

Observations in the Field of Robotics and Embodied Intelligence

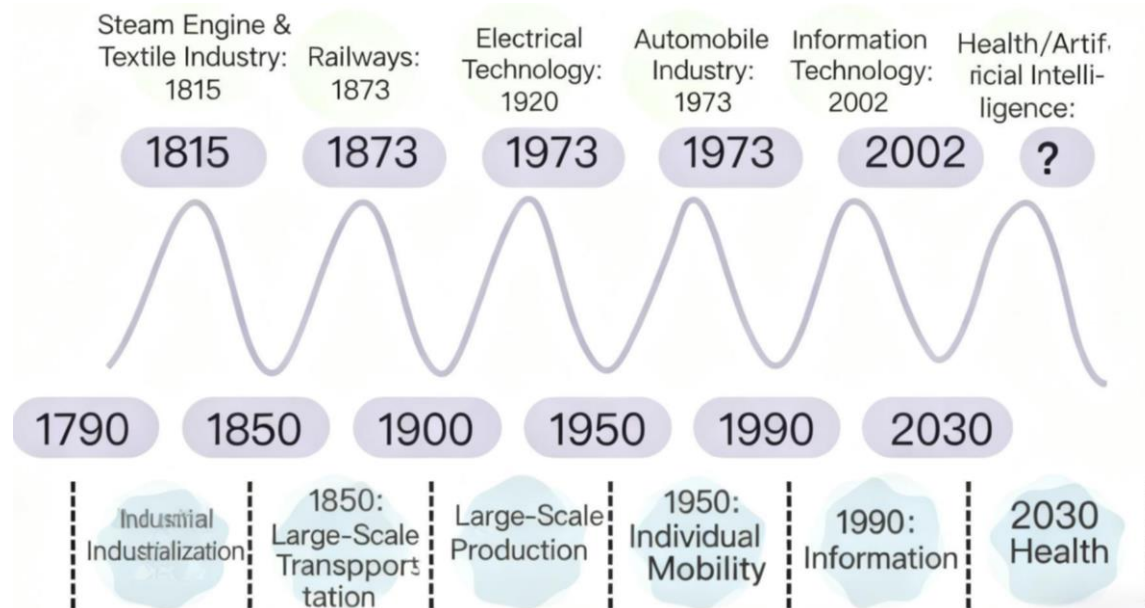
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Macro-Level Observations on Embodied Intelligence and Humanoid Robots

What's the biggest difference between 2025 and 2015 ?

Back in 2015, the world had lots of options.
But eventually, all paths merged into one.



