10 September 2024

Langbotics - Let robotics agent reason about the world

Simone Voto | Concept Reply

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ABOUT ME

Simone Voto

Robotics Tech Lead at Concept Engineering
Lead of the R&D deparment of the Company focusing on defining and realizing innovative projects using robots

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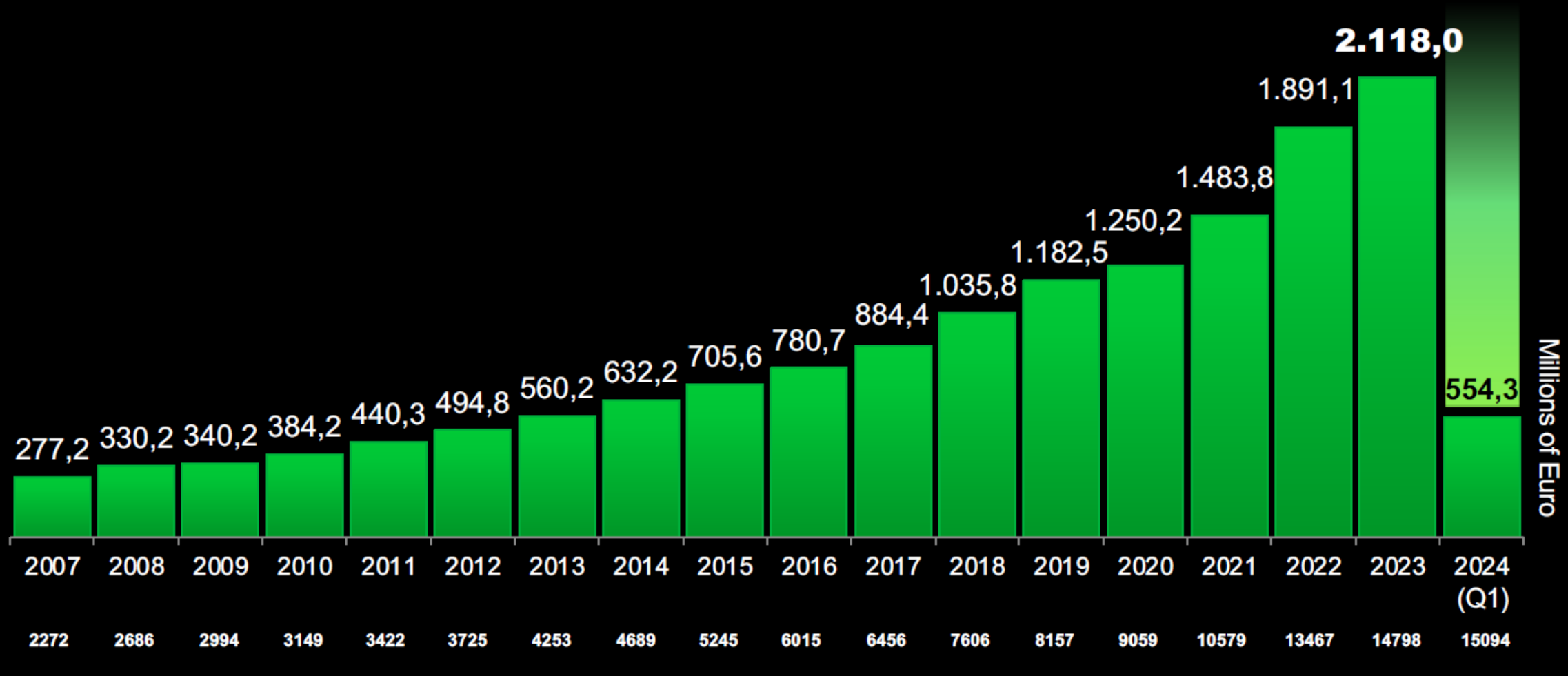
REPLY CORPORATE INTRODUCTION

To excel in helping our customers exploit relevant innovation brought about by economic changes and driven by internet technologies.

