



TORNADO

founda**T**ion m**O**del**s** for
Robots that ha**N**dle sm**A**ll,
soft and **D**eformable
Objects

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Scientific Coordinator

Project coordinator: ITML



Funded by
the European Union

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The project funded under Grant Agreement No. 101189557 is supported by the EUROPEAN HEALTH AND DIGITAL EXECUTIVE AGENCY (HADEA) HADEA.B – Digital, Industry and Space | B.2 – Digital





TORNADO Consortium and Identity

Partners



14 partners from 8 countries

42 months of research & development

3 real-world use cases

7.4 M€ total funding



Funded by
the European Union

Funded under this topic: Novel paradigms and approaches, towards AI-powered robots - step change in functionality (AI, data and robotics partnership) [HORIZON-CL4-2024-DIGITAL-EMERGING-01-03](#)

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Advancing Foundation Models for Adaptive, Perceptive, and Safe Operation in Complex Human-Centric Environments

AMR capabilities

Small, soft and deformable objects





- 01** Boost ability of AMRs to handle SSDs within complex, people-centric environments, by making breakthrough advances in FMs and AI/robotics technologies for self-adjusting planning, navigation and manipulation.
- 02** Significantly improve adaptivity of FMs for AMRs operating in complex, dynamic settings.
- 03** Raise the level of robotic perception and safe interaction, under changing conditions in complex, people-centric environments.
- 04** Develop advanced hardware solutions facilitating cloud-enabled AMRs capable of completing difficult SSD manipulation tasks, and/or the diffusion of autonomous robots to new sectors.
- 05** Horizontally integrate Social Sciences & Humanities (SSH) research/methodology.
- 06** Deliver a functional system of cooperating, cloud/AI-enabled autonomous robots and improve performance in various industry sectors under challenging conditions.

science-

technology-

application-

oriented



Factory @ The Netherlands

Manufacturing & Assembly

Flexible handling of small gear components.

Manipulation of deformable ply-sheets in industrial settings.

Hospital @ Italy

Healthcare & Assistance

Robotic assistance in palliative care for patients, including safe object handling and empathetic interaction.

Plant @ Greece

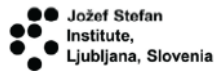
Distribution & Waste Management

Distribution Center with adaptive cloud robotics platform that enables autonomous mobile robots transforming the logistics industry.





NETWORK OF EXCELLENCE
Deformable Object Manipulation by Robots



Closing the Automation Gap:

Robotics for Textile Handling in Europe contributing to competitiveness

18 June 2026 | 09:30 – 13:00

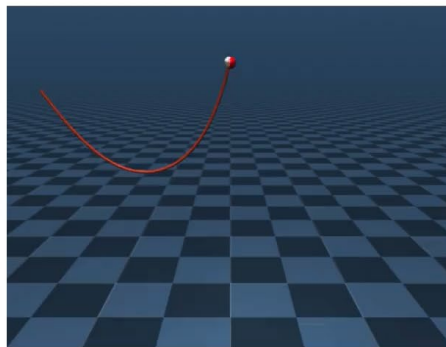
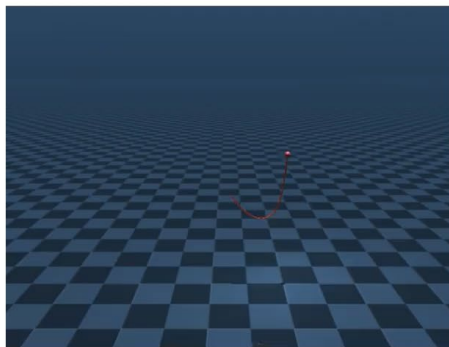
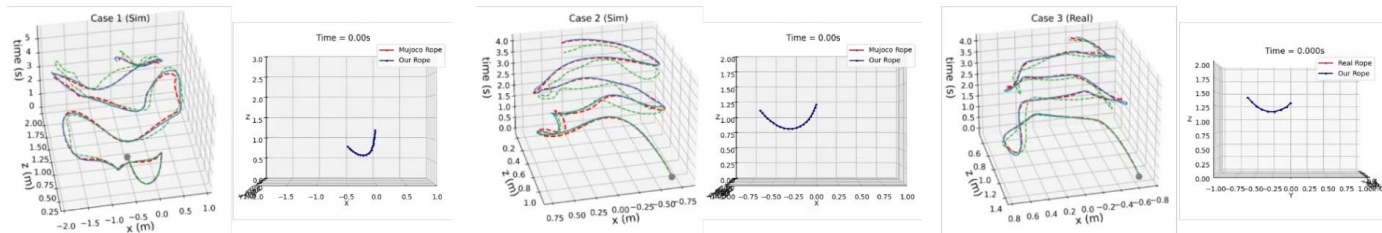
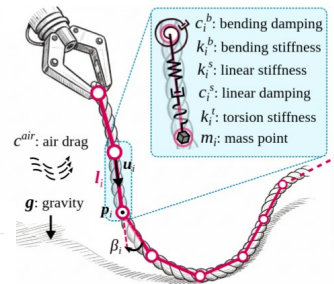
*Consejo Superior De Investigaciones Científicas (CSIC) Brussels Office
CSIC 7th floor, Rue du Trône 62, 1050 Brussels*





