CAPRA ROBOTICS®

[ONE ROBOT – MULTIPLE APPLICATIONS]

INSPECTION & SURVEILLANCE

LOGISTICS

URBAN MAINTENANCE

2024
ROBOTICS BUSINESS REVIEW
RBR50
INNOVATION AWARDS

CONTENTS

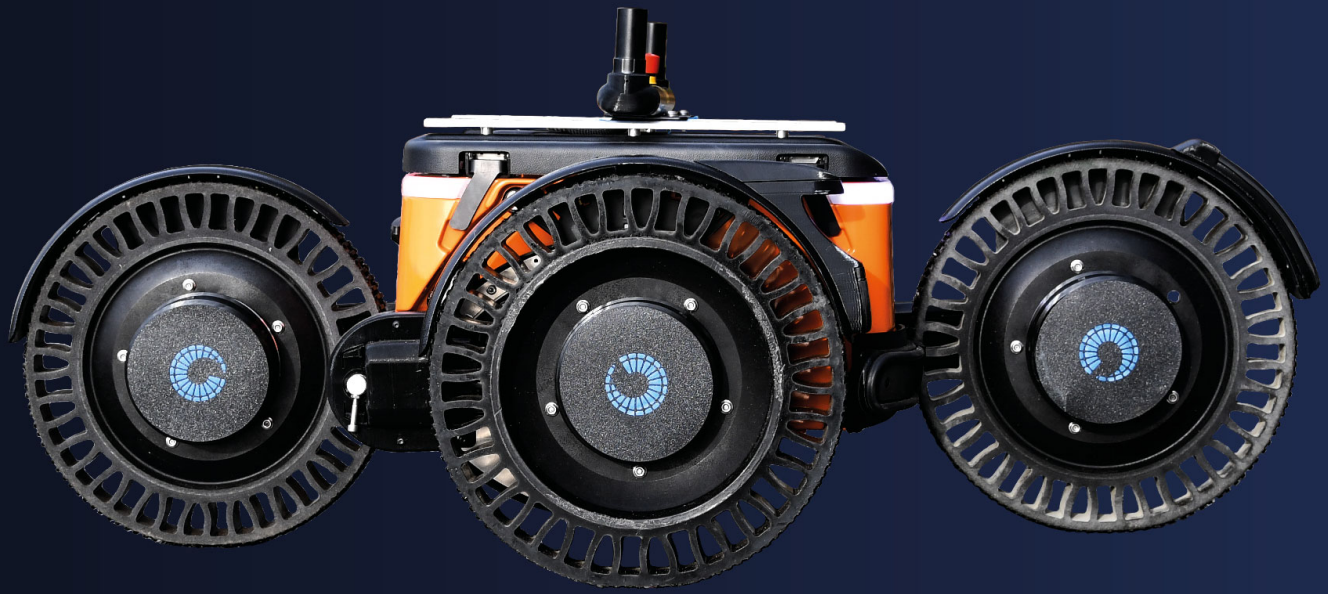
CAPRA ROBOTICS®

For too long, businesses have relied on manual labor to complete dangerous, repetitive, or time-consuming tasks. Heavy reliance on manpower puts companies at risk due to increased labor shortages and costs of labor. To stay competitive and scale their businesses, companies need new automated solutions for a wide range of tasks – and in new domains. That is where we come in. CAPRA ROBOTICS® is on a mission to combat labor shortages and eliminate dull, dirty, and dangerous tasks using state-of-the-art mobile robots.

We believe in the power of one – a single mobile robot platform designed to serve a multitude of applications in both indoor and outdoor settings. Our highly adaptable robots can be customized to fit a wide range of applications and provide you with dependable mobility for everything from perimeter control to production logistics and beyond. Its versatile and modular design grants you limitless flexibility.

We have empowered industry-leading companies and organizations, such as Lockheed Martin, EDF Energy, U.S. Air Force, and Deutsche Telekom to transform the way they operate. Our work has been recognized by internationally renowned Odense Robotics as Robotics Company of the Year in 2022, by T-Systems with a Bestform Award in 2022 in their IoT category, and by The Robot Report with an RBR50 Innovation Award in 2024.

If you're ready to take your business to the next level with the best mobility on the market, scan the QR codes on the back to learn more and schedule a demo. Let us help you take the first step toward a more efficient and automated future. Together, we will redefine what is possible in your industry.



