



**POLICE 1**

**HOW TO BUY**

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# **TACTICAL ROBOTS**

Key steps for product selection  
and purchase

# Introduction

Law enforcement capabilities have continuously evolved with the integration of advanced technologies. Today, fully autonomous, AI-driven robots, alongside wired, radio-controlled and semi-autonomous systems, have become essential tools for officers, enhancing safety and operational efficiency in complex environments.

These sophisticated robots enable officers to extend their senses beyond natural capabilities, allowing them to visually and audibly assess situations from a distance, navigate through inaccessible or hazardous areas and interact with potentially dangerous objects without direct human involvement.

Tactical robots are instrumental in a broader range of applications, including bomb threat management, hostage and active shooter resolution, search and rescue missions, security within correctional facilities, protection of critical infrastructure and much more. Their deployment in public health emergencies, such as pandemics, for tasks like disinfection and delivery of medical supplies, underscores their versatility and growing importance.

This updated Police1 guide aims to provide law enforcement agencies with the latest insights on evaluating and integrating cutting-edge robotic technologies into their operational toolkit. It reflects on the advancements in robot autonomy, AI and machine learning, offering guidance on leveraging these developments to enhance public safety and operational effectiveness.

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REMINDER: Every department is subject to local or state purchasing rules. Make sure to understand and follow the procurement process for your department and take advantage of services provided by your city or county purchasing department.



**KEY CONSIDERATIONS  
BEFORE PURCHASING  
A ROBOT**



To many, the term “robot” still evokes images of sci-fi icons like R2-D2 and C-3PO. However, the current reality of law enforcement robotics far surpasses these fictional concepts, featuring not only advanced wheeled or treaded platforms but also aerial drones and agile, quadruped robots equipped with state-of-the-art sensory technologies.

These modern enforcers come with an array of tools including high-definition visible and thermal imaging cameras, manipulator arms for complex interactions and sophisticated communication systems for one- or two-way audio. Enhanced capabilities feature LIDAR for precise mapping and navigation, advanced motion detection sensors and equipment for non-invasive environmental monitoring, such as airborne chemical detectors. Additionally, they can be outfitted with non-lethal response options like TASERs, tear gas launchers and even innovative crowd control solutions such as water cannons or sound devices.

As law enforcement agencies increasingly turn to tactical, hazmat, EOD (explosives) or patrolling robots to augment their capabilities, understanding the intricacies of developing a comprehensive robot program becomes crucial. This involves not only a deep dive into the types of missions these robots will undertake but also a strategic approach to selecting payloads that meet diverse operational needs effectively.

**The following key considerations are essential for departments aiming to integrate advanced robotic systems into their operations:**



# Robot categories

Law enforcement robots have evolved into more specialized and advanced categories, including tactical, hazmat, EOD (explosives), patrolling, and now also include support and surveillance drones, as well as autonomous intervention units.

## 1. Tactical robot

Tactical robots are now equipped with advanced navigation systems, allowing them to operate in diverse environments including urban, rough terrain and water-adjacent areas. They feature enhanced two-way audio, high-definition video capabilities and adaptive lighting systems. Modern tactical robots may also come with manipulator arms for intricate tasks, broadening their utility in operational scenarios.

## 2. Hazmat robot

The hazmat robot category has seen significant advancements, with the integration of AI for real-time data analysis, improving the detection and identification of hazardous materials. These robots now support a wider array of sensors simultaneously, reducing the need for manual sensor swapping and accelerating response times in critical situations.

## 3. EOD robot

EOD robots remain pivotal in handling explosive devices but have been upgraded with precision robotics, offering finer control over manipulator arms and tools. Enhanced portable X-ray systems and bomb-disposal technologies, including laser-based neutralization options, allow for safer and more effective disarmament procedures.

## 4. Semi-autonomous patrol robot

Semi-autonomous patrol robots have evolved beyond their initial scope, now featuring full autonomy capabilities. These robots are equipped with AI-driven anomaly detection, facial recognition for wanted individuals and can perform continuous surveillance across larger areas. They are used in a variety of settings from public spaces to sensitive installations, providing a visible deterrent and rapid response capability.



## 5. Support and surveillance drones

A new category reflecting the rise of aerial technology in law enforcement. These drones offer aerial surveillance, crowd monitoring and can carry payloads for specific missions, including lifesaving equipment or non-lethal crowd control options. They are invaluable for gaining vantage points in complex scenarios and extending the operational reach of ground forces.

## 6. Autonomous intervention units

Representing the cutting edge in robotics, these units are designed for direct intervention in high-risk situations. Equipped with AI decision-making capabilities, they can autonomously navigate to scenes, perform reconnaissance and even apply non-lethal force under remote human supervision. Their deployment aims to minimize the risk to human officers and civilians alike.



