hardware Requirements

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Minimum processor: ARM Cortex-A72 or equivalent

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Required memory: 8GB RAM

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Storage: 128GB SSD

Sensor suite: NaviFloor Standard Configuration v2.0 or higher

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2. Software Dependencies

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NaviFloor Core Framework v4.5+

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ROS2 Humble or newer

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CUDA 11.0+ for GPU acceleration

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Custom NaviFloor libraries (NFLib v3.2+)

5. SECURITY MEASURES

1. Access Control

- Role-based access control (RBAC) implementation
- Multi-factor authentication for administrative access
- Encrypted storage of algorithm parameters
- Audit logging of all access and modifications

2. Data Protection

- AES-256 encryption for stored parameters

TLS 1.3 for data in transit

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Secure boot verification

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Tamper detection mechanisms

6. USAGE RESTRICTIONS

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1. The Algorithm may only be used on authorized NaviFloor hardware platfo

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2. Any attempt to extract, copy, or transfer the Algorithm or its components t

7. MAINTENANCE AND UPDATES

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1. Regular Updates

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Quarterly parameter optimization

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Monthly security patches

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Bi-annual major version releases

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2. Version Control

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Git-based source control

Automated build and test pipeline

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Change log maintenance

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Release validation protocol

8. COMPLIANCE AND CERTIFICATION

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1. The Algorithm has been certified compliant with:

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ISO/IEC 27001:2013

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IEC 61508 SIL 2

CE marking requirements

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UL 1740 Safety Standard

9. LEGAL NOTICES

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2. CONFIDENTIALITY NOTICE: This document contains proprietary and

10. DOCUMENT CONTROL

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