



ROBOTICS R&D LAST UPDATES

Technological developments,
European projects, main
sectors and much more.

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01.

Introduction



Rafael López | Robotnik's R&D manager

R&D investment in robotic technologies has recently increased in Europe, both by companies and by governments and institutions. According to Eurostat data, in 2020, the EU spent **€311 billion** on research and development; R&D investment as a percentage of GDP stood at **2.32%** in 2020, from **1.97%** in 2010.

The enormous development of some of the catalysts of robotics, such as 5G, **Artificial Intelligence** or **IoT** provide an ideal framework with connections and capabilities that did not exist before.

Since 2002, **Robotnik** has participated in more than **60 European**

Research and experimental development, abbreviated as R & D, comprise the 'creative and systematic work undertaken in order to increase the stock of knowledge - including knowledge of humankind, culture and society - and to devise new applications of available knowledge' (Commission Implementing Regulation (EU) 2020/1197 of 30 July 2020, Annex IV, page 99).

research and development projects in mobile robotics for logistics, inspection, construction, agriculture, health or security and rescue, among others. Many of our robots and mobile manipulators have been commercialized in universities, institutions, technology centers, public and private laboratories or other academic institutions, besides industry.

These 20 years of R&D experience allowed us to test our AMRs in specific scenarios and with the necessary infrastructure. This background is today one of our competitive values.

By participating in important R&D projects such as H2020, we have the resources and the opportuni-

ty to work over a wide period of time in a research framework that allows us to develop and test novel technologies. This translates into benefits, not only for the academic sector, but also for end users and customers.

Our AMRs have open-source software (ROS) and several configuration options. They can integrate all sensors and components needed for your research and final application.

Moreover, we are manufacturers and can develop a solution tailored to the specific needs of each project.

In this ebook we compile some of the most relevant R&D projects, the AMRs that have been used in each of them and interviews with our R&D managers.

Do you have an R&D robotics project?

We will develop it with you

✉ info@robotnik.eu

02. 5G-ERA

Robotnik is coordinator of this Horizon 2020 project

The next generation of intelligent systems, especially robots, will need to be more autonomous and resilient. Research and industry have many times attempted to improve the capabilities via the evolution of **5G technologies** focusing on feasibility studies and introduction of new bandwidth.

Intelligent automation requires ways to accelerate the ongoing convergence of robotics, AI and cloud computing to efficiently develop, deploy and manage resource allocation and scalability towards a user-centric paradigm to improve the quality of experience (QoE) for customer applications.

5G technology brings **more efficient communication** and the possibility to run some services and functions

inside the robots, and other services and functions outside (on other machines or other networks). 5G communication must be built to exploit the scale, resilience and flexibility of connected intelligence.

The aim of the 5G-ERA (5G Enhanced Robot Autonomy) project is to showcase the opportunities and benefits of 5G networks through automated surveillance and mobility, Industry 4.0 and healthcare. Specifically, 5G allows two fundamental things for robotics applications: more stable latencies and a higher data transmission speed (bandwidth).

That is why the European Commission has awarded the 5G-ERA project. Over three years the 5G-ERA project will build a technological framework to bring Robotics and AI closer to the Edge Cloud and 5G technology.

To do all these things, we will use containerisation technologies - cloud-native technologies - that allow you to easily and relatively quickly deploy software.



IN 5G-ERA WE ARE WORKING IN THIS **4 USE CASES:**

1. Public Protection and Disaster Relief (PPDR).

Public area for surveillance
using robots.

2. 5G enhanced healthcare robots.

Robots for hospital logistics.

3. 5G enhanced semi- autonomous transportation.

4. 5G-remote assistance for manufacturing process.

Industry 4.0



Watch the explanation video

03.

Robotics R&D projects in healthcare

The incorporation of robotics in healthcare environments is becoming increasingly common. Currently, the automation of tasks in medicine has increased thanks to the evolution of technologies such as 5G, AI or augmented reality.

Autonomous mobile robots become excellent **hospital assistants**, providing support in operating theatres, ICUs or risk areas for the healthcare team, and are even adapted to robotic or motorised shower systems so that people with functional disabilities can shower on their own by commanding the robot.

The costs in healthcare sector imply that there is a need to **automate certain transportation tasks**.

**SOME OF THE R&D EUROPEAN HEALTH PROJECTS IN WHICH WE ARE INVOLVED****PHARAON** [↗](#)

Pilots for healthy and active aging.

**ENDORSE** [↗](#)

Robotic fleet for logistics applications in healthcare and commercial spaces.

ODIN [↗](#)

Transforming the future of healthcare in Europe's hospitals through AI.

