

How can virtual simulation and digital twins shape responsible humanoid robotics?



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Shape the future
with confidence



The better the question. The better the answer. The better the world works.

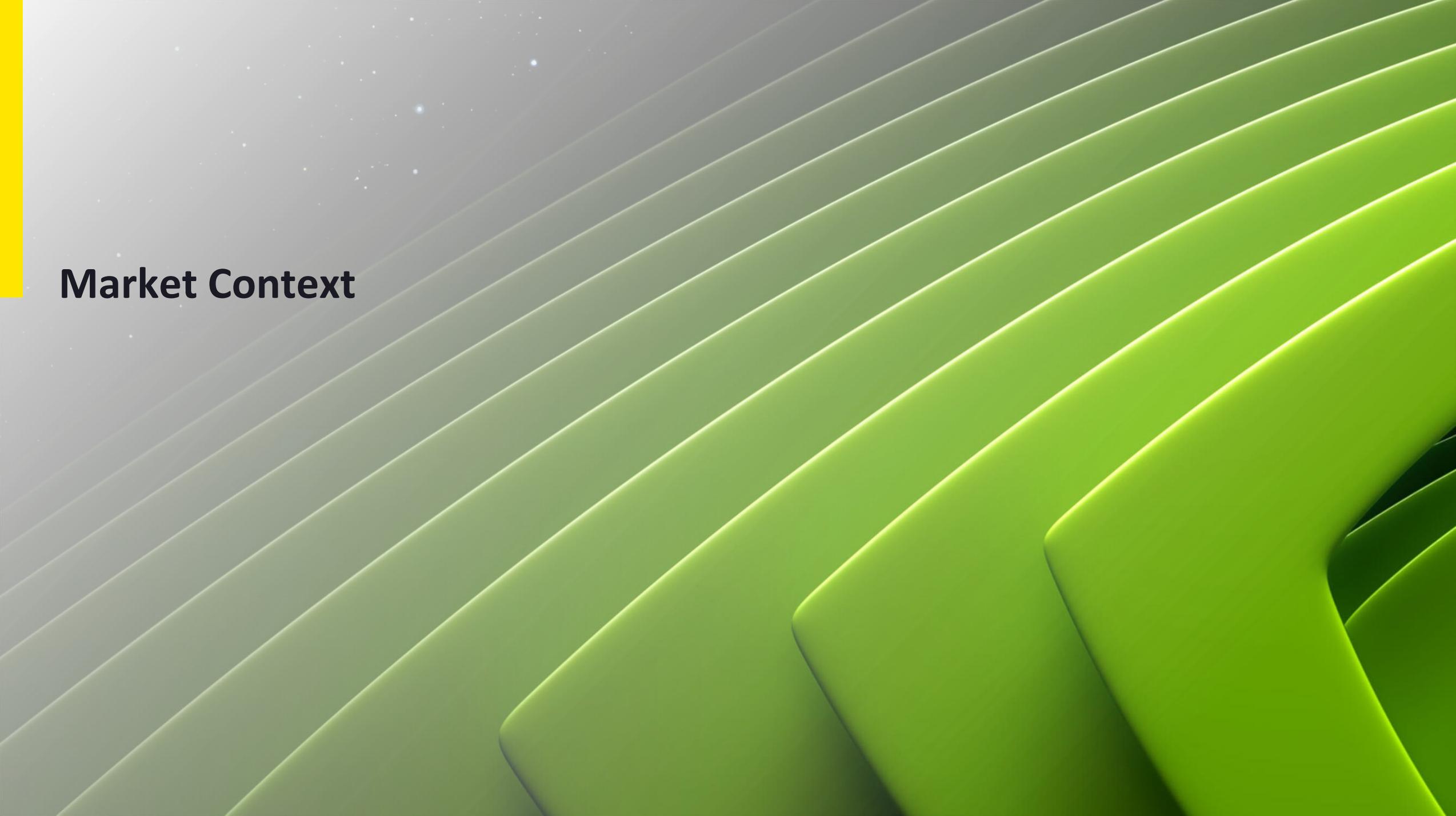
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Physical AI for the Next Wave of Industrial Digitalization

Miloš Stanić, Ph.D. | Sr. Solution Architect - GSI



Market Context

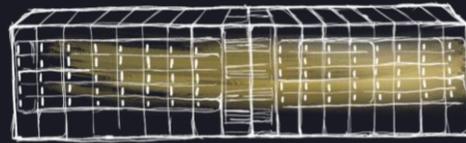
NVIDIA Transformation From GPU Chip to AI Infrastructure



