SURFACE FRICTION COEFFICIENT ESTIMATION METHOD

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Patent Application No. 16/789,432

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1. TECHNICAL FIELD

1. The present invention relates to methods and systems for real-time

2. BACKGROUND

1. This invention addresses the critical need for accurate surface fricti

2. Prior art solutions have relied primarily on pre-programmed friction

3. SUMMARY OF THE INVENTION

1. The present invention provides a method for real-time surface frictio

a) A multi-sensor array system utilizing advanced LiDAR and depth-se
technology;

b) Proprietary algorithms for processing sensor data to determine surf
characteristics;

c) Machine learning models trained on NaviFloor's comprehensive su
database; and

d) Real-time coefficient adjustment mechanisms based on robot-surfa
interaction data.

4. DETAILED DESCRIPTION

1. Sensor Array Configuration

The invention employs a proprietary sensor array comprising:

1.1. High-resolution LiDAR sensors (Model NF-L2000) operating at 12

1.2. Depth-sensing cameras with 1920x1080 resolution;

1.3. Surface texture analysis sensors utilizing infrared technology;

1.4. Accelerometers and gyroscopes for motion data collection.

2. Data Processing Algorithm

The surface friction coefficient ( ) is calculated using the following met

2.1. Initial surface scan using LiDAR and depth sensors;

2.2. Real-time texture analysis using proprietary NaviFloor algorithms

2.3. Correlation with pre-existing surface texture database;

2.4. Application of machine learning models for coefficient prediction.

3. Coefficient Calculation Formula

= k (S) + k (T) + k (R) + k (V)

Where:

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S = Surface texture parameter

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T = Temperature factor

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R = Surface roughness coefficient

V = Robot velocity vector

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k , k , k , k = Calibration constants

5. IMPLEMENTATION METHODOLOGY

1. The method is implemented through NaviFloor's proprietary softwa

1.1. Surface Analysis Module (SAM) v3.2

1.2. Coefficient Estimation Engine (CEE) v2.1

1.3. Real-time Navigation Adjustment System (RNAS) v4.0

2. The system performs continuous calibration cycles at 100ms interv

6. CLĀIMS

1. A method for estimating surface friction coefficients comprising:

1.1. Deploying multiple sensor types for surface analysis;

1.2. Processing sensor data through proprietary algorithms;

1.3. Generating real-time friction coefficient estimates;

1.4. Adjusting robot navigation parameters based on calculated coeffi

2. The method of claim 6.1, wherein the sensor array includes LiDAR,

7. INTELLECTUAL PROPERTY RIGHTS

1. This invention and all associated intellectual property rights are ow

8. CERTIFICATION

The undersigned hereby certifies that the above-described invention i

and was developed by NaviFloor Robotics, Inc.

EXECUTED this 15th day of March, 2022

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## 9. LEGAL NOTICE

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