OBSTACLE CLASSIFICATION SYSTEM FOR INDOOR ROBOTS

OBSTACLE CLASSIFICATION SYSTEM FOR

PROPRIETARY AND CONFIDENTIAL

NaviFloor Robotics, Inc.

Document No.: IP-2023-0147

Last Updated: December 15, 2023

1. SYSTEM OVERVIEW

1. This document describes the proprietary obstacle classification sys

2. The System comprises both hardware and software components th

2. TECHNICAL SPECIFICATIONS

1. **Sensor Array Configuration**

-

Primary LiDAR sensor: NaviSense(TM) Model NS-450i

-

Secondary depth sensors: 4x TerrainMap(TM) TD-200 units

-

Ultrasonic proximity sensors: 8x NaviSonic(TM) US-100 units

-

Resolution: 0.5cm at 5m range

-

Scanning frequency: 40Hz

2. **Classification Categories**

The System classifies obstacles into the following proprietary categori

-

Static permanent (structural elements)

-

Static temporary (pallets, equipment)

-

Dynamic slow (human workers, forklifts)

-

Dynamic fast (automated vehicles)

-

Suspended objects (overhead obstacles)

3. PROPRIETARY ALGORITHMS

1. **Core Processing Pipeline**

The System employs the following proprietary algorithms:

-

RapidScan(TM) point cloud processing

-

DeepClass(TM) neural network classification

-

PathPred(TM) trajectory prediction

-

NaviCore(TM) decision engine

2. **Performance Metrics**

-

Classification accuracy: 99.7% in standard conditions

-

Processing latency: <15ms

-

False positive rate: <0.01%

-

Update frequency: 60Hz

4. INTELLECTUAL PROPERTY PROTECTION

1. **Patent Protection**

-

US Patent No. 11,456,789: "Method for Real-time Obstacle Classifica

-

US Patent No. 11,567,890: "Multi-sensor Fusion System for Autonom

-

PCT Application No. PCT/US2023/012345 (pending)

2. **Trade Secrets**

The following components are maintained as trade secrets:

-

DeepClass(TM) neural network architecture

-

Training dataset compilation methodology

-

Sensor fusion optimization parameters

-

Dynamic recalibration protocols

5. IMPLEMENTATION REQUIREMENTS

1. **Hardware Requirements**

-

Processor: NaviCore(TM) NC-750 or higher

-

Memory: 16GB RAM minimum

-

Storage: 256GB SSD minimum

-

Network: Gigabit Ethernet

2. **Software Requirements**

-

Operating System: NaviOS(TM) 4.5 or higher

-

Dependencies: NaviLib(TM) 2.0, TerrainSDK(TM) 3.2

-

Runtime Environment: NaviRT(TM) 2.1

6. SECURITY MEASURES

1. **Data Protection**

-

AES-256 encryption for all sensor data

-

Secure boot verification

-

Encrypted firmware updates

-

Tamper detection system

2. **Access Control**

-

Role-based access control system

Multi-factor authentication for maintenance

-

Audit logging of all system access

-

Remote kill switch capability

7. COMPLIANCE AND CERTIFICATION

1. **Safety Standards**

-

ISO 13849-1:2015 Performance Level D

-

IEC 61508 SIL 2

-

2. **Industry Certifications**

-

CE Marking (European Union)

-

UL Listing (United States)

-

CSA Certification (Canada)

8. CONFIDENTIALITY

1. This document contains confidential and proprietary information of

2. Distribution of this document is limited to authorized personnel who

9. DOCUMENT CONTROL

Version History:

-

v1.0: Initial release (2023-03-15)

-

v1.1: Updated patent information (2023-07-20)

-

v1.2: Added security measures (2023-10-01)

-

v1.3: Current version (2023-12-15)

Approved By:

Dr. Elena Kovacs

Chief Research Officer

NaviFloor Robotics, Inc.

Date: December 15, 2023

Document Owner:

Technical Documentation Department

NaviFloor Robotics, Inc.

Email: documentation@navifloor.com

Reference: DOC-IP-2023-0147