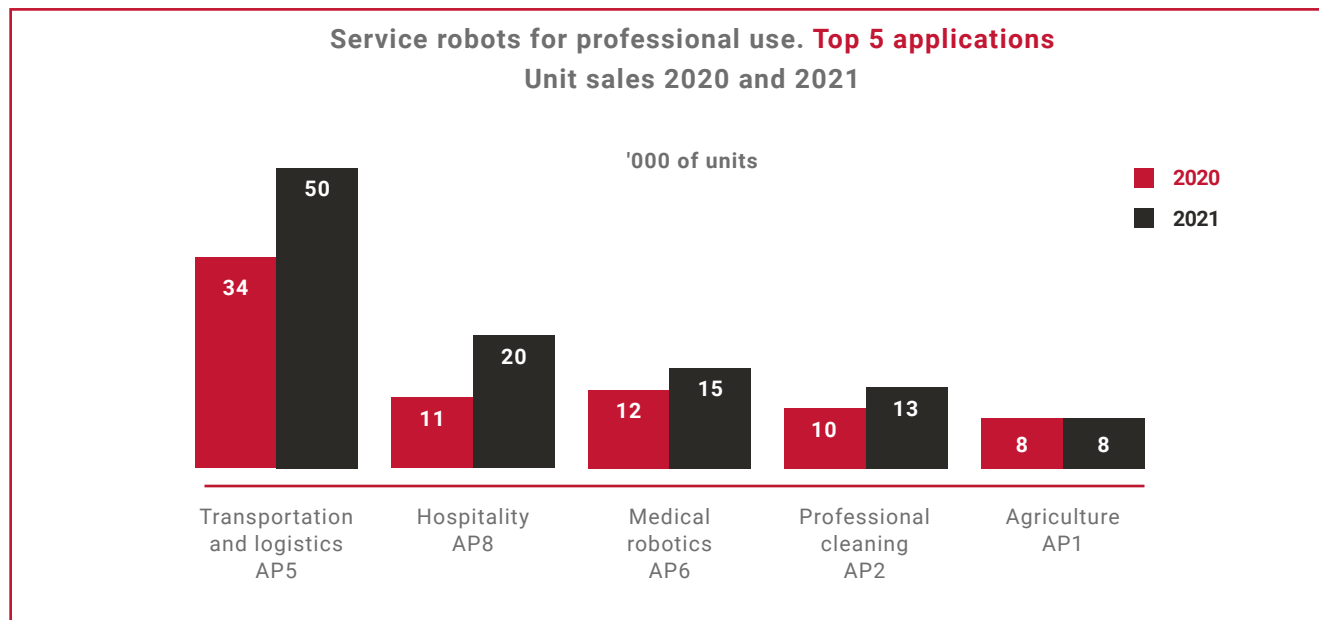


Domain studies have indicated that nurses and other healthcare workers might spend as much as **20% of their workday performing transportation tasks** that could easily be automated. If this could be **reduced to 5%**, there would be significant savings.

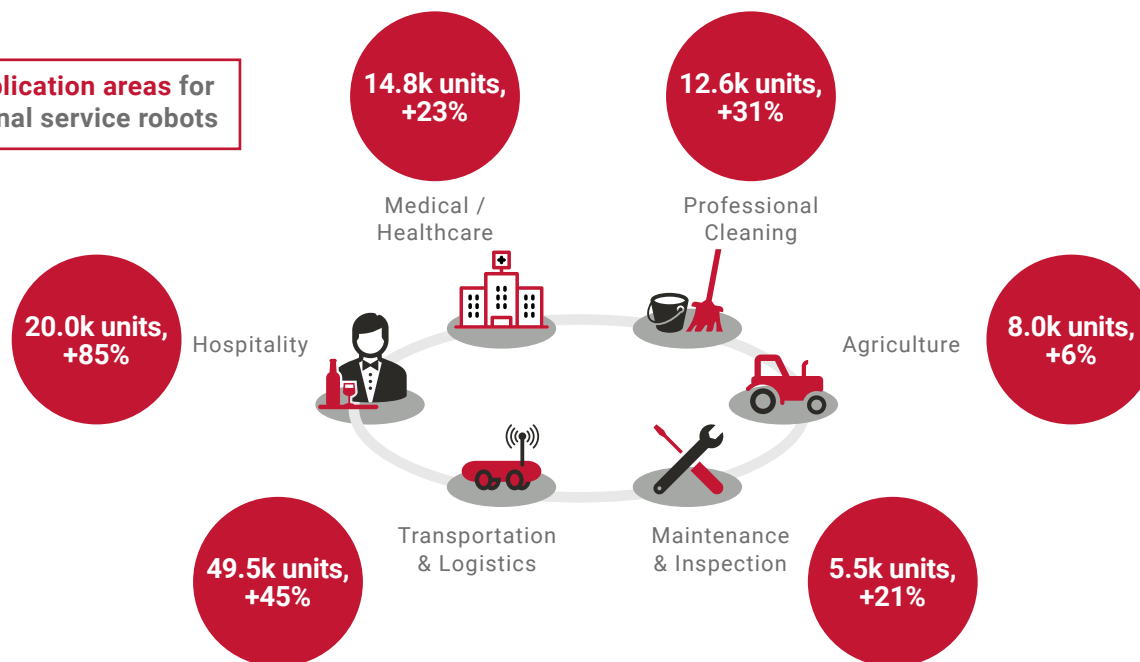
IFR - World Robotics 2021.

