

NAVIFLOOR PATH PLANNING ALGORITHM SPECIFICATION

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Classification: CONFIDENTIAL AND PROPRIETARY

1. INTRODUCTION

This Algorithm Specification ("Specification") describes the proprietary path planning algorithms developed by NaviFloor Robotics, Inc. ("NaviFloor").

in its Autonomous Mobile Robot ("AMR") fleet management system. The system is protected under U.S. and international intellectual property laws.

2. DEFINITIONS

1. "Algorithm" means the NaviFloor Dynamic Path Planning System (NaviFloor DPPP).
2. "Navigation Stack" refers to the complete software architecture implemented on the AMR platform.
3. "Terrain Map" means the three-dimensional spatial representation of the environment used for navigation.
4. "System" means the complete NaviFloor AMR platform incorporating the Navigation Stack and the AMR hardware.

3. ALGORITHM ARCHITECTURE

1. Core Components

- - 2 -

Multi-layer terrain analysis engine

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Dynamic obstacle avoidance processor

-

Real-time path optimization calculator

-

Surface coefficient analyzer

-

Fleet coordination middleware

2. Input Parameters

-

LiDAR point cloud data (minimum 32-channel)

-

Depth sensor fusion matrix

-

Surface texture classification data

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Real-time fleet position vectors

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Environmental condition metrics

4. FUNCTIONAL SPECIFICATIONS

1. Terrain Analysis

The Algorithm shall process incoming sensor data at minimum 60Hz t

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Surface classification maps

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Traversability indices

-

Friction coefficients

-

Elevation gradients

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Dynamic obstacle positions

2. Path Planning

The Algorithm shall compute optimal paths considering:

-

Multiple surface transitions

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Variable friction zones

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Dynamic obstacle fields

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Fleet traffic patterns

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Energy efficiency metrics

3. Performance Requirements

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Maximum latency: 50ms

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Minimum update rate: 20Hz

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Path accuracy: 5cm

-

Surface classification confidence: 95%

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Collision avoidance buffer: 500mm

5. PROPRIETARY METHODS

1. Surface Adaptation

The Algorithm employs NaviFloor's proprietary Marine-Derived Surface (MDSA) technology, incorporating:

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Adaptive friction modeling

-

Dynamic surface categorization

-

Real-time coefficient adjustment

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Multi-modal sensor fusion

2. Fleet Coordination

Implements NaviFloor's protected Fleet Harmony Protocol(TM) for:

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Distributed path optimization

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Traffic flow management

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Resource allocation

-

Collision avoidance

6. IMPLEMENTATION REQUIREMENTS

1. Hardware Requirements

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Minimum processor: Intel i7 or equivalent

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RAM: 16GB minimum

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Storage: 256GB SSD

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GPU: NVIDIA RTX 3060 or better

2. Software Dependencies

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NaviFloor Core Framework v4.2+

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ROS2 Humble or newer

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CUDA 11.4+

-

Python 3.9+

7. SECURITY AND ACCESS CONTROL

1. The Algorithm implementation shall maintain:

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AES-256 encryption for all data in transit

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Secure boot verification

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Role-based access control

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Audit logging of all parameter modifications

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Secure key storage

2. Access Restrictions

Algorithm source code access is restricted to authorized NaviFloor personnel with signed NDAs and specific access grants from the CTO office.

8. INTELLECTUAL PROPERTY NOTICE

This Algorithm and all associated implementations are protected by U.S. Patent

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US 11,234,567 B2

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US 11,345,678 B2

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US 11,456,789 B2

Additional patents pending. All rights reserved.

9. DISCLAIMER

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10. DOCUMENT CONTROL

Approved by:

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Document Owner: Technical Documentation Team

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