ENVIRONMENTAL MAPPING AND CLASSIFICATION SYSTEM

ENVIRONMENTAL MAPPING AND CLASSIF

PROPRIETARY AND CONFIDENTIAL

NaviFloor Robotics, Inc.

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1. OVERVIEW AND SCOPE

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1. This document describes the proprietary Environmental Mapping and Clas

2. The EMCS comprises the integrated hardware and software systems, meth

2. DEFINITIONS

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1. "Environmental Data" means all spatial, topographical, surface characteris

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2. "Classification Parameters" means the defined set of environmental attribu

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3. "Navigation Mesh" means the three-dimensional representation of traversa

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4. "Surface Profile" means the detailed characterization of floor surfaces incl

3. SYSTEM ARCHITECTURE[2]

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1. Sensor Integration Layer

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Multi-beam LiDAR arrays (Model NF-L420X)

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Depth-sensing cameras (Resolution: 1920x1080, 60fps)

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Surface texture analysis sensors

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Inertial measurement units (IMU)

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2. Data Processing Layer

Real-time point cloud generation

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Surface classification algorithms

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Dynamic obstacle detection

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Environmental change tracking

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3. Classification Engine

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Machine learning-based surface identification

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Terrain complexity scoring

Navigation risk assessment

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Dynamic route optimization

4. MAPPING METHODOLOGY

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1. Initial Mapping Process

The System employs a multi-pass mapping approach:

a) Primary scan for structural elements

b) Secondary scan for surface characteristics

c) Verification scan for data validation

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2. Classification Categories

Environment elements are classified into:

- Static structural elements
- Semi-permanent fixtures
- Dynamic obstacles
- Restricted zones
- Preferred navigation paths

3. Update Protocols

Continuous background mapping during normal operation

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Scheduled comprehensive remapping

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Event-triggered partial remapping

5. PROPRIETARY ALGORITHMS

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1. Surface Analysis Algorithm (Patent Pending, App. No. 16/234,567)

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Multi-layer surface characterization

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Friction coefficient calculation

- Load-bearing capacity assessment
- Wear pattern recognition

- 2. Dynamic Navigation Mesh Generation
- Real-time mesh updates
- Predictive path planning
- Collision avoidance optimization
- Multi-robot coordination

6. DATA MANAGEMENT AND SECURITY

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1. Storage Requirements

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Local edge processing units

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Encrypted cloud backup

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Version control system

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Delta update management

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2. Access Controls

Role-based access system

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Audit logging

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Change tracking

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Data retention policies

7. INTEGRATION SPECIFICATIONS

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1. Hardware Requirements

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Minimum sensor configuration

- Processing unit specifications

- Network infrastructure requirements

- Power supply specifications

- 2. Software Integration

- API documentation

- Communication protocols

- Data format specifications

Error handling procedures

8. INTELLECTUAL PROPERTY PROTECTION

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1. All components of the EMCS, including but not limited to algorithms, met

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2. Any improvements, modifications, or derivatives of the EMCS developed

9. COMPLIANCE AND CERTIFICATION

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1. The EMCS has been certified to meet:

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ISO/TS 15066:2016 (Robots and robotic devices)

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IEC 61508 (Functional Safety)

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CE marking requirements

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ANSI/RIA R15.06-2012

10. DISCLAIMER AND LIMITATION OF LIABILITY

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1. The EMCS is provided "as is" without warranty of any kind, either expres

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2. NaviFloor Robotics, Inc. shall not be liable for any direct, indirect, incide

AUTHENTICATION

This document is maintained under version control and is considered valid o
in its electronic form with digital signature verification.

Approved by:

Dr. Elena Kovacs

Chief Research Officer

NaviFloor Robotics, Inc.

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