REVENUE & PEOPLE



WHERE WE ARE


UK
Chester, Manchester, LONDON, Sheffield
FRANCE
Lille, Paris
BENELUX
Amsterdam, Antwerp, Brussels, Luxembourg, The Hague
SWITZERLAND
Zurich
MOROCCO
Casablanca
US
Atlanta, Bellevue, Chicago, Detroit, Jacksonville, Kansas City, Malvern, New York, Seattle
BRAZIL
Belo Horizonte, São Paulo
GERMANY
Berlin, Bremen, Dortmund, Düsseldorf, Frankfurt, GÜTERSLOH, Hamburg, Karlsruhe, Köln, Lübeck, Minden, München, Potsdam, Regensburg, Stuttgart
POLAND
Katowice
CROATIA
Zagreb
ROMANIA
Bucharest
AUSTRIA
Vienna, Innsbruck
ITALY
Bari, Bologna, Firenze, Genova, Milano, Padova, Parma, Roma, TORINO, Treviso, Trieste, Verona
INDIA
Bangalore, Kochi
CHINA
Beijing, Nanjing
SINGAPORE
Singapore
NEW ZEALAND
Auckland

REPLY SERVICES

PEOPLE

- DIGITAL HUMANS
- COPILOTS
- WORKPLACES

MACHINES

- ROBOTICS
- AUTONOMOUS THINGS
- IOT & CONNECTED PRODUCTS

DIGITAL EXPERIENCE

- PRODUCT DESIGN BRAND EXPERIENCE
- DIGITAL MARKETING
- IMMERSIVE EXPERIENCES

ENTERPRISE PLATFORMS

- ADVANCED ANALYTICS
- INDUSTRY SPECIFIC PLATFORMS
- APPLICATION SUITES & CX PLATFORMS

AI

FOUNDATIONS

- COMPUTING PLATFORMS
- DATA PLATFORMS
- WEB 3.0
- CYBERSECURITY
- NETWORK
- 3D & SPATIAL COMPUTING

CONCEPT REPLY

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ABOUT US

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We specialise in end-to-end Internet of Things solutions across various domains, including industrial applications, connected and autonomous vehicles, and connected products.
We support our customers in making their products, services, cities, and processes smarter and more automated to unlock new business models.
Our team is skilled in Hardware design, embedded software, cloud solutions, robotics, innovative human-machine interfaces, ML & AI, quality, and project management.

Agenda

1. Introduction to Human-Robot interaction
2. Problem of the classical Human-Robot interaction
3. Langbotics: natural language Reply solution

Human-Robot Interaction

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HUMAN-ROBOT INTERACTION
OVERVIEW

Human-Robot Interaction (HRI) is the study of how humans and robots interact and communicate in shared environments. It focuses on:

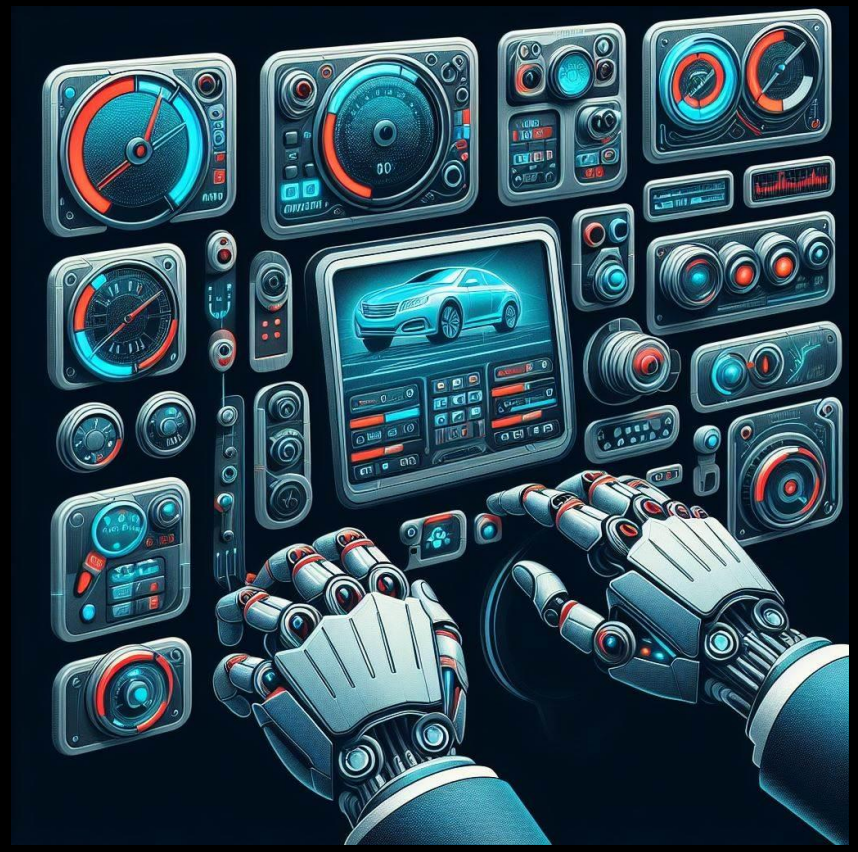
- **Understanding:** How robots can interpret human language, gestures, and emotions.
- **Collaboration:** Designing robots to work seamlessly alongside humans in various settings, such as factories, homes, and hospitals.
- **Autonomy vs. Control:** Finding the right balance between robot independence and human oversight to ensure safety and efficiency.
- **User Experience (UX):** Developing intuitive interfaces and interactions that make robots easy and effective to use.