# Defining the missions

Identifying the specific missions for which your robot will be deployed is a critical initial step in the procurement process. With the rapid evolution of technology, robots initially purchased for a singular purpose often find utility in unforeseen applications, showcasing their versatility and adaptability.

Examples of modern mission types and associated payloads include:

- **Enhanced bomb disposal:** Beyond mere location and disarmament, robots now employ advanced manipulation tools and AI-driven decision-making algorithms to handle explosive devices more safely and efficiently. This includes precision removal, disarmament and even remote detonation in controlled environments.
- **Suspect apprehension and surveillance:** Utilizing not only visual and thermal imaging but also facial recognition and movement pattern analysis, robots can track and monitor suspects with minimal risk to law enforcement personnel. These capabilities have been further refined to support non-lethal measures for incapacitating suspects when necessary.
- **Advanced situational awareness:** Today's robots integrate seamlessly with command systems, providing real-time data feeds, including 360-degree imaging and live video, to offer comprehensive scene visualization. This integration supports strategic decision-making and operational planning.
- **Scene analysis and reconstruction:** Leveraging LIDAR and 3D mapping technologies, robots can now quickly analyze crime or accident scenes to create detailed reconstructions. This capability is crucial for investigations and in situations where the environment is too hazardous for immediate human entry.
- **Logistical support in critical situations:** Robots are equipped to deliver essential items such as medical supplies, communications devices or even non-lethal deterrents to specific locations, minimizing the exposure of officers to potential threats. Innovative uses, such as the delivery of items to meet unique demands during standoffs, demonstrate the flexibility of robotic support in crisis resolution.



As robotics technology continues to advance, the scope of potential missions expands, emphasizing the importance of collaboration with similar organizations to share insights and experiences. The development of a multi-agency robotics program can offer substantial benefits, including cost sharing, unified training programs and coordinated response strategies, enhancing overall efficiency and effectiveness.

Robotics programs typically integrate into existing personnel structures, with designated operators taking on these responsibilities alongside their primary duties. As these programs grow and evolve, it becomes essential to ensure that trained operators are available across all shifts and units, underscoring the importance of comprehensive training and readiness for a wide range of scenarios.



## Robot payloads and features

Today, the baseline for law enforcement robots includes not only high-definition cameras and advanced illumination options but also foundational AI capabilities and autonomous navigation systems. These core features are supplemented by an array of potential payloads that extend and specialize the robot's functionality for specific missions.

Modern robots are designed with modularity and adaptability in mind, featuring universal mounts and quick-connect systems that allow for the rapid reconfiguration of payloads. This flexibility supports a wide range of operational needs, from surveillance and reconnaissance to tactical intervention and hazard detection.

Key advancements and considerations include:

- **Enhanced sensory capabilities:** Beyond basic cameras and spotlights, robots now come equipped with multi-spectral imaging, including thermal and night vision, LIDAR for detailed environmental mapping and sonar for operations in aquatic environments. These capabilities ensure operational effectiveness in a variety of settings and conditions.
- **Modular payload systems:** The shift toward fully modular systems enables the quick swap of payloads to suit specific mission requirements. This can include advanced manipulator arms for bomb disposal or evidence collection, specialized sensors for chemical, biological, radiological, and nuclear (CBRN) threats, and various non-lethal options for crowd control and suspect apprehension.
- **Autonomy and AI integration:** Robots are now more autonomous, capable of performing complex tasks with minimal human oversight. AI-driven decision-making enhances their ability to navigate, identify threats and even interact with their environment in meaningful ways, making them invaluable partners in law enforcement operations.
- **Communication and integration:** Enhanced communication capabilities ensure seamless integration with existing law enforcement systems, allowing for real-time data sharing and coordination. This integration is vital for situational awareness, command and control, and coordinated response efforts.



# Robot specifications and safety features

Separate from payloads, there are several general features and specifications of note:

- **Enhanced collision detection and avoidance systems:** Utilizing a combination of LIDAR, radar and machine vision, robots can now more effectively navigate complex environments, avoiding obstacles with greater precision and safety.
- **High-definition cameras with advanced stabilization:** Cameras now offer 4K resolution or higher, featuring sophisticated image stabilization technologies that deliver clear and stable footage even in challenging conditions.
- **Real-time 360° video feed:** Incorporating panoramic cameras, robots provide a live 360-degree video feed, offering operators comprehensive situational awareness without blind spots.
- **Advanced intelligent battery systems:** Next-generation battery systems not only offer extended operational life but also include predictive analytics to forecast power needs and optimize usage based on mission parameters.
- **Adaptive operator interface:** Modern robots feature AI-enhanced operator systems that adapt to user preferences and highlight critical information, enhancing decision-making and operational efficiency.
- **Dynamic speed and operational range:** With improvements in propulsion and energy efficiency, robots can now operate at variable speeds and at greater distances from the operator, suited to a range of mission needs.
- **Multi-operator coordination:** Enhanced control systems allow for seamless coordination among multiple operators, each managing different aspects of the robot's functions or a fleet of robots for complex operations.