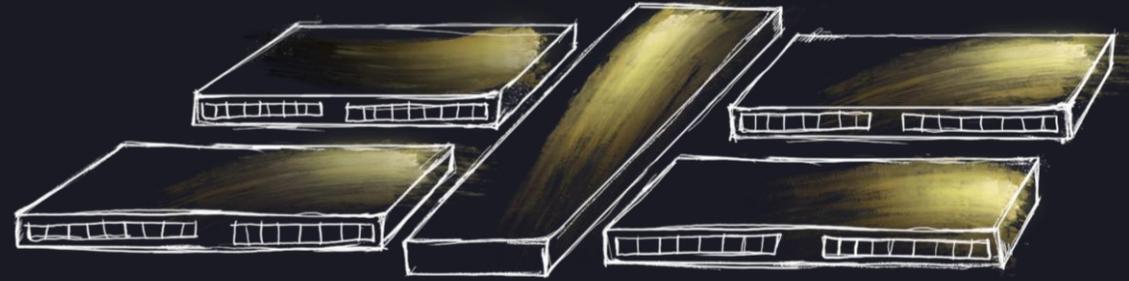
CHIP



SYSTEM



DATA CENTER



INFRASTRUCTURE



A New Industrial Revolution

AI FACTORY



TOKENS
"UNITS OF INTELLIGENCE"
□□□□□□□□□□□□
→

\$100T



SCIENCE



ENTERPRISE



HEALTHCARE



MANUFACTURING



Next Wave of AI is Physical AI

"FIRST CONTACT"