Kondratieff Cycles

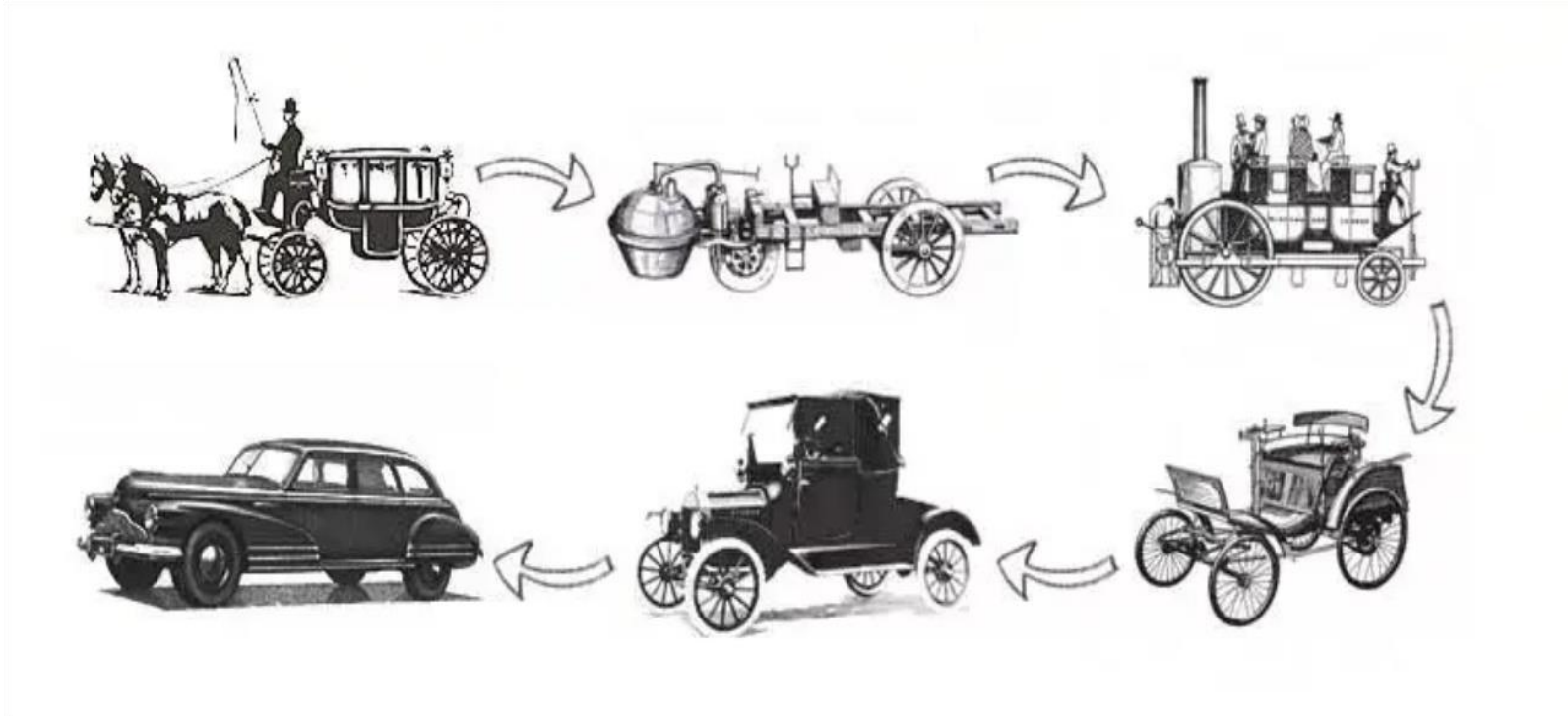
Only new products and services
will survive these cycles.



Robot 4S Store & Robot Repair

Current Status of the Robot industry

The current humanoid robot industry is much like the prototype era during the transition from horse-drawn carriages to automobiles. It's also like the Motorola-Nokia mobile days—so much stuff popping up and thriving. This industry is still super early on—but it's also so exciting. Maybe once things start to settle into a pattern, a lot of those new ideas and tech will fade into the background for observers.



1. Robot Body and Supply Chain

Robot Body and Supply Chain:

Bipedal or not ? Dexterous Hands or not?

- Bipedal locomotion isn't stable yet-it requires super high standards for motor efficiency and algorithms.
- Dexterous hands are like trying to fit five tiny robotic arms into a 10cm space, plus you need a solid tactile sensing system on the fingertips.



Droidup(Shanghai): bio-inspired tendon



Phybot(Beijing)

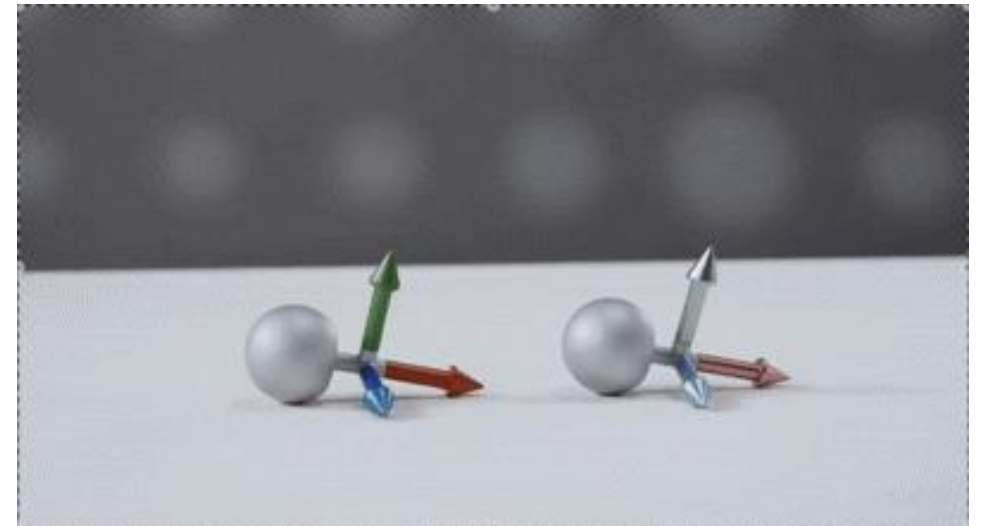
Robot Body and Supply Chain:

