



Powerfleet AI Model Card

Pedestrian Proximity Detection



System overview

The Pedestrian Proximity Detection is an advanced AI-enabled vision safety system designed to prevent collisions between industrial vehicles and pedestrians in material handling environments. It enhances workplace safety by proactively preventing accidents, protecting pedestrians, and reducing potential vehicle damage. Using vehicle-mounted cameras with embedded AI, the system automatically detects people and vehicles in real time, issuing audible and visual alerts to operators when potential hazards or imminent danger are identified.

Why This Matters

1

Primary purpose:
Enhance workplace safety by detecting pedestrians and obstacles in the path of industrial vehicles.

2

Deployment context:
Warehouses, distribution centers, manufacturing facilities, and other industrial environments.

3

Users:
Industrial vehicle operators, warehouse managers, and safety officers.

System components

- Up to three **AI-powered cameras** per vehicle.
- Edge AI processing** for real-time object detection.
- Indicator lights and audible alarms** for instant alerts.
- Integration with Powerfleet's Unity platform** for analytics, event logging, and operator coaching.

AI model summary

- **Model type:** Convolutional Neural Network (CNN)-based object detection.
- **Input:** A pretrained model adapted through transfer learning on proprietary and field data. It does not fine-tune further and cannot learn from real-time data once deployed.
- **Output:** Bounding boxes, classification, and confidence of detected pedestrians or objects.
- **Edge processing:** AI runs directly on the camera, minimizing latency and enabling real-time response.



Training data

Data sources:
Proprietary datasets from industrial environments, including annotated video of pedestrians, vehicles, and obstacles.

Diversity:
Covers varied lighting, clothing types, and environmental layouts.

Data volume:
Not disclosed; designed to be extensive enough to ensure robust detection across diverse scenarios.

Known or foreseeable risks

False positives: Non-threat objects may trigger alerts, potentially leading to alarm fatigue. ⚠️

False negatives: Missed detections could result in injury, similar to having no system installed. ⚠️

Environmental limits: Performance may degrade with poor lighting, occlusions, or extreme weather. ⚠️

Privacy concerns: Use of image data can raise surveillance and data-protection questions. ⚠️

Risk mitigation measures

01

Multi-zone detection: Supports up to five severity zones for all object types.

02

Directional activation: Alerts trigger only when the vehicle moves toward a detected object (using machine inputs or optical flow motion detection).

03

Driver coaching: Event data is logged and used to improve operator behavior.

04

No wearables required: Eliminates reliance on human compliance.

Performance metrics

- **Detection accuracy:** Designed to meet industrial safety standards.
- **Latency:** Real-time detection with edge processing.
- **Field of view:** 120° per camera.
- **Event logging:** Records breach location, time, and driver ID, along with timestamped system and machine diagnostics for analysis.

Bias and fairness

01

Potential biases:
Detection accuracy may be reduced for certain clothing colors or body types, and environmental bias can occur if training data lacks diversity in warehouse layouts or lighting conditions.

02

Mitigation:
Addressed through continuous model updates with diverse datasets and testing across varied real-world environments.

03

Algorithmic discrimination:
No known cases reported; ongoing monitoring is recommended.

Powerfleet's commitment

Powerfleet is committed to delivering AI safety solutions that are transparent, responsible, and proven in real-world industrial environments.