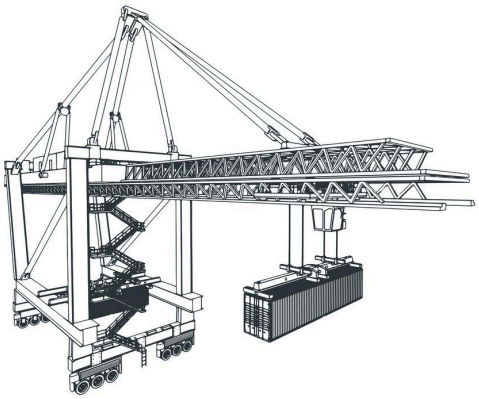
CRANE SAFETY & AUTOMATION

Anti-Collision Vision System (ACVS)

mVizn



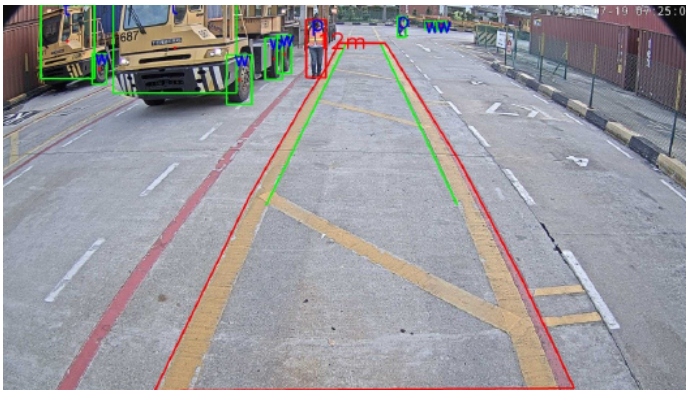
ACVS is an AI vision-based safety system that prevents collisions as cranes and carriers move through the yard. It supports RTGs, RMGs, and straddle carriers by detecting vehicles, containers, people, and barricades in the travel path—helping avoid collisions, delays, and equipment damage.

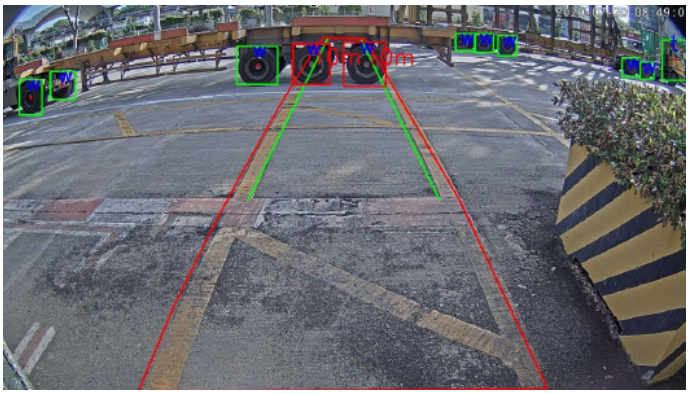
Built for all movement modes—longitudinal, cross, and rotational travel—it uses deep-learning vision models to classify objects and estimate distances in real time. Unlike laser-based solutions with fixed detection zones and no object understanding, ACVS interprets visual context—enabling smarter decisions based on what the obstacle actually is. It also supports flexible zone mapping and software-based adaptation to terminal layouts, avoiding the cost and complexity of hardware retrofits.

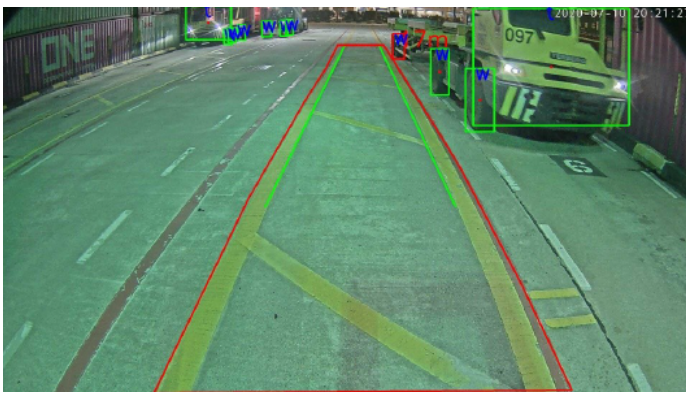
🧠 HOW IT WORKS

ACVS uses an AI vision system to monitor gantry paths and detect obstacles in real time.

- **Job Begins**: crane control system activates the monitoring zone when gantry travel is initiated.
- **Camera Views Activated**: capture continuous video of the travel path using linear and cross gantry cameras.
- **Neural Network 1 - Obstacle Detection**: identify vehicles, containers, people, and barricades in the travel path.
- **Neural Network 2 - Distance Estimation**: calculate distance and classify each detected object.
- **If Detected**: trigger a fault or warning if an object is confirmed within the critical zone—prompting the crane to slow, stop, or alert the operator.







📷 CAMERA INTEGRATION

A multi-camera setup provides coverage along the crane's linear and cross gantry travel paths:

- Configured to monitor longitudinal and cross travel zones, including blind spots and lane edges.
- Streams are processed in real time by an onboard vision system for obstacle detection and distance estimation.
- Integrates with existing crane control systems using standard network and interface protocols.

🛠️ KEY FEATURES

- **AI-powered obstacle detection**: identifies objects such as vehicles, containers, barricades, and personnel in the crane's travel path.
- **Multi-frame validation**: verifies obstacles across multiple frames to suppress false positives from brief obstructions or visual noise.
- **Real-time, adaptive monitoring**: activates automatically during gantry travel and adjusts detection logic based on crane direction and movement mode.
- **Object classification & distance estimation:** labels each obstacle and calculates its distance from the crane in real time.
- **Modular and camera-agnostic design**: Compatible with different camera setups; adaptable to various crane types and yard configurations.
- **Confidence scoring & fault output**: provides detection confidence and triggers warnings or faults via PLC or operator interface.

📈 PERFORMANCE CONSIDERATIONS

ACVS is engineered for high reliability in complex yard environments and performs accurately across varied conditions. Its design prioritizes practical safety outcomes, even in challenging visual scenarios:

- Trained to recognize real-world risks, including mixed object types, overlapping visuals, and unpredictable obstacle placements
- Resilient to cluttered scenes, variable lighting, and shadows, with multi-angle validation to reduce false positives
- Maintains operator clarity by filtering low-confidence detections—ensuring only actionable alerts are surfaced
- Like any vision-based system, performance may vary in edge cases involving severe weather, occlusion, or extremely low visibility

ACVS offers key advantages over laser-based systems: flexible coverage, object-level recognition, and software adaptability —without the rigidity or maintenance burden of fixed-zone hardware. It triggers only when a target obstacle is clearly visible in real-time video, mimicking the judgment of a trained operator.

🔌 DEPLOYMENT & INTEGRATION

- **Retrofit-ready**: installs alongside existing crane systems with minimal disruption to infrastructure.
- **Edge compute**: runs on GPU-enabled vision appliances with on-premise AI inference optimized for gantry travel operations.
- **PLC and system integration**: detection outputs integrate with existing alarm logic, operator consoles, or crane automation systems for real-time intervention.
- **Tunable detection logic**: detection zones, warning thresholds, and fault conditions can be configured to match terminal layouts 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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