

MONTHLY EXECUTIVE BRIEFING

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Uninhabited ground vehicles: evolution, military applications and market opportunities

Uninhabited ground vehicles (UGVs) span abroad spectrum of sizes and configurations, from small backpackable systems used for reconnaissance and explosive ordnance disposal (EOD) missions to larger purpose-built tactical platforms and uncrewed or crewed versions of trucks and armoured vehicles. They have been in service for several decades but are now evolving to perform a wider range of tasks and taking increasingly diverse forms, including ambulatory or legged robotic systems (which include humanoids and ‘robot dogs’). Advances in artificial intelligence (AI) are also enabling systems to perform more tasks with less direct human control.

Although demand for these systems remains lower than for uninhabited aerial vehicles (UAVs), expanding funding and demand for UGVs – in Ukraine in particular – presents significant business opportunities in both AI software and hardware manufacturing. Europe is accelerating the development and deployment of UGVs, but its dependence on China and relatively low demand serve as obstacles.

- While UGVs have been in service since the 1970s, they are evolving to perform a broader range of roles, acquiring more autonomy and taking increasingly diverse forms, including ambulatory robotic systems.
- Growing UGV investment and demand are creating significant opportunities for firms in the fields of AI software and hardware manufacturing, with the global UGV market expected to be worth US\$13.4 billion during 2025–34.
- Europe is accelerating the development and deployment of UGVs, but challenges remain, including relatively limited demand and continued reliance on China for key supply-chain inputs.

GSIS 2026 News

- **More speakers confirmed:**
Rodrigo da Costa, Executive Director of the EU Agency for the Space Programme (EUSPA), will provide insights into the growing strategic importance of Europe’s space capabilities. **The Lord Sedwill GCMG**, former UK National Security Adviser and Cabinet Secretary, joins the programme with his extensive expertise in geopolitics, security and international affairs. **Hans Beyer**, Head of Defence at SEB, and **Dr Markus Schillo**, Senior Regional Representative Germany at the European Investment Fund (EIF), will contribute to discussions on financing defence innovation and scaling dual-use technologies across Europe.
- **More speaker announcements coming soon:** Additional high-level speakers will be revealed in the coming weeks via the **GSIS LinkedIn channel**.



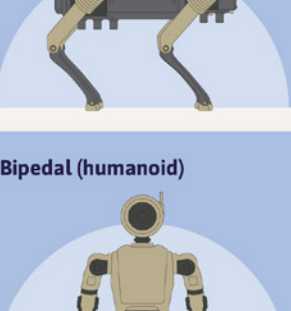
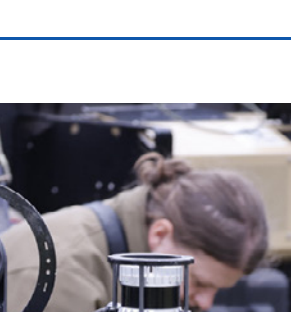
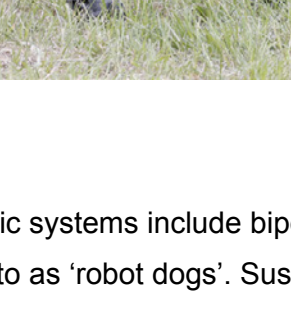
Evolution of UGVs

UGVs have been in service with armed forces for many decades but are now evolving rapidly and assuming increasingly important roles in military operations. In the 1970s, the British Army introduced the Wheelbarrow, a remotely controlled system developed for EOD during the conflict in Northern Ireland. The system significantly reduced the risks faced by bomb-disposal teams. During United States counter-insurgency operations in Iraq and Afghanistan, remotely operated ground vehicles were widely used to detect and dispose of improvised explosive devices.

Today, UGVs span a broad spectrum of sizes and configurations, from small backpackable systems used for reconnaissance and EOD missions to bigger purpose-built tactical platforms and, at the larger end, uncrewed or crewed versions of trucks and armoured vehicles. While EOD types remain among the most prevalent forms of UGVs, platforms are increasingly taking on a wider range of tasks. The Armed Forces of Ukraine have deployed thousands of UGVs on the battlefield for logistics, infantry support, casualty evacuation and combat missions. Notably, in July 2026 a UGV was deployed to the Russian-occupied Kinburn Spit in the Black Sea via an uninhabited surface vehicle, marking the first operational combination of these platforms in a complex amphibious mission.