There are also several key safety features to consider when evaluating robot options:

- **Smart Return-to-Home (RTH):** Leveraging advanced navigation and environmental awareness, the RTH feature now includes obstacle avoidance during autonomous return, ensuring the robot's safe return to its starting point under varied conditions.
- **Predictive Low-Battery Return (LBR):** This feature has been enhanced with AI to predict battery depletion more accurately, taking into account the current mission profile and environmental factors to initiate an early return if necessary, ensuring the robot never runs out of power unexpectedly. Emergency override and safety protocols: New emergency features allow operators to quickly take control or activate predefined safety protocols, including immediate cessation of movement or securing of payloads, in response to unexpected situations.
- **Environmental adaptability:** Robots are now equipped with sensors to detect and adapt to environmental conditions, such as smoke, dust or chemical hazards, adjusting their operational parameters to maintain performance and safety.

These updates reflect the rapid progress in robotics technology and its application in enhancing law enforcement capabilities, ensuring that robots are not only more capable but also safer and more reliable tools for public safety operations.



## Performance and support considerations

There are several features and factors to consider related to robot performance and general support of the product:

- **Extended battery life and energy efficiency:** Advances in battery technology and energy management systems have significantly increased operational times, reducing the need for frequent recharging and enhancing endurance for extended missions.
- **Rapid charging solutions:** The development of ultra-fast charging technologies minimizes downtime, ensuring robots are quickly ready for deployment. Compatibility with universal charging standards allows for greater flexibility across different types of equipment.
- **Advanced multi-operator interface:** Enhanced control systems now support seamless handoff and collaboration between multiple operators, allowing for complex multi-tasking and coordination during operations.
- **Intelligent obstacle navigation:** Incorporating AI, robots can now intelligently navigate and adapt to complex environments, improving their ability to autonomously detect and avoid obstacles with minimal operator intervention.
- **Comprehensive manufacturer and community support:** Beyond traditional support, manufacturers now offer access to extensive online knowledge bases, user communities and real-time support services, facilitating rapid resolution of issues and sharing of best practices.
- **Predictive maintenance and remote diagnostics:** Leveraging IoT and cloud technologies, robots can self-diagnose potential issues and schedule maintenance, supported by manufacturer services for remote troubleshooting and updates.
- **Customized training programs:** Tailored training solutions, including virtual reality simulations, ensure personnel are proficient in operating advanced robotic systems, with continuous learning opportunities to keep pace with technological advancements.



- **Modular parts and accessories ecosystem:** A more standardized and modular approach to parts and accessories allows for easy customization and repair, with transparent pricing and availability information to support effective budgeting and procurement strategies.
- **Enhanced durability and environmental adaptability:** Robots are designed with robust materials and adaptive systems to withstand diverse operational environments and conditions, ensuring reliability and stability even in challenging scenarios.
- **User-centric design and interface:** Innovations in user interface design focus on intuitiveness and customization, making it easier for operators of all skill levels to effectively control and interact with the robot.

Engaging in discussions with robot manufacturers about these updated considerations is crucial. Inquiries should explore how the latest innovations and support systems can meet the specific needs of your agency, ensuring the robots provide optimal performance, reliability and value. This includes understanding the roadmap for future upgrades and how the manufacturer plans to address evolving operational challenges and technological advancements.



# Robot costs

Identifying the specific missions for a robotic unit lays the groundwork for determining its cost-effectiveness and suitability. However, several additional factors must be taken into account to ensure the selected robot aligns with the organization's operational demands and budgetary constraints. These include enhanced operational capabilities, adaptability and environmental resilience.


