PDR-SYS-309: Fleet Management Platform API Documentation

Version 2.4.1 | Last Updated: January 11, 2024

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1. Overview and Scope

1. This API Documentation ("Documentation") describes the technical specifications, integration requirements, and usage protocols for the Fleet Management Platform API ("API") developed and maintained by Polar Dynamics Robotics, Inc. ("PDR" or "Company").

2. The API enables authorized third-party systems to interface with PDR's IceNav(TM) Fleet Management Platform for controlling and monitoring autonomous mobile robots (AMRs) in temperature-controlled environments.

2. Definitions

1. "Authentication Credentials" means the unique API keys, tokens, and certificates issued by PDR for secure API access.

2. "Cold Environment Operations" refers to automated operations in environments maintained below 0 C (32 F).

3. "Fleet Control Commands" means API instructions that direct AMR movement, task assignment, and operational parameters.

4. "System Integration Layer" means the software interface that enables communication between third-party warehouse management systems and PDR's Fleet Management Platform.

3. Technical Specifications

1. API Architecture

- RESTful API architecture
- JSON data format
- HTTPS protocol (TLS 1.3 or higher)
- OAuth 2.0 authentication framework
- Rate limiting: 1000 requests per minute per API key

2. Endpoint Structure

```
Base URL: https://api.polardynamics.com/v2/

Primary Endpoints:
- /fleet/status
- /fleet/commands
- /robot/[robot_id]
- /tasks/[task_id]
- /zones/[zone_id]
```

4. Security Requirements

1. All API users must implement:
- End-to-end encryption for all data transmission
- Multi-factor authentication for administrative access
- Regular rotation of API keys (minimum quarterly)
- IP whitelisting for production environments
- Audit logging of all API transactions

2. Security Certifications
- SOC 2 Type II compliance required
- ISO 27001 certification recommended
- NIST Cybersecurity Framework alignment

5. Integration Protocol

1. Integration Process

a) Development environment setup and testing

b) Sandbox environment validation

c) Production environment deployment

d) Performance monitoring implementation

e) Emergency shutdown protocol testing

2. Required Testing Scenarios

- Cold start operations (-30 C to -5 C)
- Multi-robot collision avoidance
- Emergency stop procedures
- Network interruption recovery
- Battery management optimization

6. Performance Standards

1. API Performance Metrics

- Maximum response time: 100ms
- Uptime guarantee: 99.99%
- Error rate threshold: <0.1%
- Concurrent connection limit: 1000
- Data freshness: Real-time (50ms delay)

2. Environmental Operating Parameters

- Temperature range: -40 C to +25 C
- Humidity: Up to 95% non-condensing
- Network latency tolerance: 200ms

7. Compliance and Liability

1. The API user shall maintain compliance with:

- All applicable safety standards and regulations
- PDR's Security and Privacy Policy
- Industry-specific regulatory requirements
- Local autonomous system operation laws

2. Limitation of Liability

PDR's liability for API-related issues shall be limited to direct damages not exceeding the greater of:

a) $50,000 USD

b) Fees paid for API access in the preceding 12 months

8. Support and Maintenance

1. Technical Support

- 24/7 emergency support for production issues
- Standard support hours: Monday-Friday, 0900-1800 EST
- Maximum response time: 1 hour for critical issues
- Scheduled maintenance windows: Sundays 0200-0400 EST

2. Documentation Updates

PDR shall provide minimum 30 days notice for:

- API version deprecation
- Breaking changes
- Security protocol updates

9. Termination

1. PDR reserves the right to terminate API access with:

- 30 days notice for standard termination
- Immediate termination for security violations
- 24 hours notice for performance issues

10. Proprietary Rights

All intellectual property rights in the API, including but not limited to patents, copyrights, and trade secrets, remain the exclusive property of Polar Dynamics Robotics, Inc.

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