HUMAN-ROBOT INTERACTION

Classical human-robot interaction

Dashboards and buttons

- They require operators to have detailed knowledge and memory of functions
- They are inconvenient and demand a high level of experience
- They limit communication expressiveness and variety
- They reduce human-robot interaction effectiveness

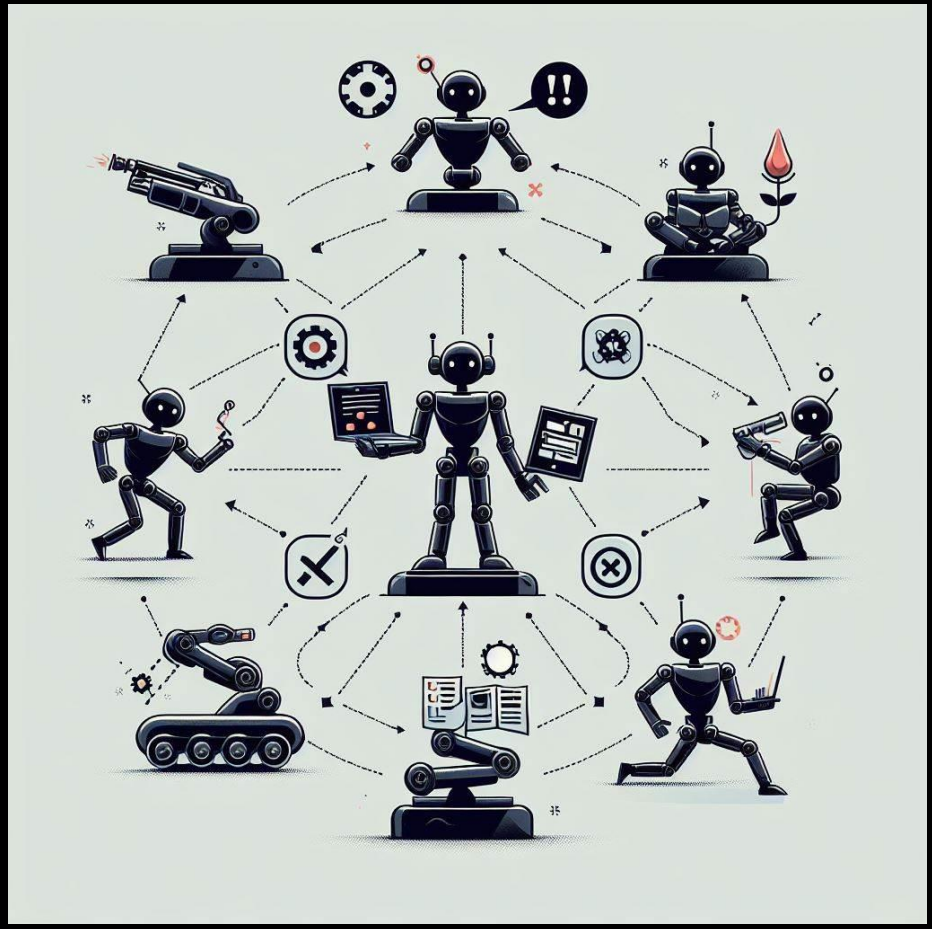


HUMAN-ROBOT INTERACTION

Challenges of static Robotic Actions

Predefined actions

- They limit robot adaptability and flexibility
- They are problematic in variable environments
- They reduce robot versatility and increase training costs
- They hinder robot performance in complex tasks



