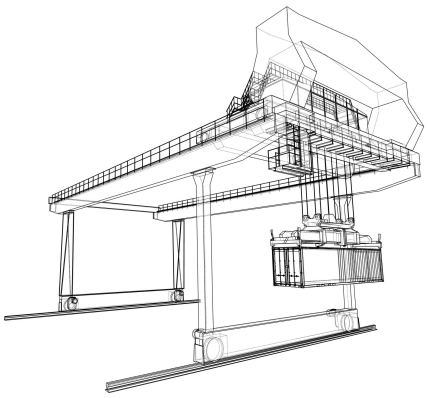
CRANE SAFETY & AUTOMATION

Truck-Lift Prevention System (TLPS)

mVizn



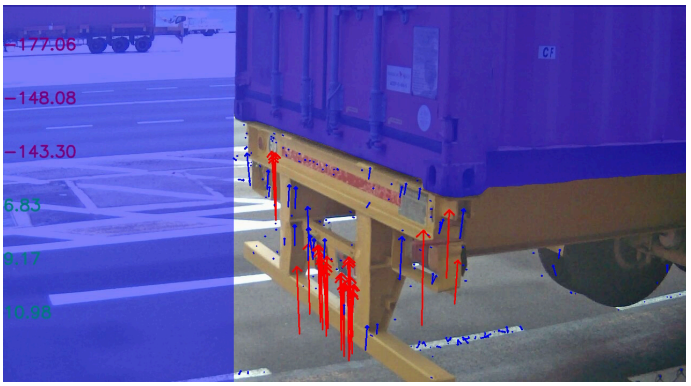
TLPS combines AI-powered computer vision with crane control logic to detect and prevent accidental lifting of trailers or chassis during container offloading. By monitoring the container-trailer interface in real time, TLPS ensures hoisting only begins when the container is safely disengaged—helping prevent dangerous lifts caused by locked chassis across RTGs, ARMGs, and other crane types.

Unlike traditional systems that rely on laser sensors or under-chassis detectors, CLPS uses AI-driven image segmentation and motion tracking to visually monitor chassis movement—adaptable across different trailer types, container sizes, and operational environments.

🧠 HOW IT WORKS

TLPS uses AI-powered image recognition to segment container and truck/chassis while the container is lifted:

- **Job Begins**: The crane's PLC sends offloading job info
- **Camera Views Activated**: TLPS monitors corners via primary and/or secondary cameras.
- **Neural Network: Stage 1 – Image Segmentation**: The model isolates the container body and parts of the trailer/chassis in the video stream.
- **Neural Network: Stage 2 – Track movement of the trailer**: A second AI model detects vertical displacement of the trailer body or chassis.
- **If Detected**: An alert is triggered or hoist is halted to prevent a dangerous lift.



📷 CAMERA INTEGRATION

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

- Primary cameras are trained for high-accuracy detection.
- Secondary cameras can be configured to provide early or supplementary detection.
- Camera selection logic is automated based on crane job data.

Note: Camera models and configurations are project-specific and will be customized per deployment.

🛠️ KEY FEATURES

- **AI-powered dual-stage detection**: uses segmentation to isolate the container, then tracks vertical chassis movement during initial hoisting.
- **Multi-frame validation**: verifies movement across consecutive frames to suppress false positives from bounce or suspension flex.
- **Real-time, adaptive monitoring**: activates after twistlock engagement and disables above a configurable hoist height; adapts based on container size and job direction.
- **Intelligent camera management**: dynamically switches between primary and secondary cameras based on operational context.
- **Modular and camera-agnostic design**: works with existing or new crane-mounted cameras; supports all standard container sizes and trailer types.
- **Confidence scoring & fault output**: provides detection confidence and triggers alerts via PLC or operator interface.

📈 PERFORMANCE CONSIDERATIONS

Detection accuracy may be impacted under conditions where:

- Visibility is obstructed (e.g. by trailer chassis structures or DST features)
- Cameras are affected by glare, water, or poor lighting
- Vertical chassis movement is subtle or momentary

TLPS is designed to match human-level observation, detecting unintended lift only when movement is visibly discernible in real-time video, just as an operator would see it.

🔌 DEPLOYMENT & INTEGRATION

- **Retrofit-ready**: installs on existing RTG/ARMG cranes with minimal disruption.
- **Edge compute**: runs on local GPU-enabled vision appliances near the crane control network, with on-premise AI inference optimized for hoisting operations.
- **PLC and system integration**: output is integrated into existing fault channels, alarms, or operator consoles.
- **Tunable detection logic**: trigger thresholds, activation windows, and fault conditions can be adjusted to match terminal equipment and safety protocols.

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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