What kind of tasks do Robotnik robots perform in the healthcare sector?

- Food transport and supply support.
- Cleaning or disinfection tasks.
- Storage and distribution of medicines.
- Surgical assistance.
- Administrative and logistical tasks that are routine and burden the healthcare workers.
- Tele-assistance.



Top 6 application areas for professional service robots



04. Robotics R&D projects in agriculture

Innovation in autonomous mobile robotics and manipulation applications in agriculture has advanced in the last 5 years.

Labour shortages, increased consumer demand and high production costs are some of the factors that have accelerated automation in this sector, with the aim of reducing costs and optimising harvests.

The incorporation of robotics in agriculture **improves both productivity and working conditions for farmers and workers**. Intelligent systems are becoming the ideal solution to drive precision farming. Today, a large number of agricultural operations are already being done autonomously.

Thus, collaborative robots are now commonly used for tasks such as **fruit picking or insect grafting** and cultivation, where Artificial Intelligence provides predictive data to optimise farms and plantations.



What kind of tasks do Robotnik robots perform in the agriculture sector?

- Crop condition identification and corresponding chemical application, spraying or harvesting, as required by the fruit or plant.
- Mobile manipulation through collaborative arms (harvesting, fruit handling).
- Collection and conversion of useful information for the farmer.
- Selective application of pesticides.
- Selection to avoid food waste.



SOME OF THE R&D EUROPEAN AGRICULTURE PROJECTS IN WHICH WE ARE INVOLVED

BACCHUS

Mobile Robotic Platforms for Active Inspection and Harvesting in Agricultural Areas.

AGROBOFOOD

Digital transformation of the European agri-food sector through the adoption of robotic technologies.

COROSECT

Cognitive robotic system for digitized insect farms.



05.

Robotics R&D projects in inspection & maintenance

The inspection & maintenance area is one of the largest in the global economy. By contrast, it is one of the slowest to start on the road to automation and digitalisation and, therefore, the integration of robotics in inspection.

Currently, inspection robotics is already integrated in different sectors and applications: **construction, architecture, masonry, demolition, infrastructures...** For example, these AMRs use technology to check and detect possible errors in real time and send the information to the system so that it can be corrected.

Increased accuracy, significantly **improved productivity, reduced errors, overcoming dead lines, fewer accidents and reduced costs** are some of the improvements that robotics brings to inspection and maintenance.



What kind of tasks do Robotnik robots perform in the inspection & maintenance sector?

- Prediction of required tasks.
- Evaluation of the progress of a project.
- Early detection of possible errors.
- Automation of dangerous tasks for the operators.
- Surveillance and inspection tasks.



SOME OF THE R&D EUROPEAN INSPECTION & MAINTENANCE PROJECTS IN WHICH WE ARE INVOLVED



HERON

Enhanced robotic platform for performing road maintenance and improvement works.

PILOTING

Robotic solutions for pilots in refineries, bridges/viaducts and tunnels.

BIMPROVE

Improving Building Information Modelling by Real Time Tracing of Construction Processes.

ROBÉTARMÉ

Human-robot collaborative construction system for shotcrete digitization and automation through advanced perception, cognition, mobility and additive manufacturing skills.

06.

Robotics R&D projects in security & rescue

The evolution of catalytic technologies such as 5G, IoT (Internet of Things) and Artificial Intelligence are key to the autonomy of robots used in security and rescue tasks.

A security robot is a robot capable of **assisting in security missions** and carrying out high-level activities that speed up decision-making at critical moments. Robotics aims to provide tools that mitigate the hazards faced by people working in security, rescue and first response in order to **minimise the risk** to their own safety and the safety of others.

Depending on the specific mission, security robots show different capabilities, different levels of autonomy, mobility, sensing or intelligence.



What kind of tasks do Robotnik robots perform in the security sector?

- Advanced inspection and surveillance tasks in potentially dangerous territories.
- Detection and prediction of threats, such as explosives or toxic substances.
- Assessment and support to disaster rescue teams.
- Delivery of pertinent information to different stakeholders in an interactive manner tailored to their needs.

SOME OF THE R&D EUROPEAN SECURITY PROJECTS IN WHICH WE ARE INVOLVED

CREST [↗](#)

Fighting Crime with an IoT-enabled Autonomous Platform.