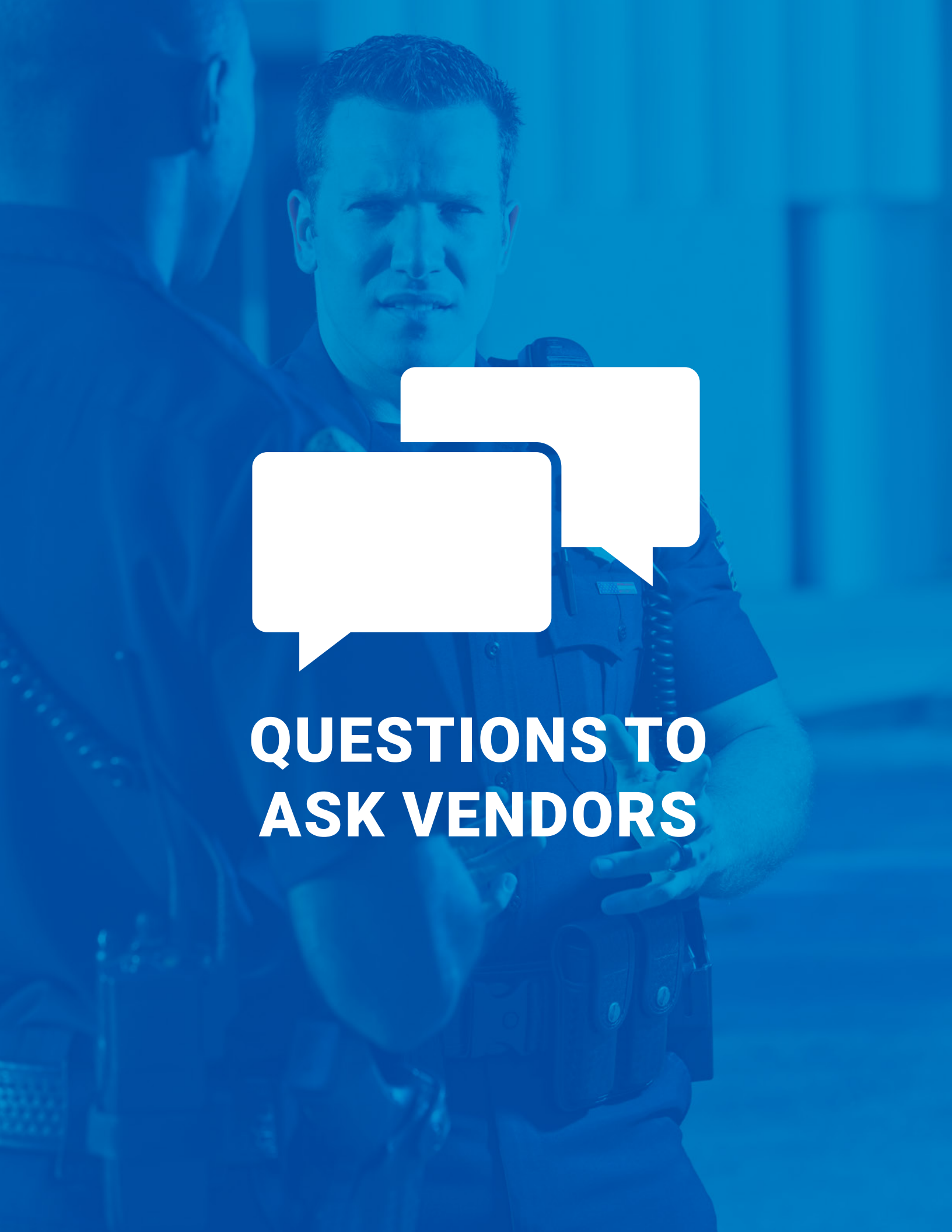
- **Enhanced operational time:** With advancements in battery technology and energy efficiency, operational time has significantly improved. Robots now feature longer duty cycles and quick-swap energy modules, minimizing downtime during missions. Assessing the endurance of a robot is crucial to ensure it meets the demands of extended operations without frequent recharging or battery swaps.
- **Advanced speed and connectivity range:** The mobility and operational range of robots have seen substantial improvements, with enhanced communication systems ensuring reliable control over greater distances and in complex environments. Evaluating the speed and range capabilities is essential for missions requiring rapid deployment or operations over expansive areas.
- **Compact design and modular portability:** Robots now come in more compact and modular designs, enhancing portability without compromising functionality. Innovative solutions, such as collapsible or reconfigurable structures, allow for easy transport and deployment, even in constrained spaces. Consideration of the robot's size and portability options, including specialized carrying mechanisms, ensures seamless integration into field operations.
- **Adaptability to geography and climate conditions:** The latest robots are engineered to operate across a broader spectrum of geographic and climatic conditions. They feature adaptive systems for terrain negotiation and climate resilience, capable of functioning efficiently in extreme temperatures, wet conditions and challenging terrains. Selecting a robot that can adapt to specific environmental factors – whether operating in urban landscapes, rugged terrains or under adverse weather conditions – is paramount for maintaining operational effectiveness.