SUBSTATION INSPECTION

[ENHANCING SUB STATION INSPECTIONS WITH MOBILE ROBOTS]

Electrical substations, vital nodes in power generation and distribution, face inherent challenges in inspection and maintenance due to their remote and hazardous environments. Overcoming labor shortages, accessing remote locations, and meeting stringent compliance standards are constant hurdles that manual inspections or fixed cameras fall short in addressing.

ACTIONABLE INSIGHTS

Our AMRs address the unique challenges of inspecting electrical substations by performing autonomous patrols, delivering real-time alerts, and enabling remote monitoring. With our inspection solution, CAPRA SCOUT it becomes possible to reduce reliance on human labor and minimizes inspection costs. Its AI-powered analysis ensures early detection of issues, converting raw data into actionable insights, identifying potential problems like faulty valves, switches, and gauge readings for early detection.

FULL CONTROL

When in operation, continuous feedback integration optimizes routes and enhances future inspections, making your operations more efficient and reliable than ever. Need a closer look? Missions can be paused to gain remote control of the robot to diverge from the path and inspect points of interest in an instant from our cloud-based ground control center.

Reduce downtime and improve operational efficiency with CAPRA SCOUT.

PERIMETER CONTROL

[A COMPLETE SURVEILLANCE SOLUTION FOR SECURING YOUR PERIMETER]

Current workflows in perimeter security of ISPS-secured areas and other fenced high-value areas are executed by manpower and simple technology. Facility managers encounter critical challenges such as a shortage of skilled labor, heightened competition, and the imperative need for secure and accurate documentation. Traditional surveillance methods often fall short in addressing these challenges, leading to compromised security and operational inefficiencies.

INTUITIVE MISSION PLANNING

Through our cloud-based control center you can easily set up our inspection solution, CAPRA SCOUT, to conduct precise patrol routes and inspection tasks. SCOUT can navigate complex environments with ease, adapting to diverse terrains and obstacles while maintaining high efficiency. Experience the convenience of remote monitoring through a user-friendly interface, accessing live surveillance data anytime, anywhere. Need to inspect a specific area? Simply pause the automated mission and take manual control for an instant deep dive.

ARCHIVE AND LOG

With real-time data analysis, the robot identifies anomalies and potential threats on the spot, ensuring proactive and immediate responses. All surveillance data is automatically archived, creating detailed logbooks for compliance and insightful analysis. Seamlessly integrate CAPRA SCOUT into your existing security infrastructure for scalable, disruption-free operations.

Optimize your resources and elevate your perimeter control to unprecedented levels.

INTERLOGISTICS

[BRIDGING THE GAP BETWEEN INDOOR AND OUTDOOR LOGISTICS]

Manufacturing companies have long optimized their intralogistics to ensure smooth internal material flow. However, the transition from indoor to outdoor logistics presents a unique set of challenges for AMRs and AGVs such as crossing the gate, shifting weather conditions, and uneven terrain, which results in additional and undesired manual handling. Manual processes place companies at increased risk of errors, operational costs, and worst: interrupted value chains.

UNINTERRUPTED VALUE CHAINS

Our logistics solution, CAPRA CARRIER, seamlessly navigates both indoors and outdoors. Using an advanced vision system and satellite positioning, the robot ensures continuous logistics flows. Its dual-navigation system coupled with automated charging reduces the need for manual labor. Its IP65 rating and state-of-the-art safety features make it a reliable solution for any industrial setting, enabling you to overcome logistics challenges and achieve long-term productivity goals.

UP TO 500 KG LOADS

The system is designed with the flexibility to handle standard load carriers such as SLCs 600x400mm and pallet footprints of 1200x1000mm as well as customer- and industry-specific packaging. In effect, the solution supports top deck loads of up to 100 kg., in addition to carts and trailers with a payload of up to 500 kg.

Bridge the gap between indoor and outdoor logistics, today.

FOOD PROCESSING LOGISTICS

[REVOLUTIONIZING INTERNAL TRANSPORTATION IN FOOD PROCESSING]

Efficient logistics within food processing, particularly in slaughterhouses, are critical for maintaining freshness, quality, and safety standards. We want to enable you to avoid manual transport of heavy loads on slippery floors. Reduce the risk of workplace injuries and fatigue-related errors, while improving ergonomics and job satisfaction.

