

FROST-RESISTANT SENSOR ARRAY DESIGN PATENT

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Patent No.: US D987,654

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TITLE OF THE INVENTION

Frost-Resistant Environmental Sensor Array Configuration for Autonomous
Robots

INVENTOR

Dr. Elena Frost

Polar Dynamics Robotics, Inc.

100 Innovation Drive

Wilmington, Delaware 19801

ASSIGNMENT

The entire right, title, and interest in this design patent has been assigned to
Polar Dynamics Robotics, Inc., a Delaware corporation.

DESCRIPTION OF THE DESIGN

Field of the Invention

This design patent relates to a novel configuration of environmental sensor
specifically engineered for autonomous mobile robots operating in sub

environments, particularly incorporating the proprietary BlueCore(TM) platform.

Background

The present design addresses the critical need for reliable sensor arrays to maintain functionality in extreme cold conditions, specifically temperatures ranging from -40 C to +25 C, while preventing frost accumulation that can impair sensor performance.

Summary of the Design

The design comprises:

A hexagonal sensor housing array with:

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Six peripheral sensor modules arranged in a 60-degree radial pattern

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One central master sensor module

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Integrated heating elements between each sensor module

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Thermally isolated mounting brackets

Each sensor module features:

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Raised geometric patterns on external surfaces to minimize frost adhesion

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Recessed sensor apertures with heated rims

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Proprietary hydrophobic coating (Patent No. US 11,123,456)

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Internal temperature regulation channels

Distinctive design elements:

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Asymmetrical ventilation ports positioned at 30-degree intervals

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Stepped surface transitions between sensor modules

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Integrated LED status indicators in triangular configuration

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Modular quick-release mounting system

CLAIM

The ornamental design for a frost-resistant sensor array for autonomous

robots, as shown and described.

DRAWINGS

The patent includes the following views:

Figure 1: Front elevation view

Figure 2: Rear elevation view

Figure 3: Top plan view

Figure 4: Bottom plan view

Figure 5: Right side elevation

Figure 6: Left side elevation

Figure 7: Perspective view

Figure 8: Exploded view showing component arrangement

DESIGN CHARACTERISTICS

Primary Features

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Overall dimensions: 280mm diameter x 85mm height

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Material: Aviation-grade aluminum alloy with specialized thermal coating

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Weight: 1.85 kg

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Operating temperature range: -40 C to +25 C

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IP67 rated enclosure

Secondary Features

-

Tool-less maintenance access panels

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Self-diagnostic LED array

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Redundant heating circuits

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Emergency thermal shutdown system

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Anti-condensation ventilation system

TECHNICAL IMPLEMENTATION

The design implements the following technical solutions:

Thermal Management:

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Active heating elements integrated into housing seams

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Passive thermal barriers between sensor modules

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Microprocessor-controlled temperature regulation

Environmental Protection:

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Double-sealed sensor apertures

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Pressure equalization membranes

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Condensation management channels

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Impact-resistant external shell

LEGAL NOTICES

Rights and Limitations

This design patent grants the owner exclusive rights to prevent others from making, using, selling, offering to sell, or importing any article of manufacture that embodies the protected ornamental design.

Term

This design patent shall be in force for 15 years from the date of grant.

Notice Requirements

The design shall be marked with "Pat. No. US D987,654" or "Protected Design" or "Patent Pending".

Design Patent D987,654" when commercially implemented.

CERTIFICATION

I hereby certify that I am the original inventor of the article of manufacture claimed herein, and that this design patent application was made by me.

Executed this 15th day of March, 2023

—

Dr. Elena Frost, Ph.D.

Inventor

—

Victoria Wells

Chief Financial Officer

Polar Dynamics Robotics, Inc.

PATENT OFFICE ENDORSEMENT

Examined and approved by the United States Patent and Trademark

Patent Examiner: [REDACTED]

Art Unit: 2917

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