## Data management & security

The data generated by robots – ranging from high-resolution imagery and video to complex datasets from advanced sensors – plays a critical role in law enforcement operations. Ensuring seamless integration with contemporary electronic records management systems is essential for operational efficiency and data integrity. As a result, agencies should keep the following in mind:

- **Advanced integration capabilities:** Modern robots are equipped with versatile connectivity options, supporting integration with a variety of digital infrastructure and records management systems. This integration facilitates the automatic tagging, storage and retrieval of data, enhancing the effectiveness of evidence management protocols.
- **Chain of custody and data security:** With the increasing use of robotic systems for evidence collection, establishing robust chain of custody protocols for digital evidence is paramount. This includes secure data storage on encrypted onboard memory cards and the implementation of audit trails to track access and modifications, ensuring that evidence remains admissible in court.
- **Regulatory compliance and camera security:** The concerns regarding foreign-manufactured components, especially cameras, have led to stringent regulatory requirements, including compliance with updated versions of the National Defense Authorization Act (NDAA). Agencies must ensure that all components, particularly those involved in data capture and communication, meet these compliance standards in order to maintain operational security and integrity.
- **Enhanced encryption standards:** The standard for data security has evolved, with end-to-end encryption becoming a baseline requirement for all data transmission, including live video feeds and command-and-control signals. This encryption safeguards against unauthorized access and cyber threats, ensuring the confidentiality and integrity of sensitive operational data.
- **Global positioning and anonymization technologies:** In response to privacy concerns, modern robotic systems incorporate features for the anonymization of identifiable information within data streams, in real-time, when required by privacy laws or policies. Additionally, geofencing technologies are employed to restrict robotic operations within authorized areas, further enhancing data security and compliance with regulatory standards.



# **QUESTIONS TO ASK VENDORS**



A vendor's website is a great place to start your research and narrow your choices. Be sure to review testimonials from satisfied clients.

Visit tactical robot vendors at tradeshow and ask specific questions.

As the procurement process advances, connect with your top vendor choices about scheduling an in-person visit – a great opportunity to involve other decision-makers and to get more questions answered.

**Here are some suggested questions to ask vendors during the purchasing process:**



- Can you detail the range of robotic systems your company offers, including fully autonomous, AI-enhanced, tethered and remote-operated models?
- What are the pricing models for your robotic systems, and do you offer bundled packages for accessories or multi-unit purchases?
- Can you describe the AI capabilities of your robotic systems? How do they enhance operational efficiency and decision-making in field applications?
- Could you explain the data privacy and security measures in place, especially concerning the collection, analysis and storage of data by the AI systems?
- What training and support do you provide for operators to effectively utilize the AI functionalities of your robots?
- Could you highlight the unique capabilities of your robotic systems, specifically:
  - Advanced navigation and mobility in challenging terrains and multi-level structures
  - Sophisticated obstacle and edge detection systems
  - Integration of LIDAR for precise mapping and environment understanding
  - Capabilities for detecting radiation and chemical threats with real-time analysis
  - Enhanced illumination options for low-light operations
  - Modular payload systems for task-specific customization
  - Options for non-lethal and less-than-lethal operational capabilities
  - Support for coordinated operation by multiple controllers
  - Advanced energy management features including predictive low-battery alerts and automated return-to-base functions
  - Additional innovative features that distinguish your robots from competitors



- Is specialized transportation equipment required for the robot, and if so, what are the specifications and additional costs?
- What are the physical dimensions and weight of the robot, and does it support easy transport options such as carry handles or compatibility with standard tactical packs?
- What is the average deployment time for the robot from arrival on the scene to operational readiness?
- Can the robot withstand impacts from falls or collisions, specifically from significant heights onto hard surfaces?
- What are the submersible capabilities of the robot, including depth and duration, for underwater operations?
- Could you provide details on the battery life under various operational conditions and the required charging time to reach full capacity?
- What are the operational speed and range limits for your robot, both in distance from the controller and in autonomous navigation modes?
- What video and imaging options are available, including camera resolutions, frame rates and low-light performance?
- What is the estimated training duration for operators to achieve proficiency with the robot, and do you provide ongoing training support?
- How is routine maintenance managed for your robots, and what are the protocols for software updates or repairs?
- Are there additional costs associated with software updates or accessing an extended suite of operational features?
- What recommendations do you have for procuring parts and accessories in the future, especially considering potential discontinuations or updates?
- Do you offer around-the-clock customer support, and what are the typical response times and resolutions rates?
- What cybersecurity measures are implemented to safeguard against unauthorized access, data breaches, and potential system hacking?

# TACTICAL ROBOTS

# COMPANY DIRECTORY



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