Human-Robot interaction in natural language

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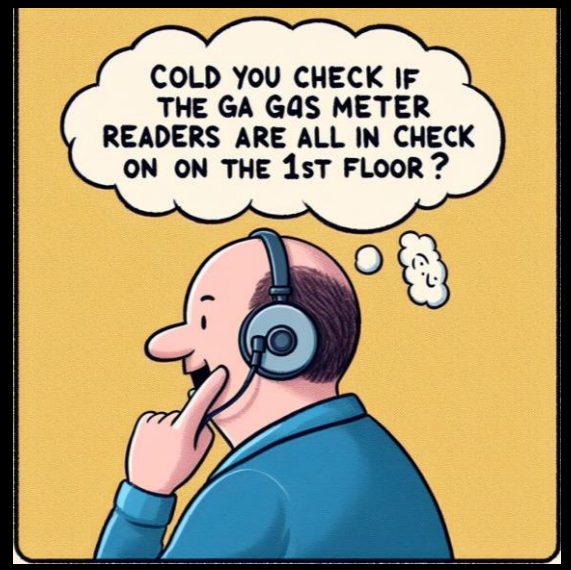
SOLUTION

Human-robot interaction in natural language

The advantages include:

- **Intuitive Communication**: No specialized training needed
- **Flexibility and Adaptability**: Robots can handle a wide array of inputs combining their low-level skillset
- **Personal Experience**: Robots understand context and sentiment.
- **Transformative Impact**: Robots are more accessible and personable.



spelling errors courtesy of DALL-E 3

SOLUTION

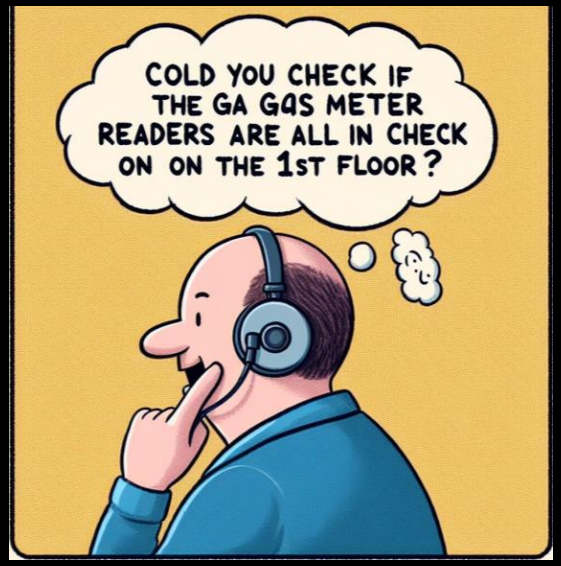
LANGBOTICS

- **NATURAL LANGUAGE INTERACTION**: the user expresses their need or the task to be performed in natural language, as if they were talking to a person.
- **COMMAND DECODING**: langbotics uses state-of-the-art large language models to understand the meaning of the command and its implications.
- **ROBOT SELECTION**: the system identifies the robots with the skills necessary to complete the task.
- **PLANNING AND ASSIGNMENT**: langbotics generates a specific mission for each robot involved, defining the actions to be taken and their sequence.
- **TASK EXECUTION**: the robots collaborate to complete the task autonomously and safely.

SOLUTION

Natural language Mission decoding

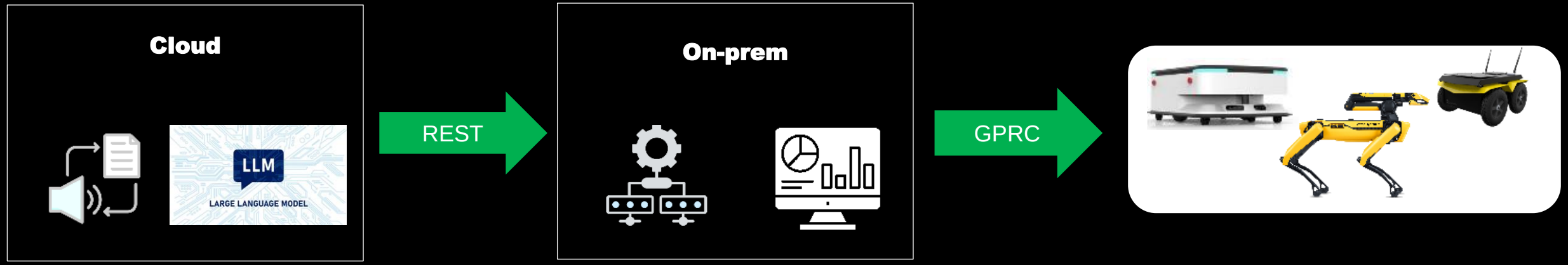
- navigation, 1° floor
- localization, all 1° floor rooms
- for each room:
  - navigation, room
  - search, meter reader
  - meter reader verification



