NAVIGATION SOFTWARE ARCHITECTURE

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 navigation software architecture (

2. The Navigation System comprises the following core components:

a) Terrain Mapping Engine (TME)

b) Dynamic Path Planning Module (DPPM)

c) Multi-Surface Adaptation Layer (MSAL)

d) LiDAR Integration Framework (LIF)

e) Fleet Coordination System (FCS)

2. SYSTEM ARCHITECTURE

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1. Core Navigation Stack

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1.1. The Navigation System utilizes a proprietary three-tier architecture:

Perception Layer

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Planning Layer

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Execution Layer

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2. Terrain Mapping Engine

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2.1. Implements real-time 3D environment reconstruction using:

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Multi-beam LiDAR sensors

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Depth-sensing cameras

Proprietary surface classification algorithms

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2.2. Maintains dynamic obstacle maps with 10ms update frequency

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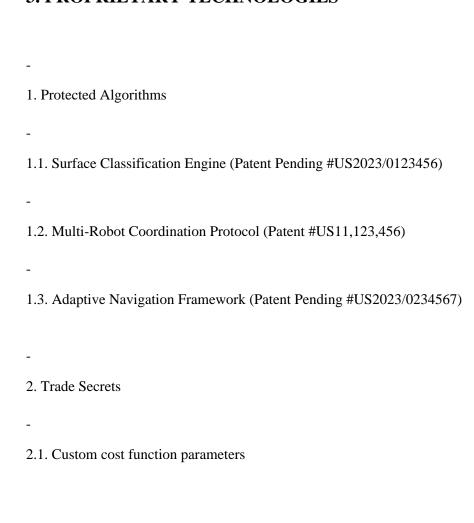2.3. Employs marine-derived SLAM algorithms for precise localization

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3. Path Planning Module

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3.1. Utilizes A* algorithm with custom cost functions

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3.2. Implements dynamic replanning at 50Hz

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3.3. Incorporates predictive collision avoidance

3. PROPRIETARY TECHNOLOGIES

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1. Protected Algorithms

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1.1. Surface Classification Engine (Patent Pending #US2023/0123456)

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1.2. Multi-Robot Coordination Protocol (Patent #US11,123,456)

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1.3. Adaptive Navigation Framework (Patent Pending #US2023/0234567)

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2. Trade Secrets

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2.1. Custom cost function parameters

2.2. Sensor fusion optimization techniques

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2.3. Fleet behavior prediction models

4. SYSTEM DEPENDENCIES

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1. Hardware Requirements

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1.1. Minimum sensor configuration:

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16-channel LiDAR

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4 depth cameras

- IMU with 200Hz sampling rate

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2. Software Dependencies

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2.1. ROS2 Humble or later

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2.2. CUDA 11.4+

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2.3. Proprietary NaviFloor Runtime Environment v2.5+

5. SECURITY MEASURES

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1. Data_Protection

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1.1. All sensor data encrypted using AES-256

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1.2. Secure boot mechanism for navigation stack

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1.3. Encrypted communication between fleet members

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2. Access Control

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2.1. Role-based access to navigation parameters

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2.2. Audit logging of all system modifications

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2.3. Secure remote update mechanism

6. INTELLECTUAL PROPERTY RIGHTS

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1. The Navigation System and all its components are the exclusive property o

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2. Protected Elements:

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2.1. Source code

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2.2. Algorithm implementations

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2.3. Configuration parameters

2.4. Documentation

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2.5. Training data

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2.6. Model weights

7. CONFIDENTIALITY

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1. This document contains trade secrets and confidential information of Navi

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2. Distribution restricted to:

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2.1. Authorized employees

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2.2. Licensed partners under NDA

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2.3. Regulatory authorities as required by law

8. CERTIFICATION

The undersigned hereby certifies that this document accurately represents the

navigation software architecture of NaviFloor Robotics, Inc. as of the date

below.

NAVIFLOOR ROBOTICS, INC.

By:

Marcus Depth

Chief Technology Officer

Date: January 11, 2024

9. DOCUMENT CONTROL

Version History:

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2 - January 11, 2024 - Updated security protocols

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1 - November 15, 2023 - Added fleet coordination system

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0 - September 1, 2023 - Major architecture revision

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1 - June 15, 2023 - Updated hardware requirements

0 - March 1, 2023 - Initial release

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