FIT FOR ANY ENVIRONMENT

Our logistics solution, CAPRA CARRIER, is IP65 rated and can withstand high humidity, cold rooms, water jets, and byproducts from industrial cleaning procedures. The robot can be easily sanitized with a water jet, allowing you to easily ensure its cleanliness and minimize contamination risks. The robot is designed to maneuver in rough terrain, and due to its flexible wheelbase, it can ease across sloped drainage systems, internal gate openings, and ramps.

PAINLESS IMPLEMENTATION

We deliver an end-to-end solution that integrates with all moving parts of your processing line. As part of the installation, we will provide the PLCs and switches for communication with all needed external systems, such as gate controls, conveyor systems, and light controls. AI-powered mapping with our onboard vision system ensures the solution is integrated and operational within hours.

Your path toward uninterrupted logistics flows starts here.

CIGARETTE REMOVAL

[OPTIMIZE CLEANING OF URBAN AREAS WITH MOBILE ROBOTS]

At an alarming rate, harmful cigarette butts have infiltrated our environment – especially in urban spaces. Cigarette butts are the most littered product in the world, with an estimated 4,5 trillion cigarette butts thrown away annually, and upwards of 75% end up in nature or on the street, releasing toxic heavy metals, microplastics and other pollutants.

EU INITIATIVES

Cigarette butts are classified as single-use plastics, which means that they are covered by The European Union's Single-Use Plastics Directive (SUP) and Extended Producer Responsibility (EPR). This effectively means that from 2025, manufacturers must bear the cost of removal, approximately €0.5 per cigarette. The current methods for removal are laborious and repetitive – a challenge further amplified by the current labor shortage trend. So even though the cost can be invoiced to the manufacturer, it is hard to find enough employees to do the task.

UPSKILLING EMPLOYEES

Our public mobile robot, CAPRA URBAN, guarantees a minimum of 80% cigarette removal through its AI-powered vision system. Covering up to 50,000 m² in a working day, our robots redefine efficiency and scale in litter collection. Our robots provide a unique opportunity to relieve and upgrade the skills of service employees to foremen of robots. One employee can oversee up to 5 robots at a time.

Boost your operations for tomorrow's needs, today.

DEICING PAVED AREAS

[MAKE THE ROADS SAFER WITH AUTOMATED DEICING SERVICES]

Keeping paved areas free from snow and ice is a core public task. Current methodologies, while effective to some extent, have revealed several drawbacks that hinder efficiency, safety, and sustainability. As we face increasing labor shortages and growing concerns about the environment, the need for innovative solutions has never been more critical.

CURRENT MEASURES

Conventional methods often put immense strain on limited resources, both human and financial. The use of excessive salt for deicing raises concerns about its negative impact on the environment, as salt can corrode underground pipes and cause damage to roads and sidewalks, leading to additional repair costs and environmental strain.

AUTONOMOUS OPERATIONS

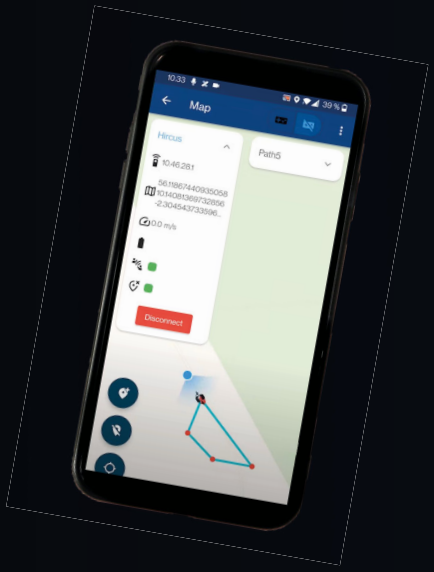
Our solution, CAPRA URBAN, is designed to operate autonomously, covering vast areas quickly and efficiently. This drastically reduces the need for manual labor and ensures prompt surface defrosting, even in the harshest conditions. Our solution can cover an area of 1800 m2 with a single tank. We utilize a Nordic Ecolabeled thawing agent which minimizes the harmful effects of excess salt on infrastructure and the environment.

Embrace transforming the way we approach deicing surfaces.

EQUIPMENT & SERVICES

[THE CAPRA ECOSYSTEM]

At CAPRA ROBOTICS®, we want to exceed merely providing you with exceptional robots. We want to provide you with an ecosystem of equipment and services that amplify your experience. We understand that adopting new technology is not just about the product; it's about the solution. That's why our additional equipment and service offerings are designed to be your tools on the road to excellence.