spelling errors courtesy of DALL-E 3

SOLUTION

ARCHITECTURE

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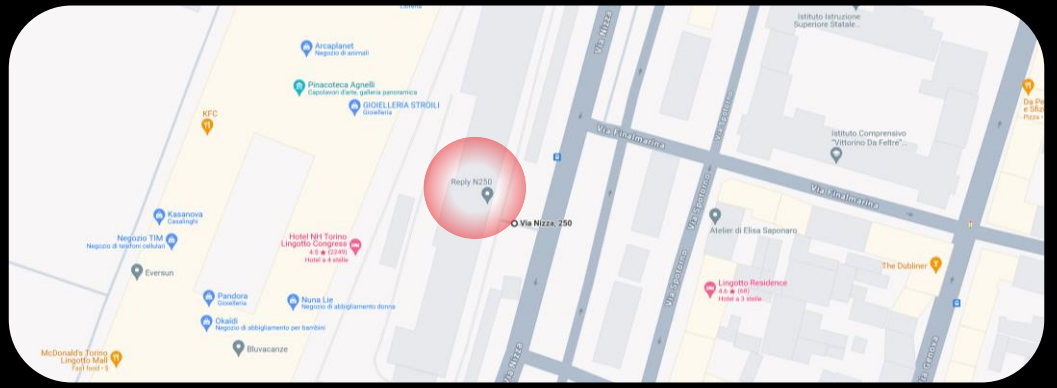

