

MANiBOT strengthens European robotics collaboration through TORNADO technical exchange

Seven European robotics projects came together to exchange technical knowledge on adaptive manipulation, perception, sensing and real-world robotic autonomy.

22 September 2026

MANiBOT took part in the **TORNADO & Cluster Projects Technical Exchange Session** on 17 September 2026, joining six other European robotics projects to compare technical approaches, discuss common challenges and identify opportunities for further knowledge exchange.

The online session brought together **TORNADO, PRIMI, MANiBOT, AEROSUB, ROB4GREEN, ARISE and SWAG**. Although the projects address different sectors and application environments, the exchange highlighted several challenges shared across advanced robotics research: enabling robots to adapt to changing conditions, improving perception and manipulation, combining different forms of sensing and control, supporting safe interaction with people, and integrating individual technologies into reliable robotic systems.

MANiBOT brings bi-manual manipulation to the exchange

MANiBOT was represented by **Dimitra Triantafyllou from CERTH**, who presented the project's work towards enabling **mobile bi-manual robots to manipulate a wide variety of objects in dynamic environments**.

MANiBOT combines **multimodal perception, cognition and control, tactile and proximity sensing, advanced manipulation approaches and human-aware robot operation**. A central challenge is enabling robots to work with highly diverse and partially or fully unknown objects while adapting their behaviour according to the sensory information available during the task.

The project is integrating and validating these technologies through two demanding application areas: **supermarket shelf restocking and airport baggage handling**.

In supermarkets, robots must identify, grasp and place products that vary considerably in shape, size and packaging while operating in spaces shared with people. In airport baggage handling, robots encounter luggage with different geometries, weights, materials and positions.

Both environments provide realistic conditions for testing how robots perceive their surroundings, choose appropriate manipulation strategies and respond when conditions differ from what was expected.

Shared challenges across European robotics projects

TORNADO opened the exchange with its work on **adaptive, perceptive and safe robotic manipulation**, including the handling of small, soft, deformable and unconventional objects.

Across the presentations, a recurring technical question was how robots can move beyond rigid, predefined behaviour.

Real-world environments are inherently variable. Objects may differ from those previously encountered, their position may change, unexpected disturbances can occur, and people may be present within the same operational space. Robots therefore need to combine **perception, sensing, decision-making and control** to continuously adapt their actions.

For MANiBOT, this challenge is closely connected to the project's wider ambition of advancing the **physical intelligence** of robotic systems towards more human-like manipulation capabilities.

Technical discussion leads to concrete follow-up

The exchange also resulted in a concrete connection between MANiBOT and TORNADO around **force-sensing manipulation methods**.

Following the technical discussion, relevant MANiBOT publications were identified for sharing with TORNADO researchers, providing a practical example of how clustering activities can support direct knowledge transfer between projects.

Such exchanges allow researchers working on related challenges to compare methods, identify complementary approaches and build on knowledge already being developed elsewhere in the European robotics ecosystem.

Moving from individual technologies to complete robotic systems

Another challenge discussed across the session was the transition from promising individual technological components to **integrated robotic systems capable of operating under real-world uncertainty**.

For MANiBOT, perception, sensing, planning, control, mobility and manipulation must ultimately function together while the robot interacts with diverse objects and potentially works alongside people.

Validation in supermarket and airport environments therefore goes beyond demonstrating individual technologies. It tests how the complete system performs when exposed to the variability and unpredictability of real operational settings.

Cross-project technical exchanges can support this process by providing opportunities to compare integration approaches, discuss technical limitations and share lessons from testing and validation.

Strengthening European robotics collaboration

MANiBOT's participation in the TORNADO Technical Exchange Session forms part of its wider effort to connect with related European research and innovation initiatives and strengthen knowledge exchange across the robotics community.

Bringing together projects working in different sectors creates opportunities to identify common technical challenges and complementary solutions that may not be apparent when projects operate independently.

For MANiBOT, these connections also place its work on **bi-manual manipulation, multimodal sensing and physical intelligence** within the broader European effort to develop more adaptable, autonomous and human-aware robotic systems.

About MANiBOT

MANiBOT – Advancing the physical intelligence and performance of roBOTs towards human-like bi-manual objects MANipulation is a Horizon Europe research and innovation project developing technologies for more capable mobile bi-manual robots.

The project combines advanced perception, sensing, cognition, control and manipulation technologies and validates them through supermarket shelf-restocking and airport baggage-handling scenarios.

MANiBOT is funded by the European Union under Horizon Europe, **Grant Agreement No. 101120823**.