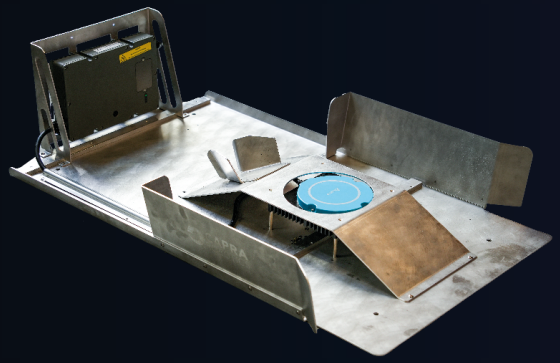
CAPRA COMMANDER APP

App-solute Control: We developed the CAPRA COMMANDER APP for you to speedily get started using our mobile robots. Regardless of experience, this intuitive app allows you to effortlessly deploy your first robot. It's the perfect tool to easily showcase their agility and precision.

A Preview of Possibilities: With the CAPRA COMMANDER APP, you can initiate mock missions and explore the various ways in which our robots can elevate your operations. It's a glimpse into the future of your business, where automation, efficiency, and innovation merge.

WIRELESS CHARGING

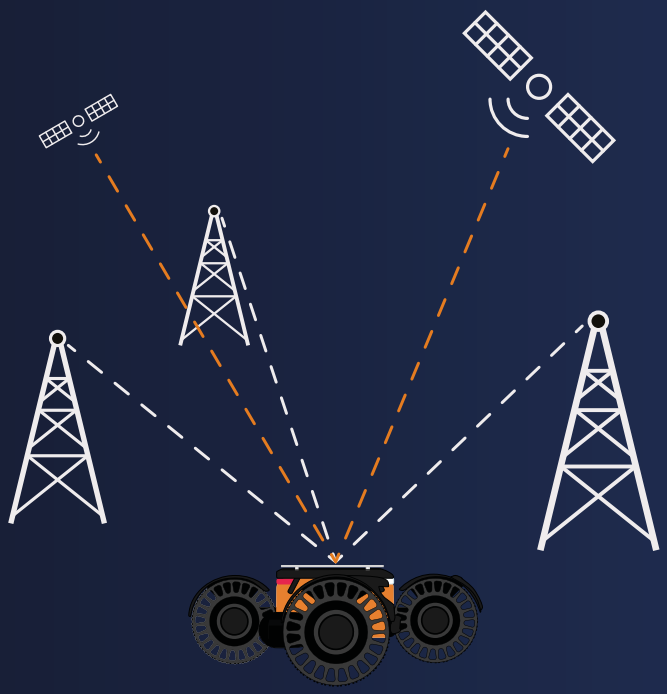
Wirelessly Empowering Automation: With the CAPRA CHARGING STATION, you can charge your robots automatically without any human intervention. Wave goodbye to days of manual charging that disrupts your logistics workflow. It's a revolution in convenience and efficiency, eliminating downtime and ensuring that your robots are always powered up and ready to tackle the next mission. It's not just about charging; it's about smart charging.



CONNECTIVITY AND PRECISE POSITIONING

Seamless Connectivity: We offer our customers state-of-the-art connectivity that ensures they are always receiving correction data via NTRIP. This connectivity paves the way for real-time data exchange, allowing you to monitor and manage your robots from anywhere in the world. It's the assurance that your logistics operations are always on track.

Accuracy Unlocked: Our precise positioning subscription offers unlimited RTK corrections for 4G NTRIP Client which enables your robots to navigate with unparalleled accuracy. This precision ensures that the robots do not deviate from the chosen path, thereby minimizing errors, and maximizing efficiency. It's a testament to our commitment to precision in every aspect of our solutions.



SERVICE AND SUPPORT

Unwavering Support: Our dedicated support team is available to assist you every step of the way. Whether it's initial setup, troubleshooting, or ongoing maintenance, we are here to ensure that your mobile robot operates at its peak performance.

Tailored Service Packages: We offer customizable service packages to cater to your unique needs. Whether you require regular maintenance, software updates, or training in the product, our service packages can be tailored to fit your specific requirements. With CAPRA ROBOTICS®, you are not just getting a robot; you're getting a comprehensive solution.