The rapid evolution of sensors :

- visual-tactile sensors
- vision-laser integrated sensors,
- surround-view cameras and microphone arrays
- human-baseline 3D VR camera modules



surround-view cameras



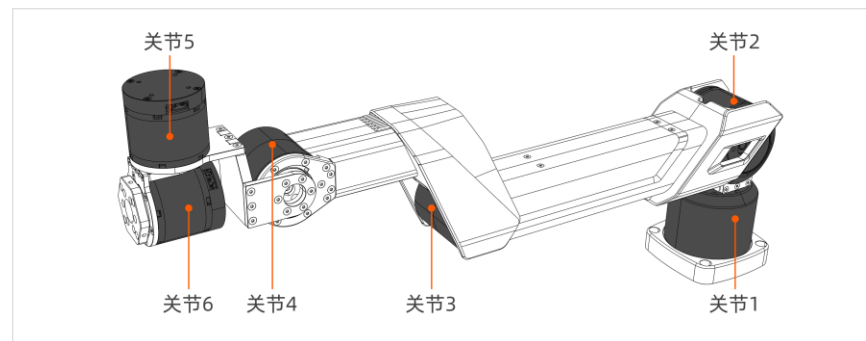
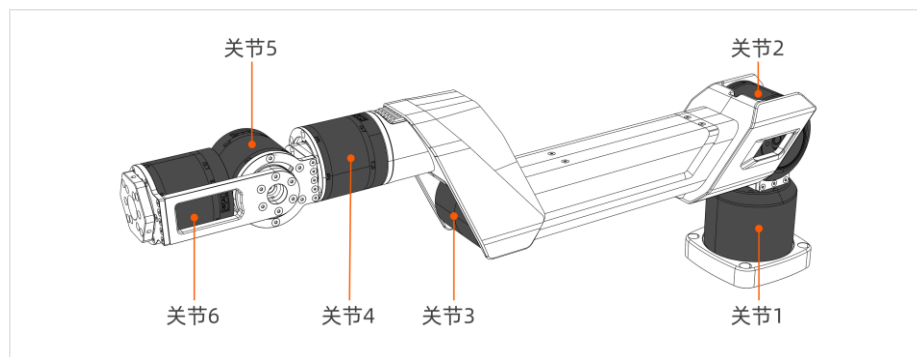
Xense: haptic sensors