2012 ALEXNET

PERCEPTION AI

SPEECH RECOGNITION
DEEP RECSYS
MEDICAL IMAGING

GENERATIVE AI

TRANSLATING
CONTENT CREATION

AGENTIC AI

CODING ASSISTANT
CUSTOMER SERVICE
PATIENT CARE



PHYSICAL AI

AUTONOMOUS VEHICLES
GENERAL ROBOTICS

Physical AI is the Next Trillion Dollar Industry

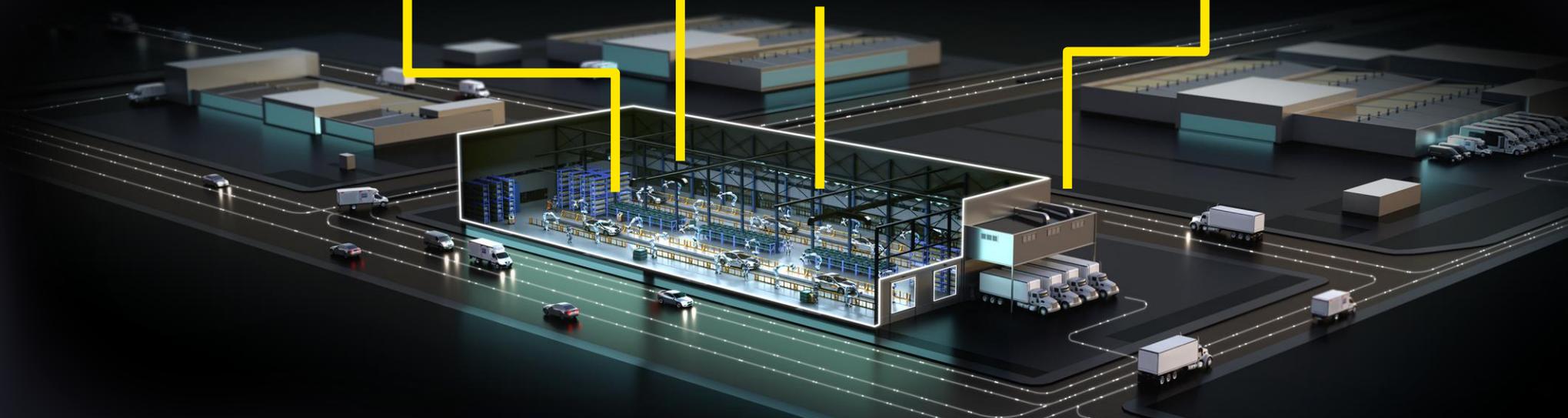
2 Billion
Cameras

10 Million
Factories

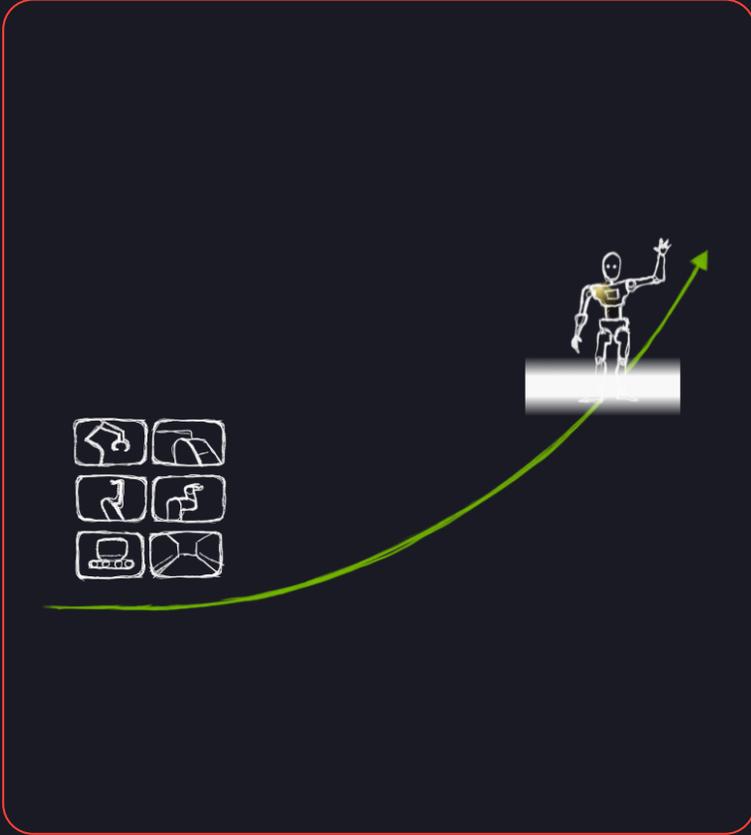
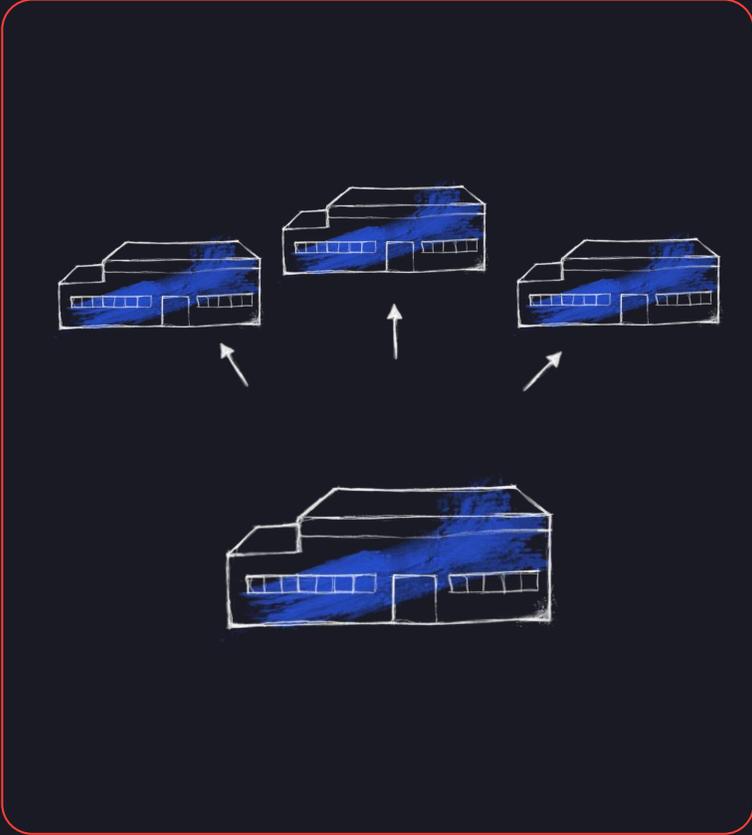
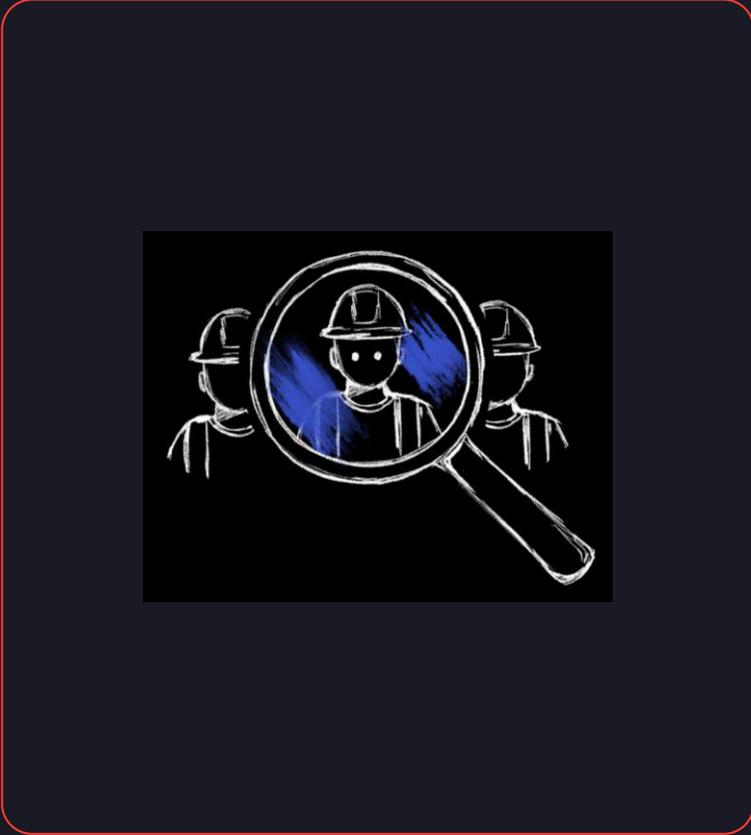
200K
Warehouses