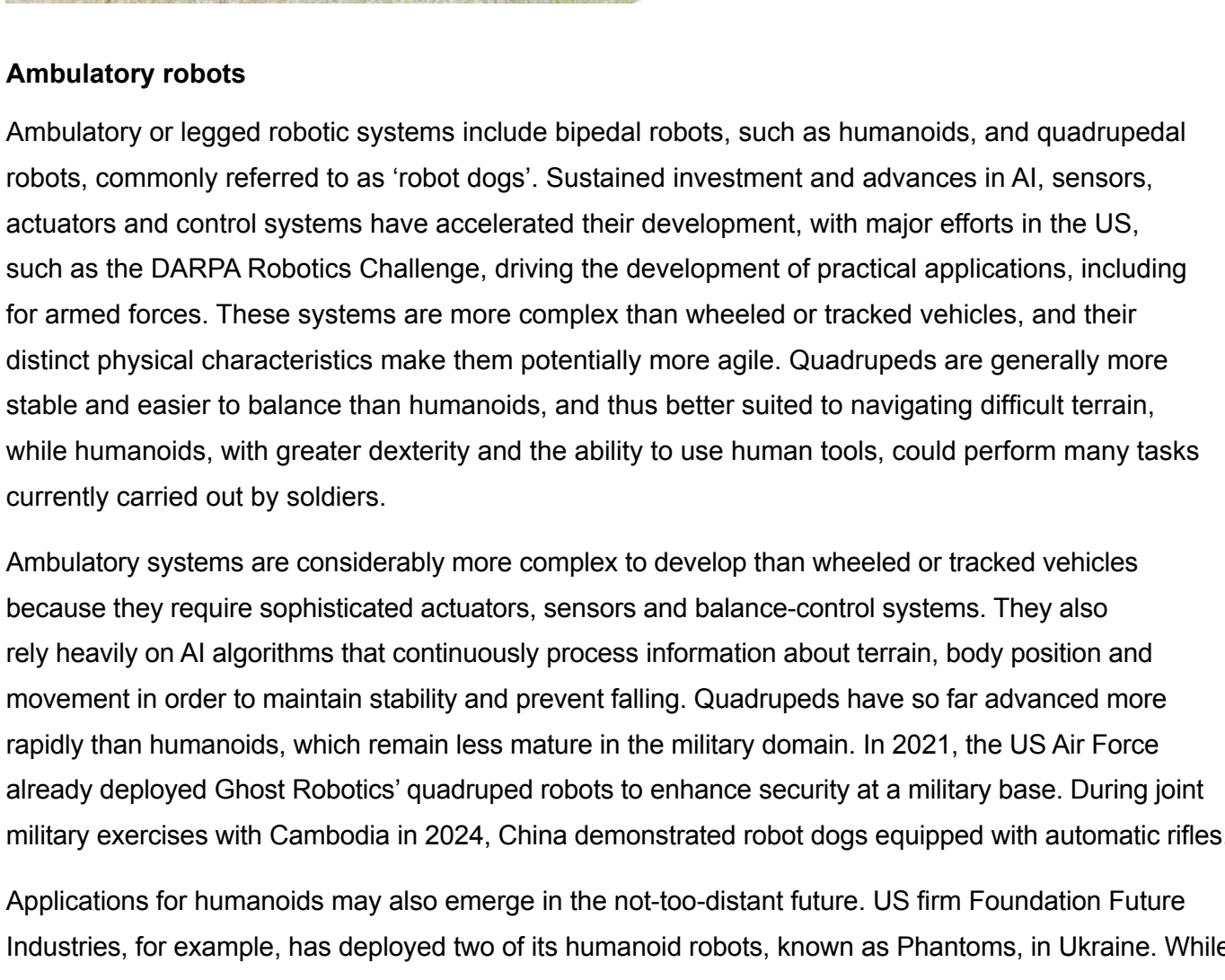
Moreover, UGVs are becoming increasingly autonomous. While most remain remotely operated, advances in AI are enabling systems to perform more tasks with less direct human control. UGVs now perceive and interpret their surroundings, navigate independently, make operational decisions and continue functioning even after losing contact with human operators. However, highly autonomous military systems have yet to be deployed at scale. Fully autonomous UGVs may remain years away from widespread battlefield use and are likely to face opposition because of ethical concerns.