TORNADO Dynamic Manipulation of Linear Deformable Objects

Self-supervised Physics-Informed Manipulation of Deformable Linear Objects with Non-negligible Dynamics



Supervised Physics-informed Manipulation of Linear Objects with Non-negligible Dynamics

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DIGITAL INTERFACES
FOR HUMAN-ROBOT INTERACTION



Supervised Physics-informed Manipulation of Linear Objects with Non-negligible Dynamics

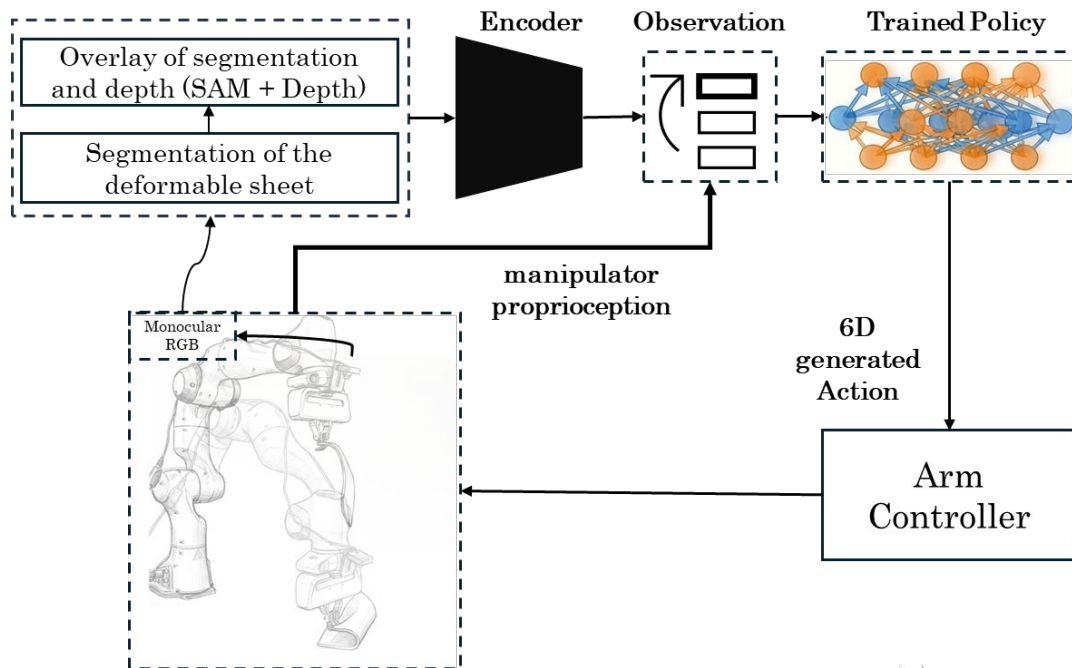
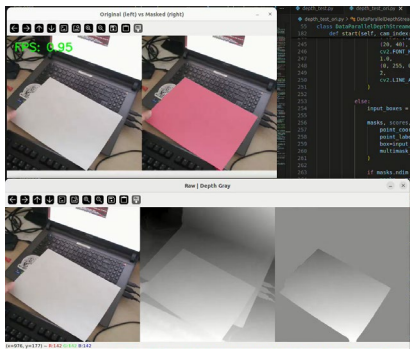
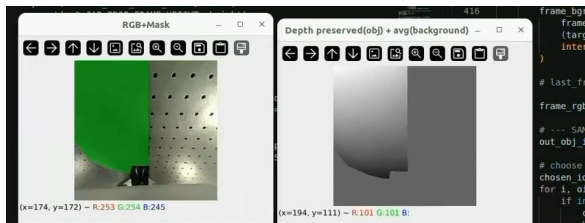
youyuan.long, Gokhan Solak, Sara Zeynalpour, Heng Zhang, and Arash Ajoudani
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TORNADO Manipulation of deformable sheets