1.5 Billion
Cars & trucks

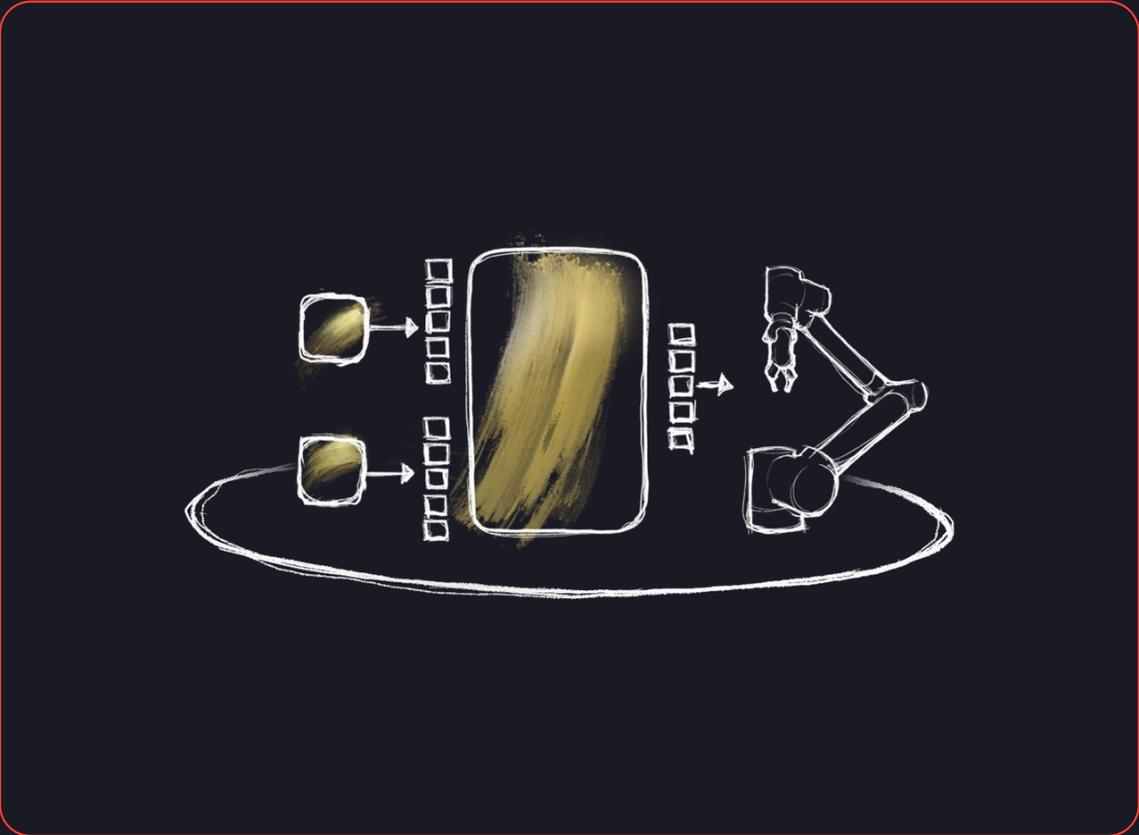
Future Billion
Humanoid robots



Fundamental Shift in Industry



ChatGPT Moment of Robotics is Here





Physical AI and 3 Computer Intro

NVIDIA Builds 3 Computers for Physical AI



Simulation Tools Propelling the Revolution

SIMULATE

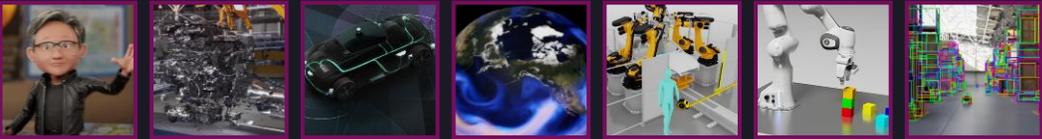
NVIDIA Omniverse &
Cosmos on RTX PRO



NVIDIA Omniverse

Platform to build and operate industrial digitalization applications on OpenUSD

Custom Applications



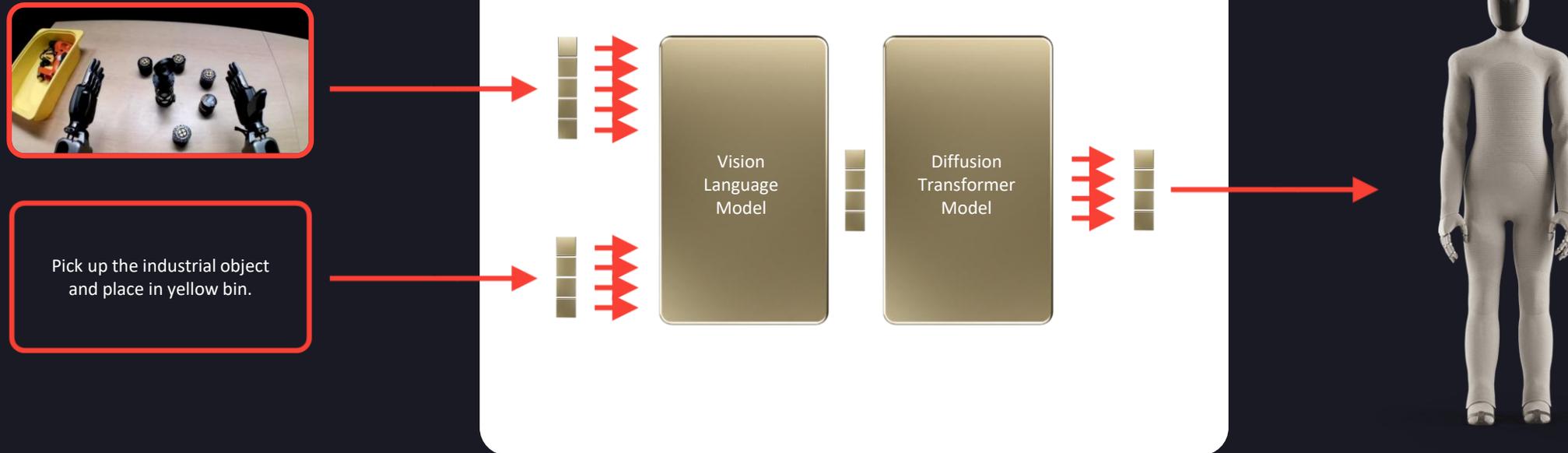
Siemens

Ansys

Cadence

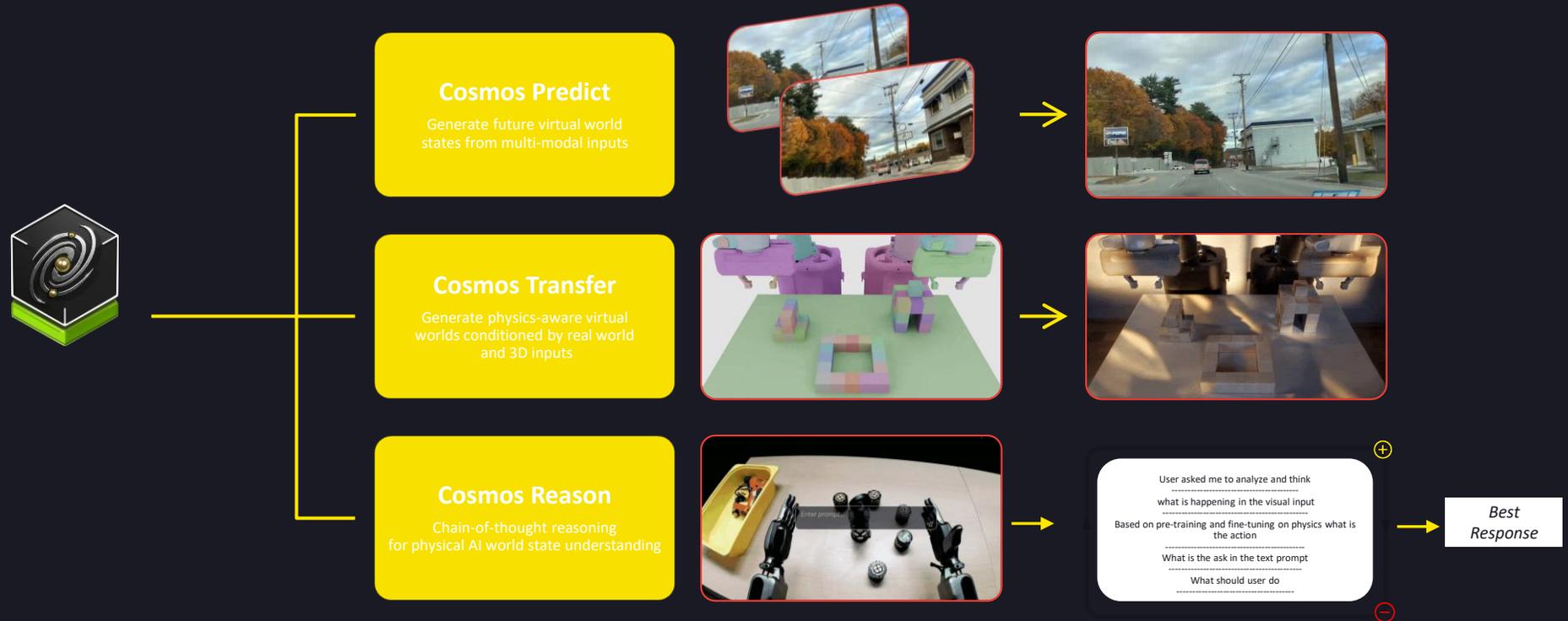
