SENSOR FUSION FOR PRECISE POSITION TRACKING

SENSOR FUSION FOR PRECISE POSITION T

PROPRIETARY AND CONFIDENTIAL TECHNICAL DOCUMENTAT

NaviFloor Robotics, Inc.

Document ID: NF-IP-2023-0142

Version: 2.1

Last Updated: December 15, 2023

1. OVERVIEW AND SCOPE

1. This document describes the proprietary sensor fusion methodolog

2. The technology described herein is protected under U.S. Patent No

2. TECHNICAL SPECIFICATIONS

1. **Sensor Array Configuration**

-

Primary LiDAR sensor: Dual-wavelength scanning unit (Class 1, eye-s

-

Inertial Measurement Unit (IMU): 9-axis MEMS-based system

-

Depth cameras: Stereo vision system with structured light projection

-

Floor texture sensors: High-resolution optical flow detection

-

Proximity sensors: Ultra-wideband (UWB) ranging system

2. **Data Integration Architecture**

-

Real-time sensor data aggregation at 200Hz

-

Kalman filter implementation for optimal state estimation

-

Proprietary error correction algorithms (Patent pending, App. No. 17/X

-

Adaptive weighting system for environmental conditions

3. IMPLEMENTATION METHODOLOGY

1. **Sensor Calibration Protocol**

The fusion system requires initial calibration using the Company's pro

NaviCalib(TM) procedure, including:

Spatial alignment of all sensors relative to robot base

-

Temporal synchronization across sensor streams

-

Environmental parameter optimization

-

Surface material characterization

2. **Runtime Operation**

The system maintains continuous position tracking through:

-

Parallel processing of all sensor inputs

-

Real-time environmental mapping

Dynamic confidence scoring

-

Fault detection and recovery

4. INTELLECTUAL PROPERTY PROTECTION

1. **Confidentiality Classification**

This document and the technology described herein are classified as
(Highest) confidential information under the Company's Information S
Policy dated March 1, 2023.

2. **Trade Secret Protection**

The following elements are maintained as trade secrets:

-

Sensor fusion algorithms

-

Calibration procedures

-

Error correction methodologies

-

Environmental adaptation parameters

5. PERFORMANCE SPECIFICATIONS

1. **Accuracy Metrics**

-

Absolute position accuracy: 2.5mm in controlled environments

-

Relative position accuracy: 1.0mm between sequential measurement

Angular resolution: 0.02 degrees

-

Update rate: 200Hz nominal

2. **Environmental Parameters**

Verified operation under:

-

Temperature range: 0 C to 45 C

-

Humidity: 10% to 90% non-condensing

-

Lighting conditions: 0.1 to 100,000 lux

-

Floor types: All industrial surfaces per ISO 15066

6. IMPLEMENTATION REQUIREMENTS

1. **Hardware Requirements**

- Minimum processor: ARM Cortex-A78 or equivalent
- RAM: 8GB minimum
- Storage: 128GB NVMe SSD
- Dedicated FPGA for sensor processing

2. **Software Dependencies**

- NaviFloor Core Framework v4.2 or higher

Real-time operating system: QNX 7.1

-

Sensor drivers per Appendix A

7. LEGAL NOTICES

1. This document contains proprietary and confidential information of

2. The technology described herein is protected by U.S. and internatio

-

Patents (issued and pending)

-

Copyrights

-

Trade secrets

-

Industrial design rights

8. DOCUMENT CONTROL

1. **Version History**

-

v2.1: December 15, 2023 - Current version

-

v2.0: September 30, 2023

-

v1.2: June 15, 2023

-

v1.1: March 1, 2023

v1.0: January 15, 2023

2. **Authorization**

APPROVED BY:

/s/ Dr. Elena Kovacs

_

Dr. Elena Kovacs

Chief Research Officer

NaviFloor Robotics, Inc.

Date: December 15, 2023

/s/ Marcus Depth

Marcus Depth

Chief Technology Officer

NaviFloor Robotics, Inc.

Date: December 15, 2023