REAL-TIME NAVIGATION STACK DOCUMENTATION

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NaviFloor Robotics, Inc.

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Classification: CONFIDENTIAL

1. PROPRIETARY NOTICE AND CONFIDENTIALITY

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Robotics, Inc. ("Company"). By accessing this documentation, the rec

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Non-Disclosure Agreement.

2. SYSTEM ARCHITECTURE OVERVIEW

1. The Real-time Navigation Stack ("NavStack") comprises the followi

a) Terrain Mapping Module (TMM-2024)

b) Dynamic Obstacle Detection System (DODS)

c) Path Planning Engine (PPE)

d) Motion Control Interface (MCI)

e) Multi-Surface Adaptation Layer (MSAL)

2. Protected Technologies:

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US Patent No. 11,789,XXX: "Method for Real-time Surface Classificat

-

US Patent No. 11,823,XXX: "Adaptive Navigation System for Autonor

-

Patent Pending: "Multi-Modal Terrain Response Algorithm" (App. No.

3. TECHNICAL SPECIFICATIONS

1. Processing Requirements:

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Primary processor: ARM Cortex-A78AE

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Secondary processor: NVIDIA Xavier NX

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Minimum RAM: 32GB DDR4

Storage: 512GB NVMe SSD

2. Sensor Integration:

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Primary LiDAR: Velodyne Alpha Prime

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Secondary LiDAR: Ouster OS1-128

-

Depth Cameras: Intel RealSense D455 (qty. 4)

-

IMU: Bosch BMI088

4. ALGORITHMIC IMPLEMENTATIONS

1. Protected Algorithms:

a) TerrainSense(TM) Classification System

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Resolution: 0.5cm at 30Hz

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Surface types: 32 classifications

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Response time: <50ms

2. Path Planning:

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Algorithm type: Modified A* with dynamic cost mapping

-

Update frequency: 60Hz

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Maximum planning horizon: 30 meters

5. SAFETY AND COMPLIANCE

1. Safety Classifications:

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IEC 61508 SIL 3 certified

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ISO 13849-1 Performance Level D

-

CE Marking compliant

2. Emergency Systems:

-

Hardware emergency stop: Category 0 stop per IEC 60204-1

Software emergency stop: Category 1 stop per IEC 60204-1

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Redundant safety circuits with dual-channel monitoring

6. INTEGRATION PROTOCOLS

1. Communication Interfaces:

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Primary: EtherCAT (1000BASE-T)

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Secondary: CAN-FD

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Wireless: IEEE 802.11ax

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Bluetooth 5.2 (configuration only)

2. API Documentation:

- REST API v3.2
- WebSocket interface
- gRPC services

7. PERFORMANCE METRICS

1. Certified Performance:

- Maximum navigation speed: 2.5 m/s

- Positioning accuracy: 1.5cm
- Angular resolution: 0.1 degrees
- Update rate: 200Hz

2. Environmental Parameters:

- Operating temperature: 0 C to 45 C
- Humidity: 10% to 90% non-condensing
- IP54 rated enclosure

8. LEGAL COMPLIANCE AND LICENSING

1. Software Licensing:

- Proprietary license
- Third-party components under MIT, Apache 2.0
- No GPL dependencies

2. Export Control:

- ECCN: 3D991
- HTS Code: 8479.50.0000

Subject to EAR compliance

9. WARRANTY AND DISCLAIMER

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10. CERTIFICATION

The undersigned hereby certifies that this documentation accurately r
the current state of NaviFloor Robotics, Inc.'s Real-time Navigation St
the date first written above.

By: _

Dr. Marcus Depth

Chief Technology Officer

NaviFloor Robotics, Inc.

Date: _

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