



## Welcome to the first edition of "INVERSE insights"!

This is the first edition of the newsletter "INVERSE insights", and we are excited to provide you with the latest updates, insights, and news from our Horizon Europe project focused on advancing long-term robot autonomy and continuous learning. **INVERSE** aims at enhancing robotic capabilities, enabling them to tackle complex manipulation tasks across various domains, even when training data is limited.

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## Project Updates

**INVERSE** introduced at the European Robotics Forum (ERF 2024) in Rimini

Dr. Dongheui Lee, consortium partner from [TU Wien](#) attended the [European Robotics Forum \(ERF 2024\)](#) that took place from **13 to 15 March 2024** in **Rimini (Italy)**.



During this event, she had the opportunity to talk about INVERSE in her keynote speech on "Human-Centric Approaches for Robot Learning and Interaction with Human".

[👉 Learn more about this](#)

## University of Trento and Mondragon University at IEEE International Conference on Robotics and Automation (ICRA 2024) in Yokohama

[ICRA 2024](#) took place on **13 to 17 May 2024**, hosted by [IEEE Robotics and Automation Society](#) in Yokohama (Japan).



Our coordinator team from the [Department of Industrial Engineering of the University of Trento](#) and our consortium partners from [Boğaziçi University](#) attended this full week of discussing innovation and new technologies in the field of robotics and automation.

👉 [Learn more about this](#)

## 28th International Congress of Project Management and Engineering

Our consortium partner [Mondragon University](#) took part at the **28th edition** of the [International Congress of Project Management and Engineering](#) on **3 to 4 July 2024** in **Jaén (Spain)**.

They presented their paper “*Collaborative Synergy in Industry: Exploring Human-Robot Interaction and Cognitive Robotics*” that is mainly about the transformative potential the field of Human-Robot Interaction especially in the industrial field.

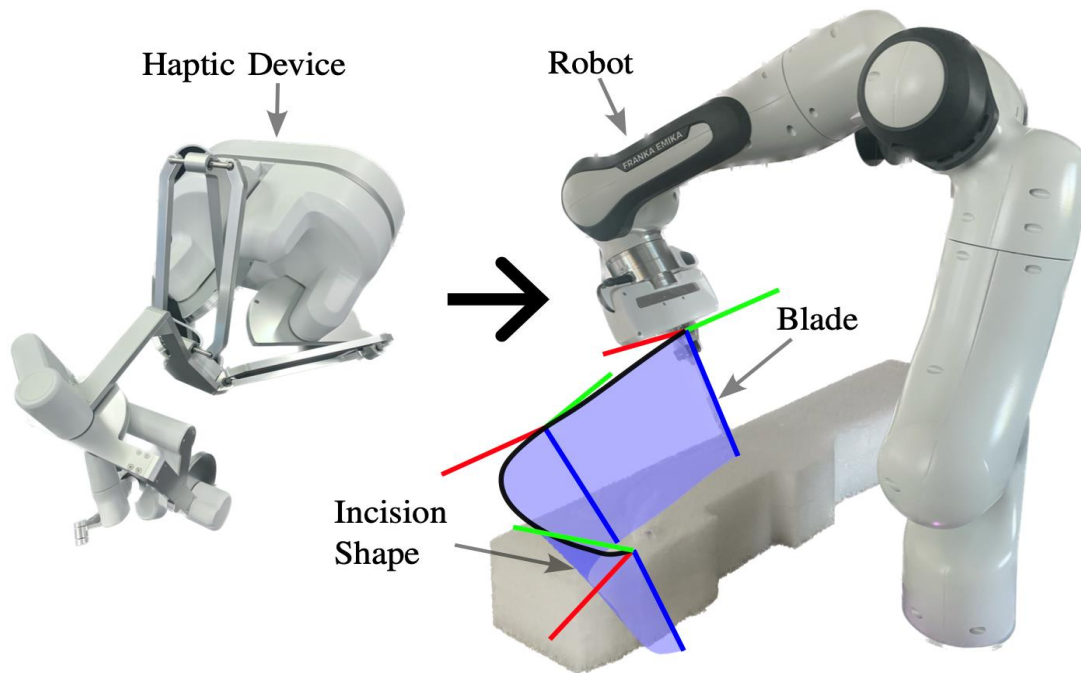
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## 👤 Partner Spotlight



Our coordinator [University of Trento](#) focuses on two main research areas strategic for **INVERSE**:

1. Knowledge generation: University of Trento developed a system for robots to use natural language knowledge to plan complex robotic tasks. The system exploits generative AI (Large Language Models) to populate and manage knowledge bases in Prolog, a logic programming method which is used to infer the robotic team's plan.
2. Safe learning: University of Trento developed a framework that learns full-pose interaction tasks and execution constraints from human demonstrations and uses Control Barrier Functions to enforce the constraints at run time. They also developed a unified approach to enforce energy and power limitation during accidental contacts with the robot, hence enhancing safety during the interaction.



