PATENT SPECIFICATION

PATENT SPECIFICATION

BLUECORE(TM) EMERGENCY SHUTDOWN PROTO

Patent No. PDR-2021-0183

Filing Date: March 15, 2021

ABSTRACT

A system and method for emergency shutdown of autonomous mobile in extreme cold environments, comprising a multi-layered safety proto

ensures graceful degradation of robotic systems while preserving criti

operational data and preventing damage to temperature-sensitive com

BACKGROUND

[001] This invention relates to safety systems for autonomous mobile

operating in sub-zero environments, specifically addressing the challe

emergency shutdown procedures in temperature-controlled facilities w

standard shutdown protocols may be insufficient or potentially damag

robotic components.

[002] Conventional emergency shutdown systems for autonomous mo

typically assume ambient operating temperatures above 0 C (32 F). W

in extreme cold environments, standard shutdown procedures can lea

mechanical failure, sensor damage, and loss of critical operational da

DETAILED DESCRIPTION

1. System Overview

[010] The BlueCore(TM) Emergency Shutdown Protocol comprises:

a) A primary control unit with redundant temperature-hardened proces

b) Multiple distributed thermal sensors

c) Proprietary shutdown sequence algorithms

d) Emergency power reserve system

e) Data preservation module

2. Components and Architecture

[020] The primary control unit includes:

1. Dual-redundant processing cores rated for operation at -40 C

2. Solid-state memory arrays with cold-temperature optimization

3. Thermal management subsystem with active heating elements

4. Emergency power cells with cold-resistant chemistry

[021] Distributed sensor network comprising:

5. Temperature sensors with 0.1 C accuracy at sub-zero temperature

6. Motion detection systems with ice/frost compensation

7. Power monitoring circuits with thermal calibration

3. Shutdown Sequence

[030] The emergency shutdown protocol executes in the following sec

1. Initiation Triggers:

a) Detection of critical system failure

b) Temperature excursion beyond operational parameters

c) Power system anomaly

d) Manual emergency stop activation

e) Network connectivity loss exceeding predetermined threshold

2. Primary Sequence:

a) Immediate cessation of all motion systems

b) Activation of emergency brake mechanisms

c) System state preservation to protected memory

d) Initiation of thermal protection protocols

e) Emergency beacon activation

3. Data Protection:

a) Real-time operational data compression

b) Secure storage in temperature-hardened memory

c) Transmission of critical data to facility control system

d) Creation of encrypted backup in redundant storage

4. Safety Features

[040] The protocol incorporates multiple safety mechanisms:

1. Mechanical Safety:

a) Fail-safe brake engagement

b) Component protection through controlled power reduction

c) Thermal protection of critical systems

2. Data Safety:

a) Multiple redundant storage systems

b) Encrypted data transmission

c) Black box recording system

5. Recovery Procedures

[050] The system includes automated recovery procedures:

1. System Verification:

a) Component integrity checking

b) Sensor calibration verification

c) Power system assessment

d) Data integrity verification

2. Restart Sequence:

a) Gradual power restoration

b) Systematic component activation

c) Operational parameter verification

d) Return to service protocols

CLAIMS

A method for emergency shutdown of autonomous mobile robots in su

a) Detecting emergency conditions through distributed thermal sensor

b) Executing a temperature-optimized shutdown sequence

c) Preserving operational data in cold-resistant storage

d) Maintaining critical system integrity during shutdown

The method of claim 1, wherein the shutdown sequence includes:

a) Immediate motion cessation

b) Thermal protection activation

c) Data preservation procedures

d) Emergency signal transmission

[Additional claims 3-20 omitted for brevity]

INVENTOR

Dr. Elena Frost

Polar Dynamics Robotics, Inc.

1250 Arctic Way

Dover, Delaware 19901

ASSIGNMENT

All rights, title, and interest in this patent are assigned to Polar Dynam
Robotics, Inc., a Delaware corporation.

CERTIFICATION

I hereby certify that I am the original inventor of the technology descril
herein.

/s/ Dr. Elena Frost

Date: March 15, 2021