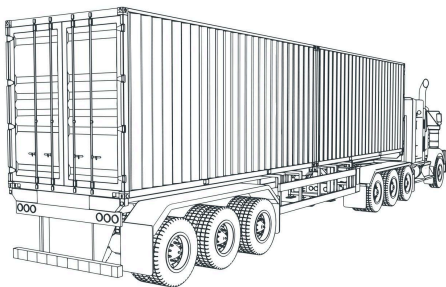


Truck Early Move-Off Detection (TEMD)



TEMD uses AI-powered computer vision and crane control logic to detect when a truck begins driving off too early during container loading or offloading. By monitoring the container-truck interface in real time, it ensures hoisting only proceeds when the truck is securely positioned—helping prevent dangerous departures across RTGs, ARMGs, and other crane types.

Unlike proximity sensors or laser systems, TEMD uses AI-based segmentation and motion tracking to visually detect horizontal truck movement—adapting to various truck types, container sizes, and terminal layouts.

HOW IT WORKS

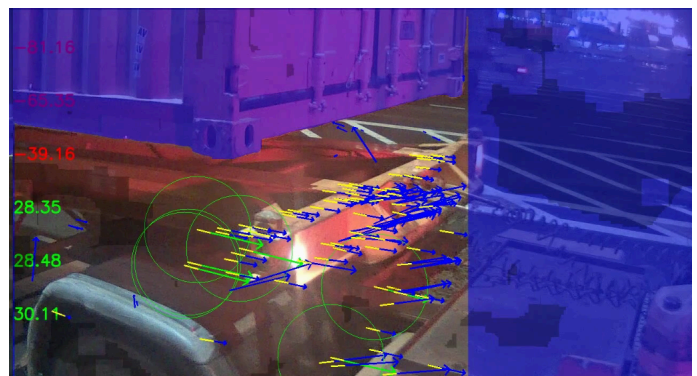
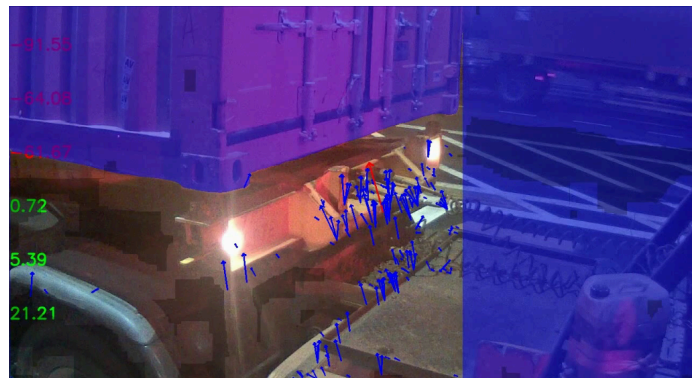
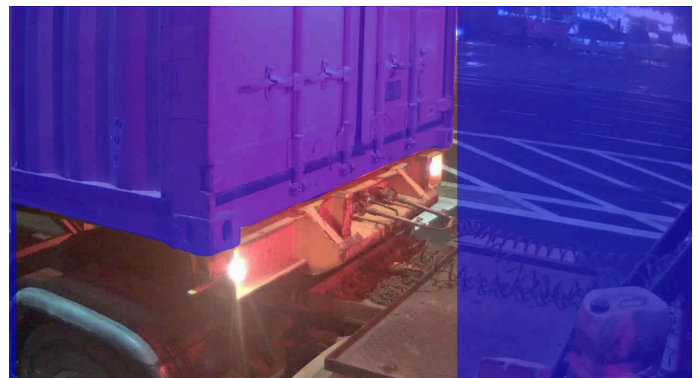
TEMD uses computer vision-based detection to identify unsafe truck movement during container handling.

- **Job Begins:** crane's PLC sends job and hoist info; monitoring activates beneath the spreader.
- **Camera Views Activated:** side and rear cameras track the truck's position in real time.
- **Neural Network: Stage 1 – Container Alignment:** system verifies container is seated properly over the truck chassis.
- **Neural Network: Stage 2 – Movement Detection:** AI model monitors for unintended horizontal truck movement before hoisting is complete..
- **If Detected:** fault is triggered if early movement is confirmed—alerting the operator or halting the hoist.

CAMERA INTEGRATION

TEMD can be adapted to work with **customer-specific camera layouts**. Depending on the site:

- Primary cameras provide side and rear views of the truck chassis and surrounding area..
- Secondary cameras can be configured to cover blind spots or extended detection zones.
- Detection is performed using deep-learning models trained to identify container alignment and horizontal truck motion.
- Camera selection is automated based on job status and crane position, ensuring accurate, timely detection.



KEY FEATURES

- **AI-powered dual-stage detection:** identifies early horizontal movement of the truck during container handling
- **Multi-frame validation:** confirms motion across consecutive frames to reduce false positives from minor vibration or suspension shift.
- **Real-time, adaptive monitoring:** activates after twistlock engagement and disables above a configurable hoist height; adapts to job status and truck type.
- **Intelligent camera management:** dynamically switches between side and rear cameras based on crane position and container alignment.
- **Modular and camera-agnostic design:** compatible with existing or new crane-mounted cameras; supports standard container sizes and trailer types.
- **Confidence scoring & fault output:** each event includes a confidence score and triggers alerts via PLC or operator interface.

PERFORMANCE CONSIDERATIONS

TEMD is engineered for real-world yard operations, detecting unsafe truck movement without disrupting standard workflows.

- Visibility is obstructed (e.g. by trailer chassis structures, surrounding equipment, or DST features)
- Cameras are affected by glare, water, or poor lighting
- Truck movement is subtle, momentary, or within expected idle tolerances

TEMD is designed to match human-level observation, triggering only when truck movement is visibly discernible in real-time video—just as a trained operator would recognize a premature departure.

DEPLOYMENT & INTEGRATION

- **Retrofit-ready:** installs on existing RTG/ARMG cranes with minimal disruption to infrastructure or operations.
- **Edge compute:** runs on local GPU-enabled vision appliances with on-premise AI inference, optimized for container handling environments.
- **PLC and system integration:** output is integrated into existing fault channels, alarms, or operator consoles to enable automated intervention or alerts.
- **Tunable detection logic:** trigger thresholds, activation windows, and movement sensitivity can be adjusted to match terminal safety policies and equipment behavior.

mVizn develops AI-powered computer vision systems that enhance safety and automation in industrial environments. Based in Singapore, we specialize in edge-deployed solutions for container terminals, ports, and logistics yards—integrating seamlessly with cranes and control systems to deliver real-time operational intelligence.

Computer vision offers a distinct advantage in dynamic, visually complex environments. By delivering object-level understanding and context-aware detection, mVizn enables operators to respond to real-world situations with greater speed, accuracy, and confidence.

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