CAPRA200 & CAPRA500

[ONE ROBOT – MULTIPLE SIZES]

We provide one robot for multiple applications. This robot comes in two size variants: the Capra200 and Capra500. While both models share the same compact form factor, wheel frame, and advanced navigation systems, each is optimized for different operational needs.

BUILT FOR RANGE

The Capra200 is designed for applications that require extended operational range. With enhanced battery efficiency, it can cover more distance on a single charge, making it ideal for tasks where agility and endurance are key. Whether it's performing detailed inspections, light-load transport, or extended patrols, the Capra200 is the perfect solution for missions that demand sustained mobility. The Capra200 supports top payloads of up to 50 kg. (110 lbs.) and trailer and cart payloads of up to 200 kg (440 lbs.)

BUILT FOR STRENGTH

On the other hand, the Capra500 is built for strength. With the ability to handle significantly heavier payloads, it is the go-to choice for industrial applications, such as material handling and towing. Its enhanced load capacity makes it a powerful option when reliability and robustness are required for moving heavier goods and equipment. The Capra500 supports top payloads of up to 100 kg. (220 lbs.) and trailer and cart payloads of up to 500 kg (1,100 lbs.)

Both platforms maintain the same seamless integration with our ecosystem, ensuring consistency across your operations. Choose the model that best fits your needs, without compromising on performance.

MODULAR AND VERSATILE PLATFORM

Our Mobile Robot Platform stands out by being a single, adaptable robot that caters to diverse needs, from inspection, to logistics, to maintenance. With different tailored tool modules, the robot becomes a complete solution for more specialized tasks. For maximum flexibility, our robots can be paired with three different tool types offering corresponding solutions:

TRAILER SOLUTIONS

The robot can also drag a trailer behind it, expanding its capacity to transport goods over longer distances or in rougher outdoor settings. This module is particularly useful for applications like food processing logistics with standardized wheeled load carriers, or interlogistics where goods need to be moved between buildings or across complex terrains. Trailer solutions support payloads of up to 500 kg (1.100 lbs.)

TOP SOLUTIONS

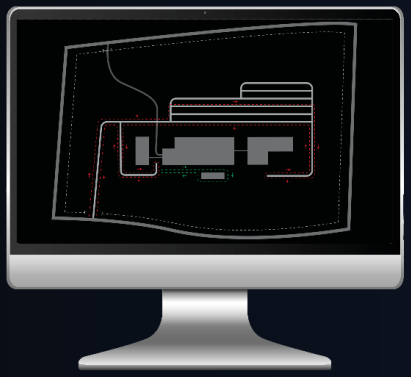
Our multi-purpose robot platform provides a suitable foundation for top-mounted robotics applications. With top mounted tools you preserve the highest possible agility, also on uneven terrain, making it highly effective in outside areas, for example for use in inspection and surveillance or in urban maintenance, supporting payloads of up to 100 kg. (220 lbs.)

CART SOLUTIONS

Cart solutions involve the robot dragging a material cart that is fixed on a top module. In this case, the top module will latch onto the cart, enabling automated pick-up and drop-off. It's ideal for moving larger loads or bulk materials in interlogistics and warehouse environments. Our cart solutions support material handling of up to ISO pallet footprints and 500 kg. (1.100 lbs.)

AUTONOMOUS OPERATIONS

The demand for efficient, reliable, and safe operations is increasing, but labor shortage is threatening sustainable growth. Automation represents the only scalable solution. Our robots can independently navigate complex environments, both indoors and outdoors, significantly enhancing productivity and reducing the need for manual intervention.



INDOOR NAVIGATION

The indoor navigation system is comprised of a state-of-the-art VSLAM system, CAPRA VISION, coupled with pLd-rated industrial radars for object detection. The AI-powered camera system offers easy mapping of the deployment area and automated updating at double the rate of LiDAR mapping. The fast update rate allows the robots to create real-time maps, enabling them to adapt to dynamic environments and maintain optimal efficiency, whether it's maneuvering through narrow aisles or avoiding obstacles.

OUTDOOR NAVIGATION

Our outdoor navigation system rests on a proprietary Kalman Filter comprised of sensory input from GNSS signals, Odometry, and IMUs within the robot. The onboard GNSS receivers paired with 4G or 5G RTK corrections are fused with the odometry data to achieve centimeter-precise positioning. The Kalman Filter dynamically weighs the input from the various data sources and applies them in a probability calculation for which data inputs to trust. This means that the robot automatically switches navigation systems when the environment changes.