NVIDIA Isaac GR00T N Foundation Models

Open, Fully Customizable Humanoid Robot Foundation Models



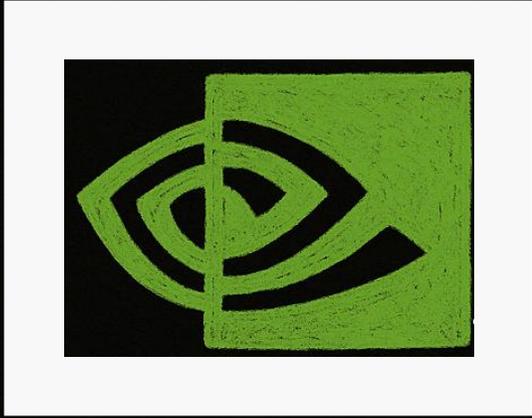
NVIDIA Cosmos World Foundation Models

World Foundation Model Development Platform for advancing Physical AI





Unitree
H1



01

Revolutionizing Industries with Physical AI and Digital Intelligence

Redefining Industries:

the growth power of physical AI, digital twins and synthetic data

Industrial robotics market to surge to \$90 billion by 2030 at 13%.¹

Humanoid robot market is projected to reach \$4 billion by 2030, growing at a CAGR of 17.5%.²