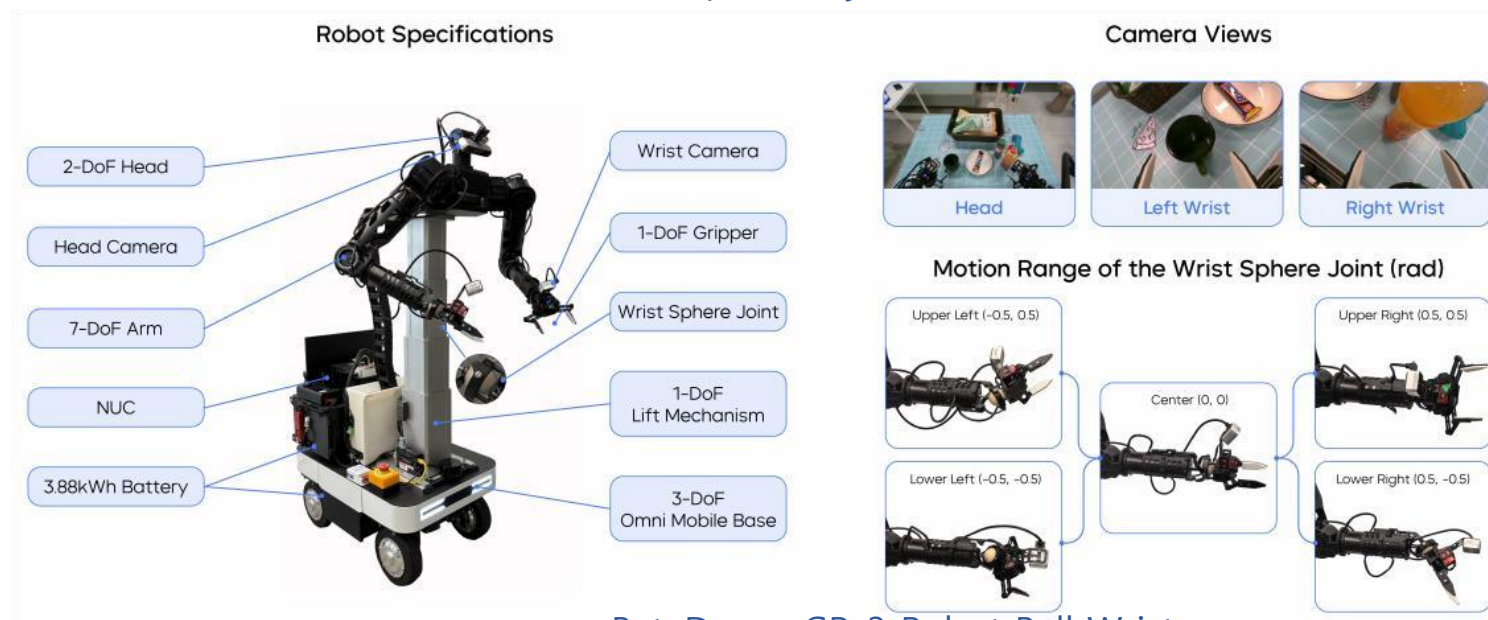
RoboSense: Vision-Laser Camera

Robot Body and Supply Chain:

The design exploration of robotic arms or upper bodies now has clear guidelines
more comprehensive dexterous workspace、 shorter response times、 better teleoperation experience



Galaxea planetary robotic arm



ByteDance GR-3 Robot Ball Wrist



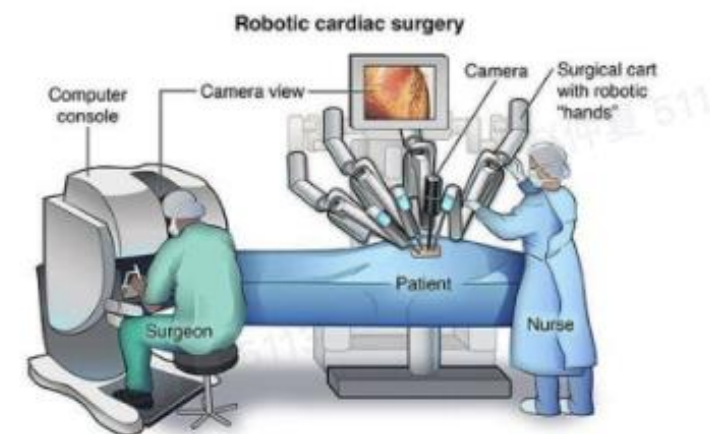
Linkage Wrist

2. From Teleoperation to Super Platform

Robots require a cockpit

Teleoperation has always been used in professional fields—like space exploration, the Da Vinci surgical robot, and smart excavators. But as embodied intelligence needs more data from human-controlled robots, the software and hardware for teleoperation have also evolved.

Teleoperation is to robots what steering wheels and cockpit systems are to cars. Embodied intelligence, on the other hand, is like autonomous driving. Once teleoperation completes its iteration, a complete robotic product will emerge—and that'll make it much easier for us to set standards.