RESPOND-A [↗](#)

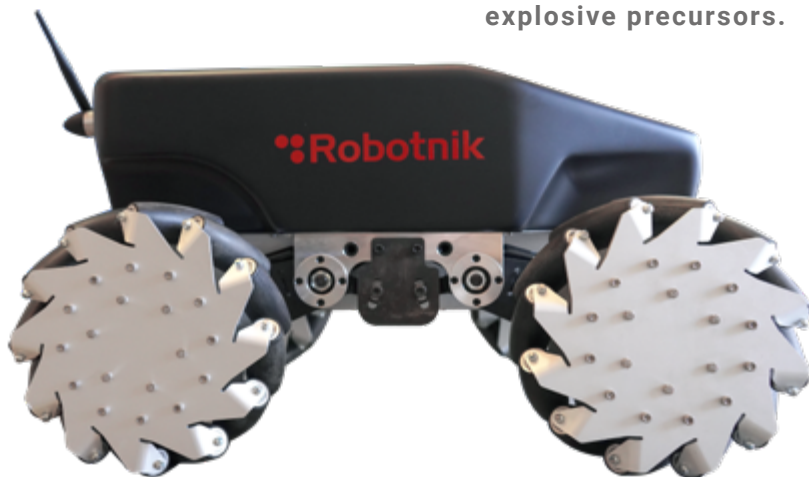
Next-generation equipment tools and mission-critical strategies for First Responders.

NESTOR [↗](#)

Enhanced pre-frontier intelligence picture to safeguard the European borders.

ODYSSEUS [↗](#)

Preventing, Countering and Investigating terrorist attacks through prognostic detection and forensic mechanisms for explosive precursors.



07.

Robotics R&D projects in logistics

Today's consumer demands ever faster production and delivery times. This means that manufacturers must necessarily speed up their production and logistics processes to remain competitive.

Collaborative robotics, and specially Mobile Manipulation, is a powerful tool that **solves any repetitive and tedious activity**, such as many of those carried out in the logistics sector.



One out of three professional service robots is marketed for logistics tasks.

Mobile robotic solutions are already established in transport and logistics with more than 49,500 units (+45%) sold in 2021, according to *World Robotics 2022*.

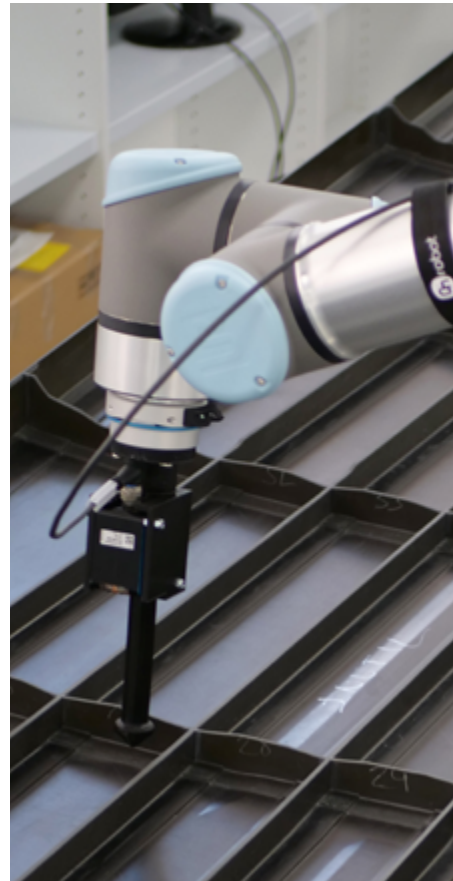
At **Robotnik** we are already marketing AMRs capable of working in logistics tasks not only in indoor but also in outdoor environments, e.g. for last mile delivery.



What kind of tasks do Robotnik robots perform in the logistics sector?

- Last mile logistics.
- Transport of goods and materials.
- Pick & Place.
- Metrology.
- Bolting.
- Quality control.
- Packaging.
- Polishing.

SOME OF THE R&D EUROPEAN LOGISTICS PROJECTS IN WHICH WE ARE INVOLVED



LOGIBLOCK

Modular platform for the deployment and management of fleets of autonomous vehicles and logistics robots in SMEs.



VOJEXT

Digital Technologies for manufacturing and construction.

HR-RECYCLER

Human-Robot recycling plant for electrical and electronic equipment.

08. Interviews

R&D is one of the most important departments at Robotnik, which allows our robots and autonomous mobile manipulators to be constantly developed and improved.

The participation in R&D projects supported by the European Union also allows us to stay at the technological forefront.

Miquel Cantero and **Marc Bosch**, project managers at Robotnik, talk about technological innovation, what these projects bring to the robotics sector and other developments.



Miquel Cantero
Project manager



Marc Bosch
Project manager

20 YEARS LEADING MOBILE ROBOTICS



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