Synthetic data generation market is expected to be worth around \$6.64 billion by 203, growing at a CAGR of 35.7%.³

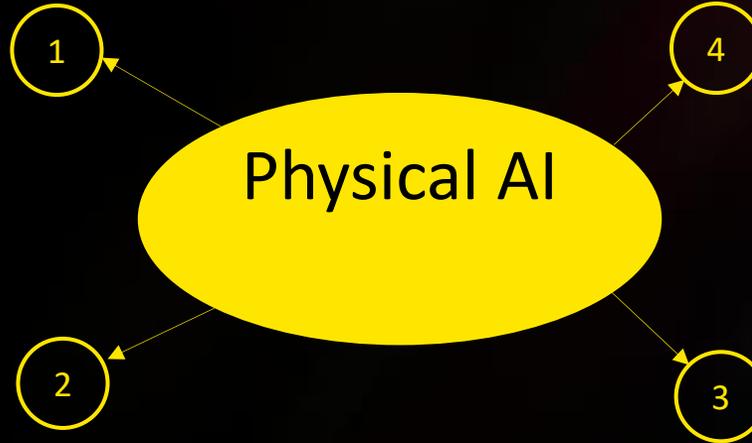
Digital twin market size is projected to grow \$259.32 billion by 2032, exhibiting a CAGR of 40.1%.⁴

- The combination of digital twins, virtual simulation and synthetic data are critical to enable the successful deployment of humanoid robots over the next several years.
- EY Intelligent Realities Lab building upon award winning experience in 3D world building to create world leading capability leveraging NVIDIA Omniverse and AI stack.

Physical AI:

Unlocking New Capabilities through emerging World Foundation Models and Advanced Robotics

Onboard computational power and energy storage



World foundation models, digital twins, virtual AI training



Advanced sensing (lidars, radars, etc.) and actuators with high precision

Large language models, proven Gen AI and agentic AI application

Content (text, audio, video)

Customer service

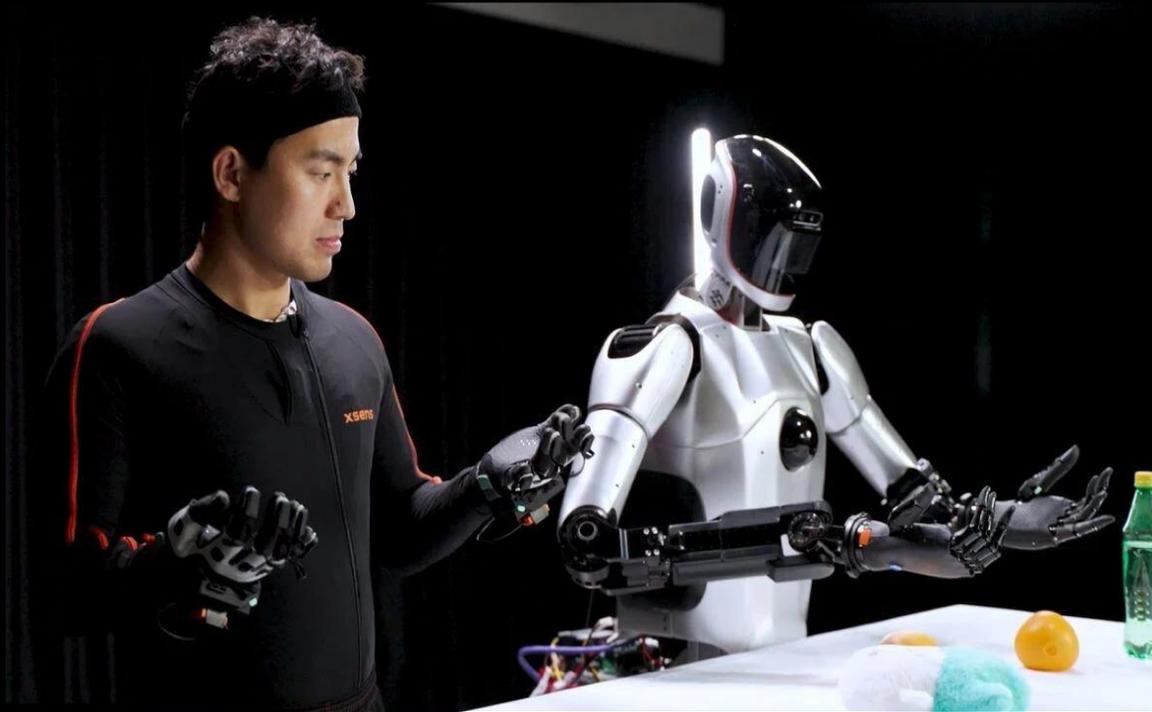
Website

Patient care

Digital marketing

Coding agent

Through these advancements in technology, “42 years’ worth” of training can be achieved in 32 hours



Historically, AI robots have been trained through **motion capture using gloves and cameras.**



Today, Physical AI developers enable robotic models to be trained in **virtual environments.**

02

EY's Physical AI Ecosystem: Innovation, Alliances, and Market Leadership

EY's physical AI offerings are developed to help enable safe, efficient, and sustainable deployment and operations of autonomous systems

Physical AI Offerings

Physical AI Strategy

Structured approach that defines how the organization will use embodied AI systems (robots, drones, smart-edge devices) to deliver business outcomes.

