



# WORKSHOP ON HUMANOID ROBOTICS GO UBIQUITOUS! INDUSTRIES AND RESEARCHERS AS THE KEY ENABLERS

*Danilo Pau (STMicroelectronics) and Tiziana Tambosso (R8 CoCC Chair)*  
*September 19<sup>th</sup>, 2024 (8:50 – 13:00, CEST)*



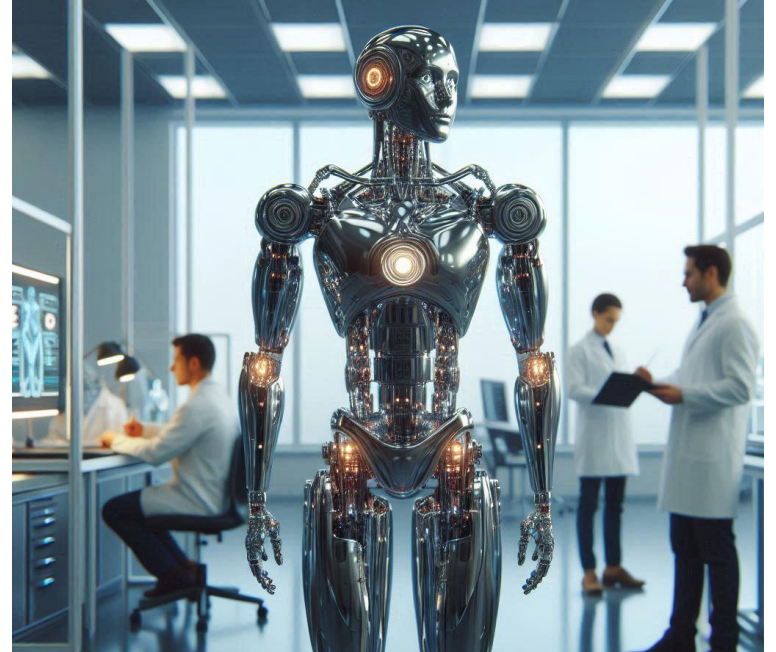
# Introduction

- ▶ Human-like robots are set to be ubiquitous as mobility means, TV, home appliances, and smartphones.
- ▶ The impact is expected to be on every one of us in everyday life with feature-rich interactions.
- ▶ Many industries, research entities and universities across the world are actively working on that and the list of them is growing with daily announcements of ground-breaking progress both from a technology standpoint and use cases (e.g. logistic and manufacturing industry sectors).
- ▶ Research is suggesting increasing similarities to how human beings perceive, behave and act.
- ▶ This is inspiring and has motivated huge investments by many industries and start-ups in US, Europe, China and Japan.
- ▶ Based on decentralized AI algorithms, the electronics systems are required to be low energy and efficient. To adopt cheap sensors (any type of), and embody powerful next generation of embedded processing and actuators.
- ▶ An unprecedented unique opportunity for AI to evolve to the next level for the entire humanity to benefit from.



# Objective

- ▶ To present some examples of humanoid robots developed in Italy and Europe both at industrial and research level.
- ▶ Involved dimensions are applications, AI algorithms, mechanical components, and electronics.
- ▶ To reasons about the impact Humanoid Robotics can bring to the broader industry and humanity.
- ▶ Two major topics will be addressed during the Workshop:
  - Exemplary applications
  - Electronics' industry perspective.



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AS THE KEY ENABLERS

IEEE  
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2024

RESEARCH AND  
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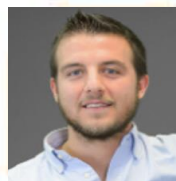
IEEE  
Italy Section

IEEE  
Region 8

19 September



**Fabio Ruggiero**  
Italy Section RAS  
Chapter Chair



**Luca Marchionni**  
CTO – PAL Robotics



**Giuseppe Messina**  
System Research –  
STMicroelectronics



**Simone Voto**  
Reply Concept



**Fabio Puglia**  
CEO –  
Oversonic Robotics



**Lorenzo Cominelli**  
University of Pisa



**Giulio Ricotti**  
Design Director –  
STMicroelectronics



**Mona Gassemian**  
Huawei



**Lorenzo Natale**  
Italian Institute  
of Technology



**Marco Roveri**  
University of Trento



**Marco Bianco**  
MEMS Software  
Solutions Manager –  
STMicroelectronics



# Agenda

- ▶ 08:50 – **Welcome to participants** by Danilo Pau (ST) and Tiziana Tambosso (R8 CoCC Chair)
- ▶ 09:00 – **Humanoid Robots: Challenges and Perspective in Automation** by Fabio Ruggiero (Italy Section RAS Chapter Chair)
- ▶ 09:15 – **A predictive approach for Maintenance and Safety of a wheeled humanoid robot** by Fabio Puglia (CEO – Oversonic Robotics)
- ▶ 09:30 – **Humanoid robots that learn: challenges and applications** by Lorenzo Natale (Italian Institute of Technology)
- ▶ 09:45 – **Advancements in high performance humanoid robot functionalities** by Luca Marchionni (CTO – PAL Robotics)
- ▶ 10:00 – **What Does a Robot Need to Be Human? The Journey of Abel**, by Lorenzo Cominelli (University of Pisa)
- ▶ 10:15 – **Thrustable autonomy for efficient and safe deliberation** by Marco Roveri (University of Trento)
- ▶ 11:00 – **Enhancing Humanoid Robot Autonomy: An ISPU-Based Approach to Fall Detection and Prevention** by Giuseppe Messina (System Research – STMicroelectronics)
- ▶ 11:15 – **High density power controllers for Robotics** by Giulio Ricotti (Design Director – STMicroelectronics)
- ▶ 11:30 – **Industrial IMUs to monitor robotic applications** by Marco Bianco (MEMS Software Solutions Manager – STMicroelectronics)
- ▶ 11:45 – **Langbotics – Let Robotic Agents Reason About the World** by Simone Voto (Reply Concept)
- ▶ 12:00 – **Exploring the Role of 6G Technology in Robotics Applications** by Mona Ghassemian (Huawei)
- ▶ 12:15 – 12:30 – **Q&A & Round Table by Moderators:** Danilo Pau, Fabio Ruggiero

# Questions

- ▶ What makes unique the innovation of the humanoid robotics in the perspective of impacting everyone in everyday life ?
- ▶ How do you see the ecosystem at both university and industry level being built to address complex systems such as these family of robots ?
- ▶ How should the role of the semiconductor industry be in providing critical components about the evolution of the humanoid robotics ?
- ▶ How important is the energy efficiency aspect in such domain ? Are we close or the community needs more developments ?
- ▶ Can any standardization initiative (e.g. MPAI with IEEE) ease the adoption of AI by the industries ?
- ▶ Are the Isaac Asimov's "Three Laws of Robotics" applicable or subject of standardization with respect to the deployments occurring these days ?