

# SENSOR FUSION IMPLEMENTATION DETAILS

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NaviFloor Robotics, Inc.

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Classification: CONFIDENTIAL

### 1. OVERVIEW AND SCOPE

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1. This document details the proprietary sensor fusion implementation method

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2. The information contained herein is subject to intellectual property protection.

## **2. DEFINITIONS**

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1. "Sensor Array" refers to the integrated collection of sensing devices including:

- a) Primary LiDAR units (Model NF-L350X)
- b) Secondary depth sensors (Model DS-2000)
- c) Proprietary terrain mapping sensors (Series TM-X)
- d) Inertial measurement units (IMU-NF-450)

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2. "Fusion Algorithm" refers to the Company's proprietary NaviCore Sensor Fusion

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3. "System" refers to the complete sensor fusion implementation including hardware and software components.

### 3. TECHNICAL SPECIFICATIONS

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1. Hardware Integration Architecture

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1.1. Primary sensor array utilizing quad-core processing units

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1.2. Redundant sensor configuration with n+1 failover capability

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1.3. Real-time data synchronization across multiple sensor streams

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1.4. Hardware-level timestamp correlation with sub-millisecond precision

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## 2. Software Architecture

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### 2.1. Multi-threaded sensor data processing

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### 2.2. Real-time calibration and sensor alignment

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### 2.3. Dynamic sensor weighting based on environmental conditions

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### 2.4. Proprietary error correction algorithms

## **4. IMPLEMENTATION METHODOLOGY**

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### 1. Sensor Data Collection

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1.1. Primary LiDAR scanning at 40Hz refresh rate

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1.2. Depth sensor sampling at 60Hz

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1.3. Terrain mapping sensor data acquisition at 100Hz

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1.4. IMU data collection at 200Hz

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2. Data Processing Pipeline

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2.1. Raw data preprocessing and filtering

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2.2. Temporal alignment of sensor streams

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2.3. Environmental condition compensation

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2.4. Dynamic calibration adjustments

## **5. PERFORMANCE SPECIFICATIONS**

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1. System Accuracy

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1.1. Positional accuracy:  $\pm 2.5\text{mm}$  in standard conditions

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1.2. Angular resolution:  $0.1^\circ$  at 20m range

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1.3. Surface classification accuracy: 99.7%

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## 2. Processing Requirements

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2.1. Maximum latency: 5ms

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2.2. CPU utilization: <60% under normal operation

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2.3. Memory usage: <4GB RAM

## **6. SAFETY AND REDUNDANCY**

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### 1. Fault Detection

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1.1. Continuous sensor health monitoring

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### 1.2. Automated fault detection and isolation

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### 1.3. Real-time performance degradation analysis

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## 2. Failover Mechanisms

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### 2.1. Redundant sensor activation protocols

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### 2.2. Graceful degradation procedures

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### 2.3. Emergency operation modes

## **7. PROPRIETARY NOTICES**



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1. The information contained in this document constitutes valuable trade secret

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2. This document is protected under applicable intellectual property laws and

## **8. CERTIFICATION AND COMPLIANCE**

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1. The System has been certified to meet the following standards:

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1.1. ISO/TS 15066:2016

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1.2. IEC 61508 SIL 2

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1.3. EN ISO 13849-1:2015

## **9. DOCUMENT CONTROL**

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1. This document is maintained by the NaviFloor Robotics Technical Document

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2. Document History:

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Version 3.2: December 15, 2023

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Version 3.1: September 30, 2023

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Version 3.0: June 15, 2023

## **APPROVAL AND AUTHORIZATION**

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