Safety, Ethics, Governance

Guardrails to help ensure that autonomous machines are safe, ethical, compliant and cyber-secure across their life-cycle.

Physical AI Architecture

Provides the reference framework for designing scalable, modular, and secure embodied-AI platforms.

Physical AI Implementation and Integration

Provides production-grade solutions that meet technical constraints, user needs and operational realities.

Physical AI Asset Management/Ops

Helps optimize ongoing operations, cost and performance of embodied-AI deployments.

Physical AI Process Management

Integrates Physical AI into existing processes, aligning operations with strategic goals to deliver greater customer value.

Human-centric Change Management

Empowering innovation: Our Robotics Centre of Excellence



Meet Our Robots

- Humanoids
- Unitree G1
- Quadrupeds
- Unitree Go2
- Unitree Go1
- Robotic arms
- Assistant robots
- Temi Robot V3
- Aerial and underwater drones
- CRX-5iA
- Ufactory 850
- DJI Avata
- DJI M30T
- Fifish v6
- BlueEye X3 + Tether
- UR3e

Our Physical AI Talent

EY's hub - convening the right people, from developers to strategists - brings integrated collaboration with our global network, to deconstruct challenges and find solutions at speed

Our Simulation Hardware and Data Systems

Computers and virtual machines – equipped with powerful Central and Graphics processing unit, and high-speed memory and storage - are capable of real-time hyper-realistic 3D simulation, physics calculation and AI processing

External Market Highlights

Harnessing AI powered Emerging Technologies for Positive Human Impact (Humans@Center)

Key highlights:

- **8 recent** awards.
- **#1** market leader in Metaverse (recognized by HFS).
- **Premier Global events:** South by Southwest (SXSW), Mobile World Congress (MWC), Innovation Realized, Strategic Growth Forum, National Association of Corporate Directors (NACD), Grace Hopper, Vive, Consumer Electronic Show (CES) on the Hill etc.
- **Media Coverage:** Business Insider, Forbes, New York Times, Venture Beat, Tech for Good, Tech UK .

Thought Leadership



EY named as **Horses for Sources (HFS) Horizon 3 Metaverse Leader**



2X Webby Honoree, We Love Tech, Business Intelligence, WorkLife, Fast Company, BIG Innovation award, DRUM Creator of the Year award, National Tech Awards

Business and Technology Recognition



Action needed to ensure the Metaverse is fully inclusive

Launched new initiative with **EY Foundation**



Premier events such as **SXSW (3K visitors)** and MWC

Creative Technology and Social Impact

EY Intelligent Realities Lab Differentiators

In order to deploy humanoid robots in real physical environments, you first need:

1. Photorealistic and accurate scans or Computer-Aided Design data of the physical environment
2. Deep technical knowledge of NVIDIA Omniverse stack
3. Ability to simulate real physics to meet business needs

03

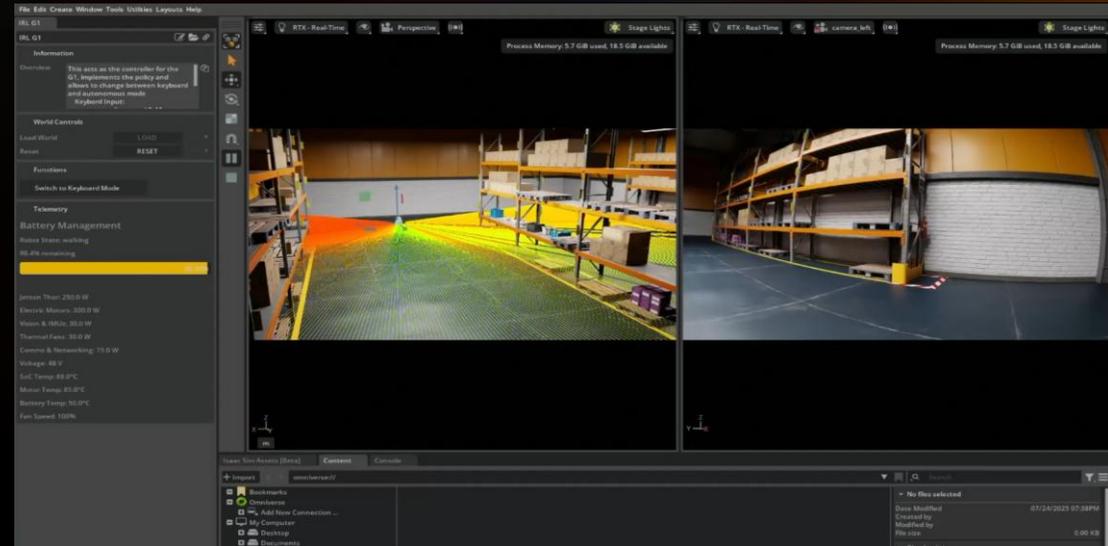
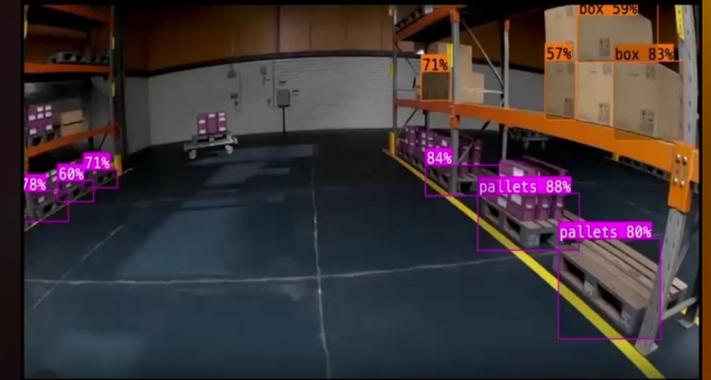
Now, Next, Beyond: AI-Powered Human Safety at Scale leveraging NVIDIA Omniverse

