AND SYSTEM FOR REAL-TIME FLOOR SURFACE CLASSIFICATION USING LI

METHOD AND SYSTEM FOR REAL-TIME FL

Technical Description and Implementation Overview

NaviFloor Robotics, Inc.

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1. TECHNICAL OVERVIEW

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1. This document describes the proprietary method and system developed by

2. The system comprises:

a) Multiple LiDAR sensors mounted at optimized angles

b) Real-time data processing algorithms

c) Surface classification neural network

d) Terrain mapping database

e) Dynamic navigation adjustment system

2. SYSTEM ARCHITECTURE

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1. Hardware Components:

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Primary LiDAR array (Model: NF-L2000)

Secondary validation sensors

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Onboard processing unit (Custom NaviFloor Processing Module)

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Environmental sensors for calibration

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Redundant data storage systems

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2. Software Architecture:

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Proprietary surface analysis algorithm (v4.2.1)

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Machine learning classification engine

- Real-time decision matrix

- Navigation optimization module

- Error detection and correction systems

3. IMPLEMENTATION METHOD

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1. Data Acquisition:

The system employs a multi-beam LiDAR array operating at 120Hz scanning frequency, collecting point cloud data at a minimum density of 2,000 points per square meter.

2. Processing Pipeline:

a) Initial point cloud filtering

b) Surface normal calculation

c) Feature extraction

d) Classification processing

e) Navigation parameter adjustment

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3. Classification Categories:

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Smooth concrete

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Textured concrete

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Metal surfaces

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Grating

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Expansion joints

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Transitional surfaces

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Inclined surfaces

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Wet surfaces

4. PROPRIETARY ELEMENTS

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1. The following components are deemed proprietary and confidential:

a) Surface classification algorithms

b) Neural network architecture

c) Training datasets

d) Calibration methodologies

e) Error correction protocols

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2. Protected Implementation Features:

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Sensor array configuration

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Processing pipeline architecture

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Classification thresholds

Navigation adjustment parameters

5. PERFORMANCE SPECIFICATIONS

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1. System Requirements:

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Processing latency: <50ms

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Classification accuracy: >98%

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Surface type detection: 8 categories

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Minimum operating speed: 2.5 m/s

Maximum operating speed: 4.0 m/s

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2. Environmental Parameters:

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Operating temperature: 0°C to 45°C

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Humidity tolerance: 10-90% non-condensing

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Lighting conditions: 5-1000 lux

6. INTEGRATION REQUIREMENTS

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1. Hardware Integration:

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Compatible with NaviFloor AMR platforms

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Standard power supply: 24V DC

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Data interface: Gigabit Ethernet

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Sensor mounting specifications

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2. Software Integration:

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API version 2.3 or higher

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ROS2 compatibility

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Custom protocol support

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Real-time data streaming

7. INTELLECTUAL PROPERTY PROTECTION

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1. This system and all associated components are protected under:

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U.S. Patent Application No. 17/234,567

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U.S. Patent Application No. 17/234,568

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Related international patent applications

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NaviFloor trade secrets

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2. Confidentiality Requirements:

All information contained herein is strictly confidential and proprietary to NaviFloor Robotics, Inc.

8. LEGAL NOTICES

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1. This document contains confidential and proprietary information of NaviF

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9. DOCUMENT CONTROL

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10. APPROVAL

APPROVED BY:

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