Types and characteristics of UGVs (by movement)

Typical roles	Type	Advantages	Limitations
• Combat missions • Logistics and resupply • Infantry support • Casualty evacuation • Patrol and security missions • Explosive ordnance disposal • Reconnaissance	Tracked 	• Strong traction and obstacle-crossing ability over churned ground, trench lines, mud and snow	• Lower road speed than wheeled systems • Higher maintenance burden due to track wear
	Wheeled 	• High road speed and efficiency • Mechanically simpler and easier to maintain • Can leverage automotive design and mass-production expertise	• Less effective in deep mud, sand and snow • More constrained by steep terrain and high vertical obstacles
• Logistics and material handling • Explosive ordnance disposal • Base and perimeter security • Reconnaissance • Potential support for maintenance, inspection, logistics and other soldier tasks	Quadrupedal (legged) 	• More stable and easier to balance than humanoids • Well suited to uneven terrain, stairs and obstacles • More technologically mature than humanoids	• More complex and costly than wheeled or tracked systems
	Bipedal (humanoid) 	• High dexterity and manipulation potential • Can potentially use tools, equipment and infrastructure designed for humans • Potentially more adaptable in human-built environments	• Least mature of the major UGV forms • More difficult to balance and stabilise than quadrupeds • Highly complex and costly to develop

Source: IISS research

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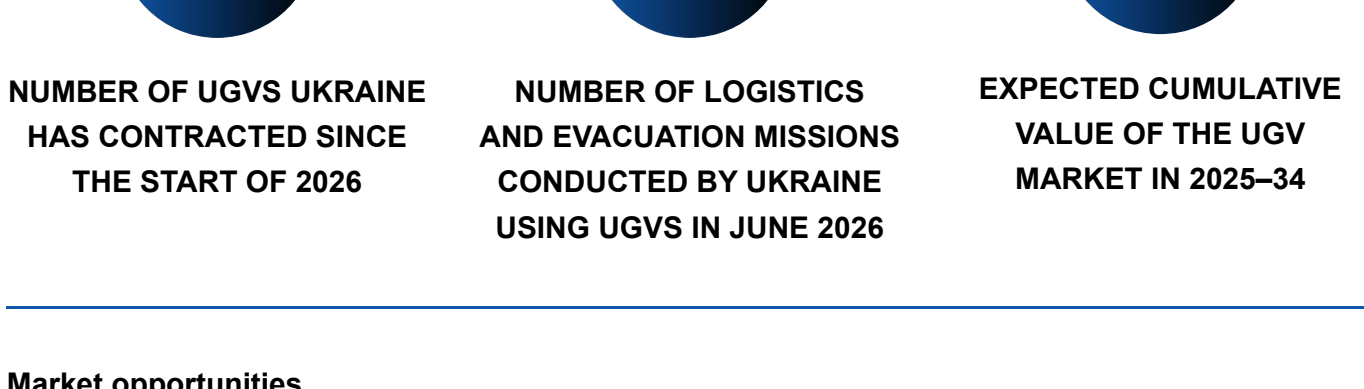


Ambulatory robots

Ambulatory or legged robotic systems include bipedal robots, such as humanoids, and quadrupedal robots, commonly referred to as ‘robot dogs’. Sustained investment and advances in AI, sensors, actuators and control systems have accelerated their development, with major efforts in the US, such as the DARPA Robotics Challenge, driving the development of practical applications, including for armed forces. These systems are more complex than wheeled or tracked vehicles, and their distinct physical characteristics make them potentially more agile. Quadrupeds are generally more stable and easier to balance than humanoids, and thus better suited to navigating difficult terrain, while humanoids, with greater dexterity and the ability to use human tools, could perform many tasks currently carried out by soldiers.

Ambulatory systems are considerably more complex to develop than wheeled or tracked vehicles because they require sophisticated actuators, sensors and balance-control systems. They also rely heavily on AI algorithms that continuously process information about terrain, body position and movement in order to maintain stability and prevent falling. Quadrupeds have so far advanced more rapidly than humanoids, which remain less mature in the military domain. In 2021, the US Air Force already deployed Ghost Robotics’ quadruped robots to enhance security at a military base. During joint military exercises with Cambodia in 2024, China demonstrated robot dogs equipped with automatic rifles.

Applications for humanoids may also emerge in the not-too-distant future. US firm Foundation Future Industries, for example, has deployed two of its humanoid robots, known as Phantoms, in Ukraine. While little is known about their performance, the company announced its plan to produce 50,000 units by the end of 2027 for both commercial and military use. China has demonstrated the most sophisticated humanoid robots in the civilian sector, such as Unitree Robotics’ G1 and H2, although it has not yet publicly unveiled comparable military humanoid systems. Boston Dynamics’ Atlas, one of the most advanced humanoid robots currently available, is restricted to civilian applications, though its underlying technologies could potentially be adapted for military functions such as surveillance and logistics.