PATENTED AGILITY

Our robots are based on a unique, self-developed, and patented wheel frame. The wheel frame differs from previous wheel frames, as it uses the most prominent features of Ackermann and Differential steering in one, utilizing their respective benefits and omitting their flaws. This resulted in a novel wheel frame with both precise and agile steering.

GO ANYWHERE

The unique wheelbase provides our mobile robots with a small turn radius, enabling it to navigate tight spaces. The wheel frame also features a novel suspension system that allows it to effortlessly climb curbs and challenging environments. The suspension is complimented by its large engine power and 4-wheel drive enabling it to drive in all terrains and on any surface, including uneven ground and saft sand, making it perfect for outdoor use.

EXTEND OPERATING TIME

By separating steering and driving force, we have ensured that all available drive torque goes into propelling the robot forward, resulting in more energy-efficient movement and longer-lasting operations. The energy efficiency and high battery capacity of the platform offers you a range of up to +50 km or the capacity to perform for more than 10 hours.

Go where others cannot, with CAPRA ROBOTICS.

CAPRA FLEET MANAGER

Tasks generated in your central management system (WMS/MES/ERP) can be easily communicated to the robot via the VDA5050-compliant CAPRA FLEET MANAGER interface.

ERP/WMS/MES

REST API

REST APIs are platform independent, meaning they can be used on various devices and operating systems. This flexibility is essential when dealing with robots that might have different hardware or software configurations.

Capra Fleet Manager

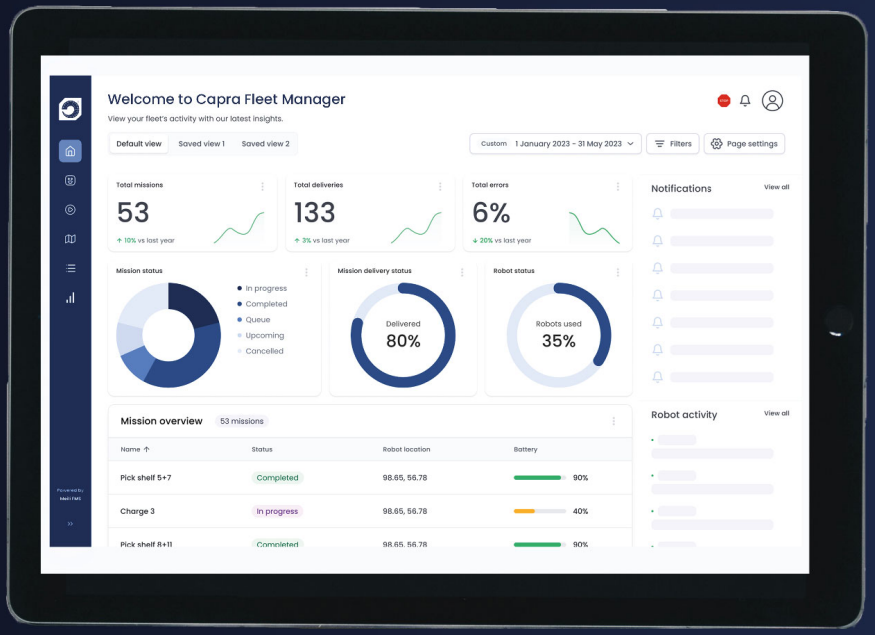
- Order Handling
- Route Planning
- Service Module
- Supervisor
- Dispatcher
- Monitor

Secure Internet

Effortlessly control a fleet of up to +10 AMRs and/or AGVs.

Remote Console

IoT Communication



The CAPRA FLEET MANAGER controls the overall operation and performance of your robots, receives orders from external sources, and monitors the progress and status of its subsystems.

You can intuitively dispatch robots by the press of a physical or virtual button at the production line.

Our system allows for interaction with several external systems, such as, gate controls, light controls, and crossing signals.