Now - Path Optimization

Current Capability

Isaac Sim's Graphic Processing Unit-accelerated generation and auto-optimized routing deliver collision-free navigation workflows:

- Path optimization scalable to multi-robot
- Simulation of multi-layout scenarios
- Real-time collision avoidance with static and dynamic objects
- Sensor integration
- Machine Vision for Detection and Recognition



Video sources: EY Intelligent Realities Lab

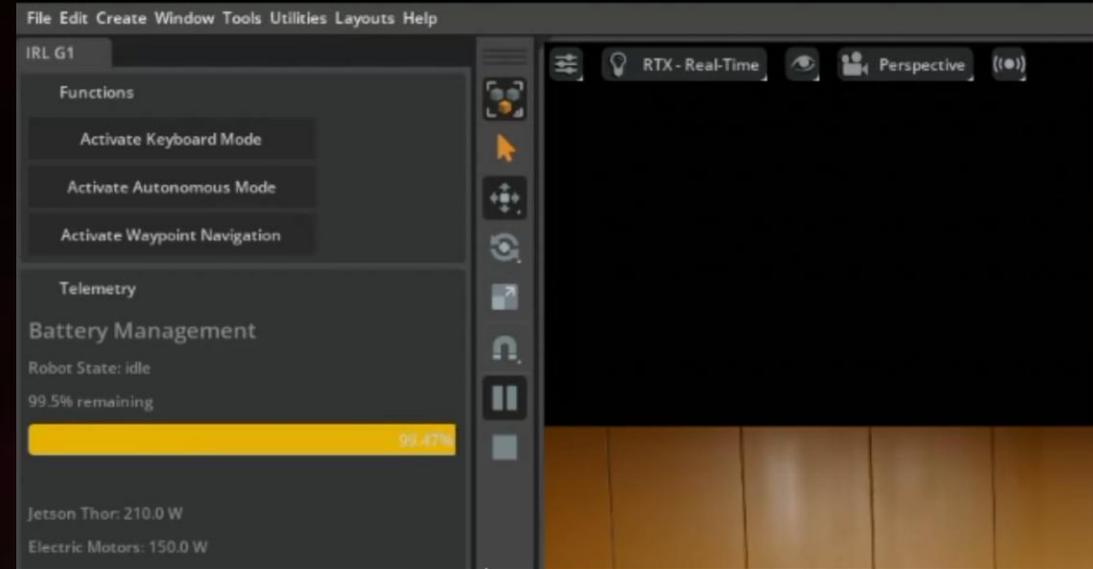
Next - Data Driven Decisions

Technoeconomic modelling

Design and Optimize a Warehouse Robot Fleet with Digital Twins:

Simulate Robot Fleet Performance in Isaac Sim:

- Test scenarios for task allocation, battery usage, charging station placement, and fleet sizing using Isaac Sim, enabling data-driven decisions for the most efficient and scalable factory automation strategy
- Create assets that help enable first order return on investment calculation for clients across varied sectors and use cases



Video source: Fourier

Beyond - Human Safety at Scale

Model Extreme Environments, Emergency Response

Simulate Emergency and Extreme Scenarios with Isaac Sim + Omniverse:

- Use high-fidelity digital twins to train humanoid robots in mission-critical tasks such as fire response, space missions, disaster zones, deep ocean operations, and search and rescue

Support First Responders with Physical AI powered by Frontier Tech convergence

- Model the ability for Physical AI to save human life when powered by converged frontier tech (5G, autonomous vehicles, blockchain, digital twins etc.)



Excerpt from the short film *“Maelstrom: An EY Omniverse Story”* *Currently in pre-production

Hands On Experiences



Robotic Arms



Humanoid Robots

These experiences aims to promote hands-on engagement with both physical and digital robotics systems, highlighting the human-centered training approach and the scalability provided by the Nvidia Stack.

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All in to shape the future with confidence.

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