>22,000

NUMBER OF UGVs UKRAINE HAS CONTRACTED SINCE THE START OF 2026

>16,600

NUMBER OF LOGISTICS AND EVACUATION MISSIONS CONDUCTED BY UKRAINE USING UGVs IN JUNE 2026

US\$13.4 BILLION

EXPECTED CUMULATIVE VALUE OF THE UGV MARKET IN 2025–34

Market opportunities

Demand for UGVs is increasing, although it remains far lower than demand for UAVs. According to Ukraine’s Ministry of Defence, its armed forces conducted more than 16,600 logistics and evacuation missions using UGVs in June 2026 alone, a 122% increase since January 2026. Ukraine has contracted through 2025 – with additional procurement still under way – the nearly twice the total contracted throughout 2025 – with additional procurement still under way. The global UGV market is estimated to be worth US\$13.4bn during 2025–34, with the US accounting for nearly 20% of global spending and China catching up with US spending.

This expanding funding and demand for UGVs presents significant business opportunities in both AI software and hardware manufacturing. On the software side, there will be significant demand for AI software that will allow UGVs to gain greater autonomy. AI systems will also play an important role in training and testing these systems, both in real-world environments and through simulation, to improve their accuracy, reliability and safety. Edge AI – or AI deployed directly on local devices – represents another important opportunity, as models capable of running directly aboard UGVs would allow them to process information collected by cameras, radar, light detection and ranging (lidar) and other onboard sensors, and make decisions without relying on continuous access to cloud computing or external communications networks.

On the manufacturing side, the global automobile industry is particularly well positioned to enter the UGV market, especially in the development of wheeled systems that share many characteristics with conventional vehicles. Car manufacturers already possess expertise in vehicle design, propulsion systems, power management and large-scale manufacturing. Their established supplier networks and ability to produce complex vehicles efficiently and at scale could also help reduce costs and accelerate the mass production of military UGVs. The growth of the UGV market is likely to generate opportunities across a much broader industrial ecosystem, which includes batteries, semiconductors, sensors, actuators, cameras and communications equipment.

“10 years from now if the first person through a breach isn’t a ... robot, shame on us.”

Robert O. Work, US Deputy Secretary of Defense, 2015

“Everyone must understand: this is about saving lives. Logistics on the front line, evacuation of the wounded, combat missions – the use of UGVs is now expanding at the fastest pace. And this is exactly how it should be.”

Volodymyr Zelenskyy, President of Ukraine, April 2026

“With the emergence of a large number of drones of different kinds, unmanned combat has brought about profound changes in warfare.”

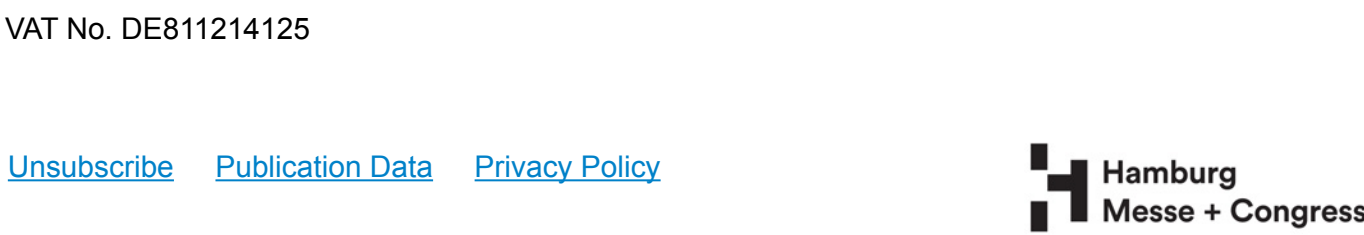
Xi Jinping, President of the People’s Republic of China, July 2020

UGVs in Europe

As pioneers in UGVs, European companies are accelerating the development and deployment of systems. Estonian firm Milrem Robotics has already battle-tested its TheMIS UGV and is developing next-generation armoured combat platforms with advanced AI systems and significant armament, named HAVOC and Vector. ARX Robotics, backed by the NATO Innovation Fund, has developed and begun manufacturing its GEREON UGVs at scale, some of which have been deployed by the German armed forces and in Ukraine.

However, challenges remain. Despite growing interest in UGVs for a wider range of applications, demand from European armed forces beyond traditional EOD missions has so far remained relatively limited. In addition, lacking sufficient domestic capacity to manufacture many systems and components at scale, European countries remain heavily dependent on Chinese companies, particularly batteries, magnets and key electronics. Europe’s advancement in the UGV field will require sustained demand signals that incentivise private firms to invest in and expand UGV development and production, and a simultaneous reduction in dependencies on China by strengthening domestic industrial capacity, increasing investment and diversifying critical supply chains.

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