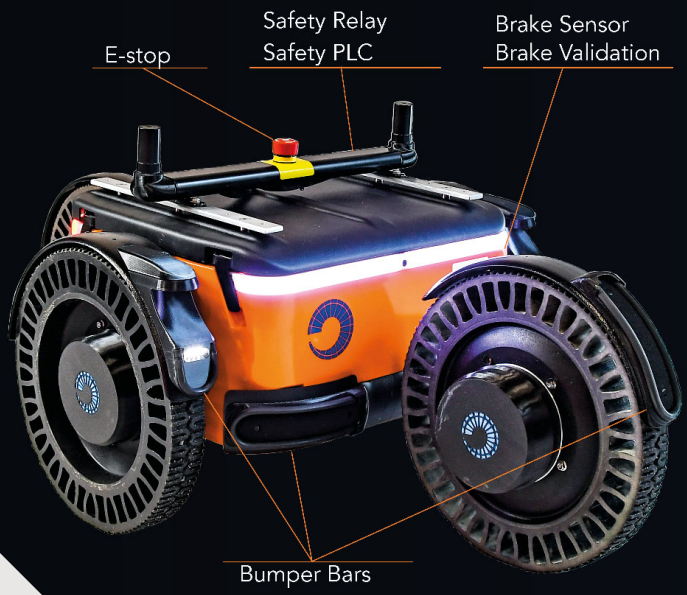
We employ industry-leading encryption protocols, and AWS Greengrass manages our security infrastructure. All HTTP connections are secured with SSL and the passwords are encrypted using a PBKDF2 algorithm with a SHA256 hash.

SAFETY & CYBER SECURITY

[PROTECTING YOUR ASSETS IN AN INTERCONNECTED WORLD]

In today's interconnected world, cybersecurity and safety are paramount concerns for automated logistic flows. Maintaining an impenetrable safety system is our top priority, and our robots are designed for safety and is thoroughly tested before shipment.

We have gone to great lengths to ensure that our solution is safe for use in busy industrial environments, with multiple safety protocols and features built into the design. The robot features state-of-the-art PLd-rated radar sensors, the most dependable safety sensor for combined indoor and outdoor driving. The radar works in any weather and lighting conditions, can measure several objects simultaneously and have a response time of less than 100ms for optimal safety. Our solution is certified DS/EN ISO 3691-4:2020 and R15.08-1-2020 compliant at Performance Level D.



CYBER SECURITY

Our mobile robots operate in a dynamic and diverse range of environments, including highly sensitive locations. Therefore, they are equipped with the latest firmware and software, which are diligently updated to combat emerging cyber threats with the latest encryption, communication, and multi-factor authentication.

We ensure the security of our operations through cutting-edge technologies and industry-leading encryption protocols, including:

1. Data security: Our systems feature data integrity checks, dynamic provisioning and revocation of permissions, and a zero-trust architecture to prevent unauthorized access.

2. Communication security: We use secure communication protocols like TLS, x509 certificates, and secure MQTT to protect data transfer. AWS Greengrass manages our security infrastructure.

3. Secure data exchange: We employ the DDS security standard and Vault for secure information transfer and storage of sensitive data such as authentication credentials.

With CAPRA ROBOTICS®, you can rest assured that your operations are fortified against both physical and digital vulnerabilities.

SPECIFICATIONS

DIMENSIONS & WEIGHT

External Dimensions (LxWxH)	1106x600x373 mm
Wheel Diameter	326 mm
Clearance Height	126 mm
Weight	50 kg (with 2 batteries)

ENVIRONMENT

Operational Temperature Range	-20°C to +50°C*
IP Rating	IP 65
Usage	Indoor & Outdoor

SPEED & PERFORMANCE

Maximal Speed	6 km/h
Turning Radius	465 mm
Chassis	4-wheel robot frame
Motor Type	4 pcs. Hub motor of 250W each
Payload Capacity	Up to 500 kg

INTERFACE & COMMUNICATION

External Communication	4G router with Dual-band Wi-Fi (G/N/B) and Dual-SIM
I/O	M12 Ethernet connector
	M12 Battery power (10A E-stop, 10A Continuous)
Manual Steering	Remote Control

EFFECT

Battery Type	Li-NMC
Battery Capacity	Up to 4 units of 25.9V, 20 Ah each
Operating Time	Up to +10 hours (with 4 batteries)
Driving Range	Up to +50 km (with 4 batteries)**
Charging Time	2 hours***

SAFETY

Collision Avoidance	2 pcs. PLd-certified Radar Sensors
Safety Functions	4 safety functions according to ISO 13849-1 • Brake validation • Bumper bars • Detection of manually triggered brake • Emergency stop

* Lower than -10°C requires additional heating element
** Depending on surface, incline, and payload
*** With wireless charger

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[ONE ROBOT – MULTIPLE APPLICATIONS]

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