TERRAIN CLASSIFICATION NEURAL NETWORK ARCHITECTURE

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PROPRIETARY AND CONFIDENTIAL

NaviFloor Robotics, Inc.

Document ID: IP-TCNN-2023-001

Effective Date: December 15, 2023

1. OVERVIEW AND SCOPE

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1. This document describes the proprietary neural network architecture ("Arc

2. The Architecture comprises the core intellectual property underlying the C

2. DEFINITIONS

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1. "Neural Network" means the specific implementation of deep learning alg

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2. "Training Dataset" means the proprietary collection of labeled terrain data

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3. "Model Parameters" means the weights, biases, and hyperparameters that

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4. "Inference Engine" means the optimized software implementation of the A

3. TECHNICAL SPECIFICATIONS

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1. Network Topology

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Input Layer: 256x256x4 tensor (RGB + depth)

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Encoder: Modified ResNet-50 backbone with custom skip connections

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Decoder: 5-layer transpose convolution network

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Output Layer: 16-class softmax classification layer

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2. Key Architectural Features

- Proprietary attention mechanism for surface texture analysis

- Custom loss function incorporating safety constraints

- Real-time inference optimization for embedded systems

- Hardware-specific acceleration for NVIDIA Jetson platforms

4. INTELLECTUAL PROPERTY PROTECTION

1. Trade Secret Classification

The Architecture and all associated implementation details are classified as trade secrets under applicable state and federal laws, including the Defend

Trade Secrets Act of 2016.

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2. Access Controls

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Access restricted to authorized engineering personnel

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Multi-factor authentication required for source code repositories

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Segmented access levels for different architectural components

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Mandatory logging of all access events

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3. Third-Party Restrictions

The Architecture shall not be disclosed to any third party without:

(a) Written authorization from the Chief Technology Officer

(b) Execution of an NDA with minimum 5-year term

(c) Implementation of agreed-upon technical protection measures

5. DEVELOPMENT HISTORY AND OWNERSHIP

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1. Original Development

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Initial architecture designed by Dr. Marcus Depth and Dr. Elena Kovacs

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Development period: June 2018 - March 2019

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First deployment in MSANS v1.0 (April 2019)

2. Subsequent Improvements

- Version 2.0: Enhanced surface texture recognition (October 2020)
- Version 3.0: Multi-modal sensor fusion integration (May 2022)
- Version 4.0: Real-time adaptation capabilities (Current)

3. Ownership Declaration

All rights, title, and interest in the Architecture are exclusively owned by NaviFloor Robotics, Inc., including all improvements, modifications, and derivative works.

6. USAGE AND IMPLEMENTATION REQUIREMENT

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1. Deployment Standards

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Mandatory code signing for production releases

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Version control requirements per SOP-DEV-2023-003

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Runtime integrity verification

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Performance monitoring and logging

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2. Documentation Requirements

Architecture changes must be documented in the Technical Design Repositor

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Quarterly security audit compliance

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Maintenance of deployment configuration records

7. CONFIDENTIALITY AND NON-DISCLOSURE

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1. This document contains highly confidential and proprietary information of

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2. Recipients must maintain strict confidentiality and implement appropriate

8. CERTIFICATION

The undersigned hereby certifies that this document accurately represents the current state of NaviFloor Robotics' Terrain Classification Neural Network Architecture as of the Effective Date.

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Dr. Marcus Depth

Chief Technology Officer

NaviFloor Robotics, Inc.

Date: December 15, 2023

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Dr. Elena Kovacs
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Chief Research Officer

NaviFloor Robotics, Inc.

Date: December 15, 2023

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## 9. DOCUMENT CONTROL

Version: 4.0

Last Updated: December 15, 2023

Review Cycle: Annual

Next Review: December 15, 2024

Document Owner: Office of the CTO
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