Complete Robotic Product

北京智源人工智能研究院
BEIJING ACADEMY OF ARTIFICIAL INTELLIGENCE



Dexteleop Intelligence



AgiBot

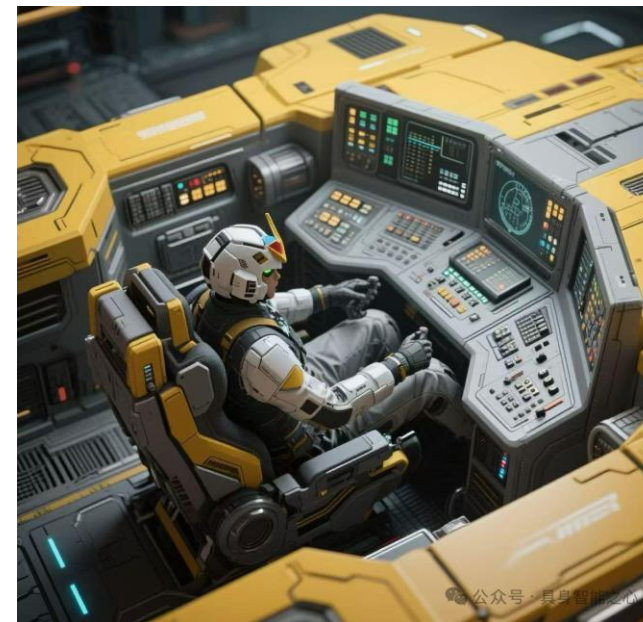
From Teleoperation to Super Platform

Embodied intelligence needs a progressive implementation plan

Similar to autonomous driving, a better embodied intelligence will emerge from a stronger human-robot interaction shadow mode.

Super Platform

But unlike cars, a robot steering wheel and its body are separate. Robots get different designs based on their environment, while teleoperation is built for human use. That's why teleoperation might evolve into a traffic gateway for the internet, letting people and organizations connect to different robots. The future of teleoperation is a Super Platform like PC and mobilephone



