3D POINT CLOUD PROCESSING FOR FLOOR TEXTURE ANALYSIS

3D POINT CLOUD PROCESSING FOR FLOOR

Technical Documentation and IP Rights

1. OVERVIEW AND SCOPE

1. This document describes the proprietary 3D point cloud processing

2. The Processing System comprises the technical specifications, me

2. TECHNICAL SPECIFICATIONS

1. **Point Cloud Acquisition**

- LiDAR-based depth sensing with minimum resolution of 2mm at 1m d
- Multi-beam scanning array utilizing 16 independent channels
- Minimum scan rate of 300,000 points per second
- Angular resolution: 0.1 horizontal, 2.0 vertical

2. **Processing Architecture**

- Real-time point cloud segmentation using proprietary SLAM algorithm
- Surface normal calculation with adaptive neighborhood sizing

Texture feature extraction using modified Harris operator

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Multi-scale analysis framework (2cm to 50cm scale range)

3. **Analysis Parameters**

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Surface roughness quantification (Ra, Rz metrics)

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Material classification based on reflectivity patterns

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Friction coefficient estimation using texture gradients

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Dynamic surface deformation modeling

3. PROPRIETARY ALGORITHMS

1. The following algorithms are proprietary to the Company:

a) NaviCloud(TM) point cloud filtering and optimization

b) TextureMap(TM) surface characteristic extraction

c) AdaptiveGrid(TM) dynamic resolution adjustment

d) SurfaceNet(TM) neural network architecture for texture classificatio

2. Each algorithm incorporates protected intellectual property develop

4. INTELLECTUAL PROPERTY RIGHTS

1. **Patents**

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US Patent No. 11,234,567: "Method for Real-time Surface Texture An

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US Patent Application No. 17/123,456: "Adaptive Resolution Control i

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PCT Application PCT/US2023/012345: "Multi-Scale Surface Classifica

2. **Trade Secrets**

The following components are maintained as trade secrets:

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Calibration parameters for multi-beam alignment

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Surface normal calculation optimization methods

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Feature vector compression techniques

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- Machine learning model architectures and weights

5. IMPLEMENTATION REQUIREMENTS

1. **Hardware Requirements**

- Minimum computing platform: NVIDIA Jetson AGX Xavier or equivale
- Required sensor suite: NaviFloor MS-16 LiDAR array
- Minimum RAM: 32GB
- Dedicated GPU memory: 16GB

2. **Software Dependencies**

NaviFloor Core Framework v4.2 or higher

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CUDA 11.4+

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Point Cloud Library (PCL) v1.12+

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Proprietary NaviCloud(TM) Runtime Environment

6. CONFIDENTIALITY AND USAGE RESTRICTIONS

1. All information contained herein is strictly confidential and constitute

2. No part of the Processing System may be reproduced, modified, or

3. Usage of the Processing System is restricted to authorized licensee

7. WARRANTY AND LIABILITY

1. The Processing System is provided "as is" without warranty of any

2. The Company shall not be liable for any damages arising from the

8. CERTIFICATION AND VALIDATION

1. The Processing System has been validated according to ISO/IEC 2

2. Performance metrics and validation results are documented in Tech

9. DOCUMENT CONTROL

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The undersigned acknowledges receipt and understanding of this doc

agrees to be bound by its terms and conditions.

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