Comparison of Perimeter Surveillance Solutions

Scope of the analysis: Detection of an intrusion by a person or vehicle at the outer perimeter of a restricted-access industrial or government site

General qualitative assessment. Actual performance depends on site conditions, climate, installation, and system integration.

Category	Solution	People Detection	Vehicle Detection	Day/Night Performance	Resistance to Harsh Weather Conditions	Location and Tracking	Visual verification	Continuous Monitoring	Relative TCO*	Key limitations
Video	**Conventional cameras**	Average if monitored	Average	Good during the day; variable at night	Average	Good within the coverage area	Excellent	Yes, but human detection is required	Moderate	Not very effective as an automated detection method; blind spots; dependent on lighting and operator attention
Video	**Smart cameras with video analytics**	High	High	Good to excellent	Average	Good	Excellent	Yes	Average to high	Performance is affected by lighting, shadows, animals, vegetation, snow, and positioning
Thermal video	**Smart thermal cameras**	Very high	Very high	Excellent day and night	Good	Good	Average	Yes	High	Limited identification details; performance may be reduced by fog, heavy rain, or low thermal contrast
Point sensor	**PIR or microwave motion detectors**	Average	Average	Good, day and night	Average	Poor: zone-based detection	None	Yes	Low to medium	Limited range; difficult classification; risk of false alarms caused by animals or the environment
Radar	**Perimeter surveillance radars**	Very high	Very high	Excellent, day and night	Very good	Excellent: position, direction, and speed	None without an associated camera	Yes	High	Does not allow for visual identification of the target; generally requires a PTZ camera or another means of verification
Instrumented fence	**Vibration sensors on the fence**	Very high during a scaling attempt	Low	Excellent, day and night	Good, after configuration	Good, depending on the system's segmentation	None	Yes	Moderate to high	Mainly detect climbing, cutting, or prying; depend on the quality and maintenance of the fence
Active barrier	**Active Infrared Barriers**	High	High	Excellent, day and night	Average	Average: beam-based detection	None	Yes	Low to medium	Precise alignment required; vegetation, snow, animals, or objects crossing the beams
Active barrier	**Microwave barriers**	High	High	Excellent, day and night	Good	Average: corridor detection	None	Yes	Average	Requires an unobstructed corridor; significant adjustment is needed to avoid false alarms caused by animals, vegetation, or outdoor movement
Buried sensor	**Buried seismic or geophonic sensors**	High	Very high	Excellent, day and night	Good	Average to good	None	Yes	High	Installation work; results influenced by soil type, freezing, industrial vibrations, or nearby traffic
Buried sensor	**Buried fiber-optic sensors**	High	High	Excellent, day and night	Very good	Good to excellent, depending on the system	None	Yes	Very high	Complex installation; specialized signal configuration and interpretation; potentially costly repairs
3D detection	**3D surveillance LiDAR**	High	High	Very good, day and night	Average	Excellent: position, trajectory, and 3D shape	Low to moderate	Yes	High	Performance may be reduced in rain, snow, or fog; more complex software integration
Vehicle detection	**Magnetic loops installed in the ground**	None	Very high	Excellent, day and night	Excellent	Excellent at the access point	None	Yes	Low to medium	Detects only vehicles; roadwork; coverage limited to equipped lanes
Vehicle detection	**Off-road magnetic or magnetometric sensors**	None	High	Excellent, day and night	Very good	Good in some areas	None	Yes	Low to medium	Detect only metallic objects; limited range; do not always provide accurate classification
Vehicle identification	**Automated license plate recognition (ALPR)**	None	Very high at road access points	Good to excellent with proper lighting	Average	Excellent at checkpoints	Excellent for the license plate and the vehicle	Yes	Moderate to high	Detects only vehicles passing through its field of view; dirty, hidden, or illegible license plates; privacy concerns
Acoustic	**Acoustic sensors**	Medium	Medium to high for engines	Good, day and night	Moderate	Low to moderate, except for sensor networks	None	Yes	Moderate	Ambient noise, wind, machinery, and traffic; classification sometimes uncertain; rarely sufficient on their own
Acoustics	**Specialized acoustic detection of cutting or impact**	High for targeted action	Low	Excellent, day and night	Good	Works well when combined with a fenced-in area or a fence	None	Yes	Moderate	Detects specific activity rather than mere presence; must be combined with another system to confirm an intrusion
Mobile aerial platform	**Remotely piloted drones**	High when in flight	High	Good to excellent, depending on the sensors	Low to medium	Excellent and mobile	Excellent	Not with a single device	High	Flight time, weather, regulations, need for a pilot, and deployment time
Medium-range aerial vehicle	**Autonomous drones with a docking station**	High	High	Good to excellent	Low to moderate	Excellent and mobile	Excellent	Average: intermittent assignments	Very high	Limited availability during recharging; regulatory, meteorological, and aeronautical constraints
Medium-range ground-based	**Autonomous ground-based surveillance robots**	High	High	Good to excellent depending on the sensors	Average to good	Excellent and mobile	Excellent and close	High on planned routes	Average	Manual remote control is complex due to telecommunications latency; requires good route and mission planning
Staff	**Officers on foot**	High in the vicinity	High if visible	Good during the day; variable at night	Average	Average	Excellent with human judgment	Low to moderate over a large area	Very high and recurring	Highly visible, intermittent coverage, fatigue, distraction, slow speed, and exposure to danger
Personnel	**Officers in vehicles**	High	High	Good with appropriate equipment	Good	Average	Excellent	Average on accessible trails	Very high and recurring	Highly visible from a distance; blind spots between patrols; limited to vehicle-accessible roads; personnel and vehicle costs
Personnel	**Officers with dogs**	Very high, even for a hidden person	Average	Excellent, day and night	Good	High at close range	Excellent when handled by the dog handler	Low to moderate	Very high and recurring	Requires a specialist; limited duration of intervention; safety, insurance, and animal welfare constraints

** Relative TCO: total cost of ownership over the useful life, the level of which varies significantly depending on the size of the site and the required availability.*

© Glocal Robotics - Canada - June 2026