3. Embodied Intelligence Model

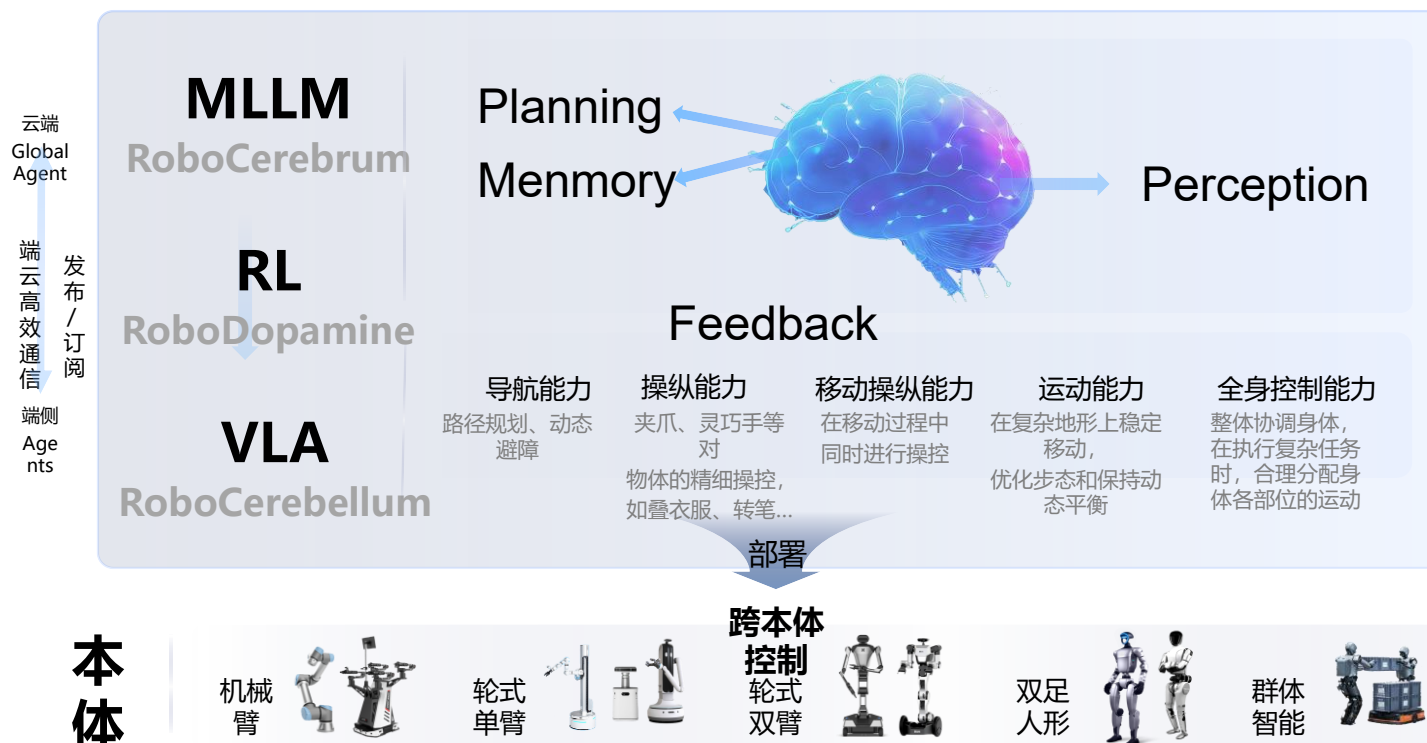
Algorithm for Embodied Intelligence

Working with embodied algorithms can feel like being on a roller coaster—too immersed in the process itself.

Overall, this experience can be summarized into two key aspects: hierarchical resolution and unified integration.

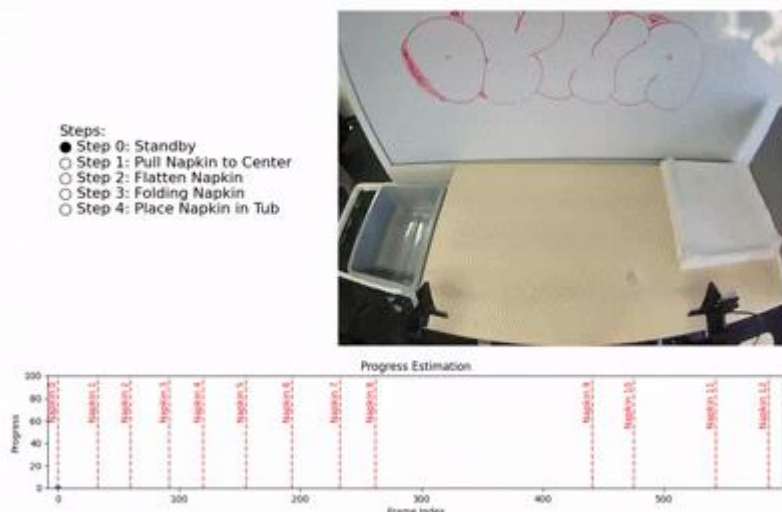
Hierarchical resolution: For the required functions of new robot products, existing algorithms are divided into specialized hierarchies to address the demands of embodied intelligence.

Unified integration: As AI glasses and robots become more popular, a huge amount of ego data will emerge. And with the evolution of intelligent model architectures, a unified model might just appear. May be world model?



RL Connects Fast-Slow Systems

Integration of VLA and WBC



DYNA-1 is the first foundation model featuring all-weather, high-efficiency, and dexterous autonomy. This model has for the first time proven that dexterous operation is commercially viable. In a 24 hour operation, DYNA-1 automatically folded more than 850 napkins, maintaining approximately 60% of the human speed, while achieving a success rate of 99.4%-with zero intervention and full-shift reliability.