Apart from these focus points, University of Trento proposes a framework that exploits a learned safe set (aka the viability kernel) in a **Model Predictive Control (MPC)** framework to ensure safety.



**Mondragon  
Unibertsitatea**

**Goi Eskola Politeknikoa  
Faculty of Engineering**

[Mondragon University \(MGEP\)](https://www.mondragon.es/) is recognized internationally for its expertise in human-centred design.

In the **INVERSE** project, MGEP plays a crucial role in enhancing the efficiency and safety of **Human-Robot Interactions (HRI)**. Their primary focus is on the human perception of the system's intelligibility and trustworthiness, ensuring that users can easily understand and rely on the robotic systems. MGEP is actively involved in the development of the HRI system, where they contribute to systemic changes aimed at optimizing interactions between humans and robots.



Their contributions to the **INVERSE** project include the **development of a novel framework** that integrates both design and assessment aspects, using a Social Sciences and Humanities (SSH)-based and user-centric design methodology. This innovative approach ensures that the human-robot interface is not only functional but also intuitive and user-friendly. By prioritizing the user's perspective, MGEP ensures that the system is designed to meet the actual needs and preferences of its users.

This emphasis on human perception and user trust is critical for the successful implementation and adoption of the HRI system. Through their expertise and innovative methodologies, MGEP significantly enhances the project's goal of creating safer and more efficient human-robot interactions.

👉 [More about the INVERSE consortium](#)

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## Upcoming Events

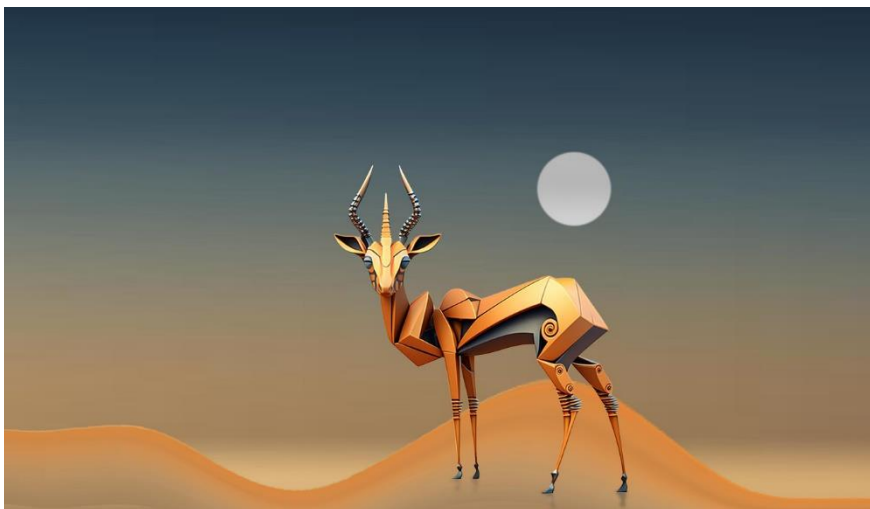
IEEE I Conference on Industrial Electronics and Applications (ICIEA 2024)



The [19th IEEE Conference on Industrial Electronics and Applications \(IEEE ICIEA\)](#) hosted by the IEEE Industrial Electronics Chapter of Singapore, the University of Agder, and the IEEE Singapore Section will take place on **5 to 8 August 2024** in **Kristiansand, Norway**.

Our partner [VTI](#) will be present and publish a conference paper on "*Programming of Skill-based Robots*" at this event. The paper is about fast and easy programming of robot tasks and utilizes a robot skill library and intuitive user interfaces for CAD model or operator tracking based programming.

IEEE/RSJ International Conference on Intelligent Robots and Systems in Abu Dhabi



The [2024 IEEE/RSJ International Conference on Intelligent Robots and Systems \(IROS 2024\)](#) will be held **October 14 – 18, 2024** at ADNEC in **Abu Dhabi, UAE**.

**IROS** is one of the largest and most important robotics research conferences in the world, attracting researchers, academics, and industry professionals from around the globe. Established in 1988, IROS provides a platform for the international robotics community to exchange knowledge and ideas about the latest advances in intelligent robots and smart machines.

The theme of IROS 2024 is “Robotics for Sustainable Development“ it focuses on highlighting the role of robotics in achieving sustainability goals.

Matteo Saveriano from the [University of Trento](#) will attend IROS and will co-organize the workshop “*Variable Impedance Learning and Control: Navigating Challenges, Exploring Opportunities, and Shaping the Future*” and present the scientific paper “[A Novel Safety-Aware Energy Tank Formulation Based on Control Barrier Functions](#)” that was published in the scientific journal [IEEE ROBOTICS AND AUTOMATION LETTERS](#) in June 2024.

 [Check out all INVERSE events](#)

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# INVERSE



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