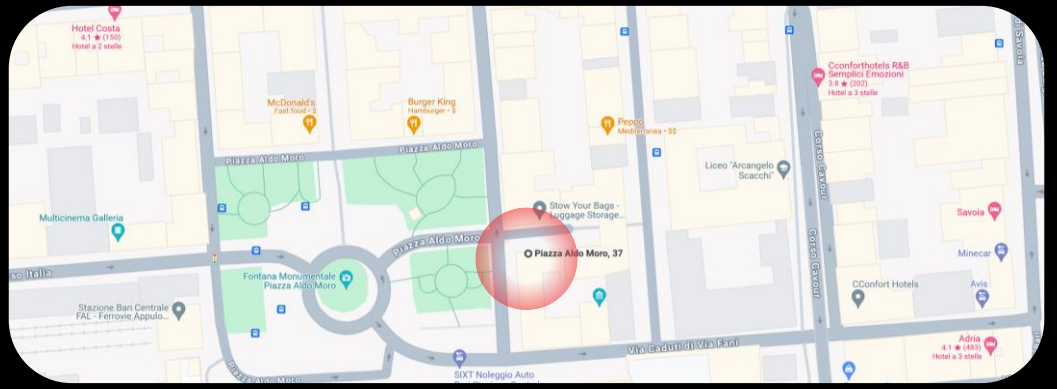

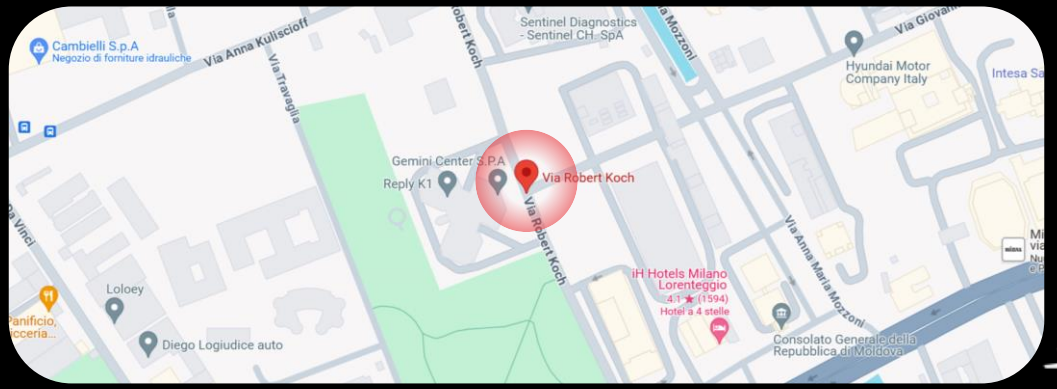

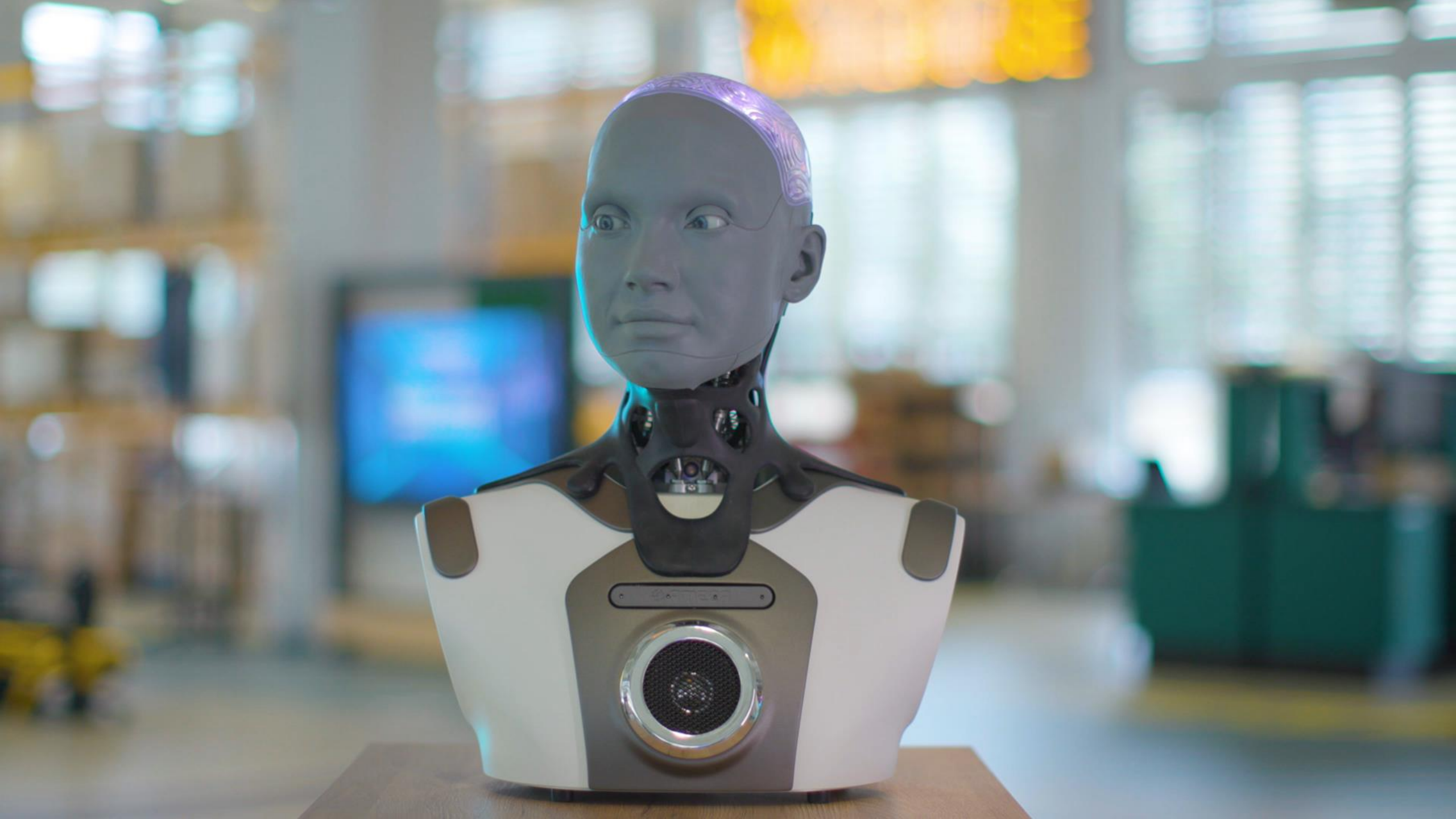

THANK YOU

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