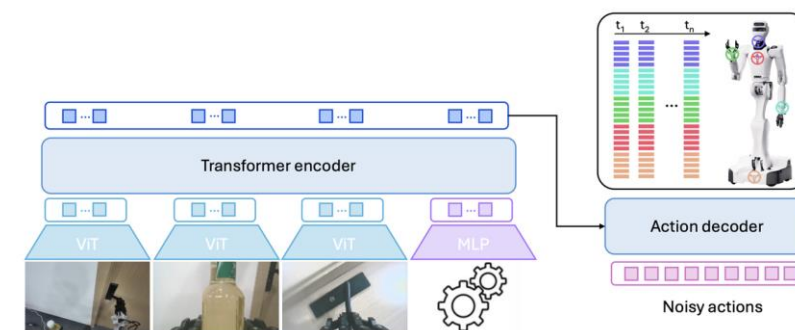
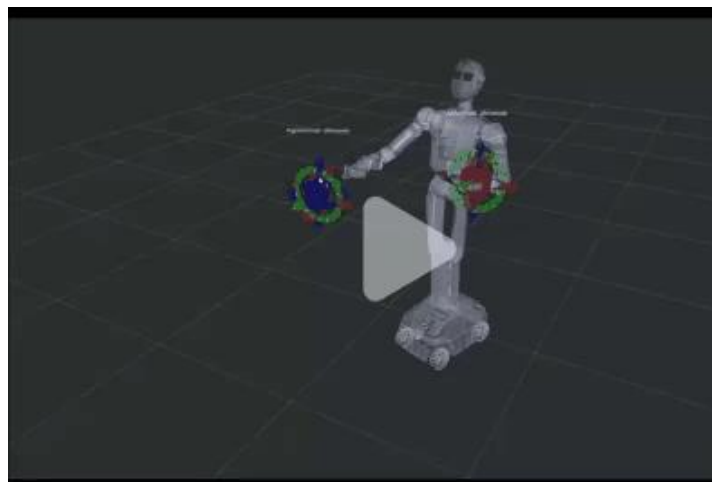


Figure 5 | **DuoCore-WB model architecture for imitation learning.** DuoCore-WB denoises whole-body actions within the embodiment space and facilitates effective whole-body policy learning by directly predicting delta end-effector (EE) poses relative to the EE frame.

4. About Commercialization

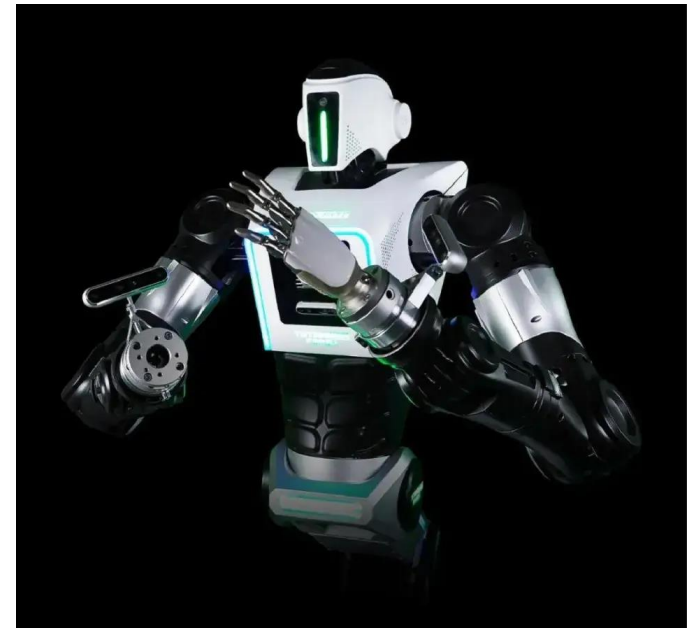
Current State of Commercialization

The current robotic body is not sufficient to replace humans in completing assembly-line-level tasks. Most of the time, it is the task that adapts to the robotic body rather than the robotic body adapting to the environment. The robotic bodys and algorithms that truly belong to the industry are still in the making, and even the industry itself needs to define a universal robotic body design that can solve most of the needs.

It is recommended that the industry side collect more requirements, conduct research on robotic body designs that adapt to the environment, and build the infrastructure for data collection.



RoboGYM : Elderly Care Robot



2.2 meter-tall Tiankui 1

Regarding Commercialization

The opportunities in this wave of robotics innovation should first lie in safety applications in extreme or enclosed environments, as well as the use, management, operation and maintenance of human-used equipment. Only after that will they address the dirtiest, most difficult, and most delicate tasks that automated equipment leave for humans.



Automotive Final Assembly Process



3D Printer Farm



Snowy Mountain Sentry Post



Booster Robotics



Thanks!

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