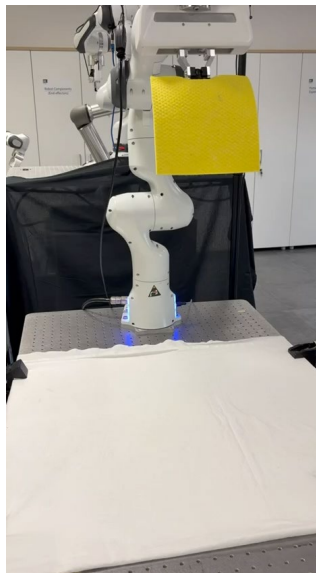
Camera view during manipulation:





TORNADO Manipulation of deformable sheets

Disturbance Recovery



Flat



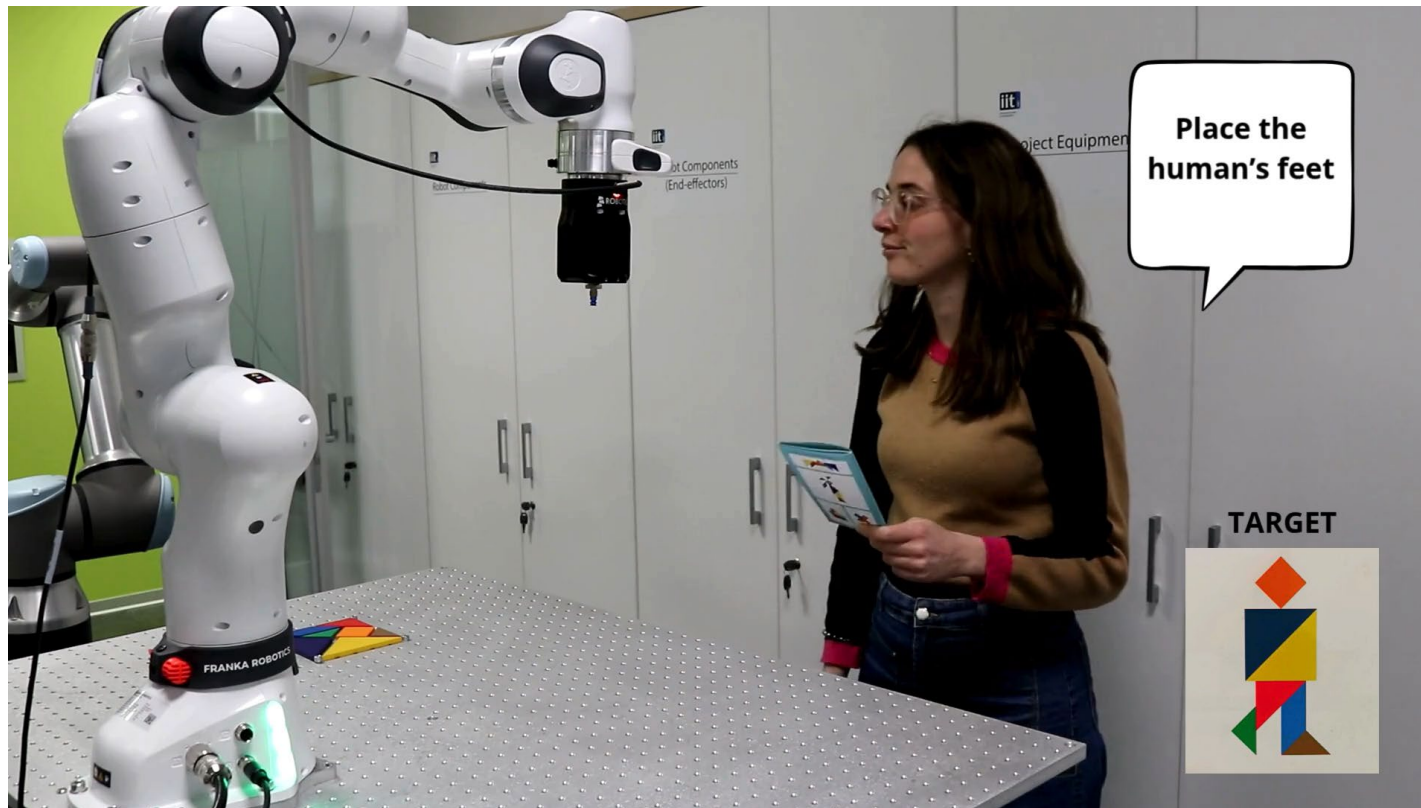
Horizontally Folded



Flat



TORNADO Adaptive continuous planning





TORNADO

www.tornado-horizon.eu

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