KUKA Approach to AI

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Head of Business Development
KUKA Roboter Italia SpA

KUKA

_you encounter KUKA everywhere

Our way forward to win market share

VISION Clear choice for smart automation

MISSION Making life and work easier

Systems	Robotics	Swisslog	Swisslog Healthcare	Digital
KUKA	KUKA	SWISSLOG		DEVICE INSIGHT · VISUAL COMPONENTS · mosaixx
Smart, safe & efficient production solutions	Hardware, software & services for smart automation	Data- & robotic-driven logistics automation	Material Transport & Pharmacy Automation	Digital Solutions for Manufacturing lifecycle

Strategic Target

Systems	Robotics	Swisslog	Swisslog Healthcare	Digital
Strong **core business** as basis to drive new growth	**Top #2 globally | #1 in China** Become a volume player targeting 100.000 units	Becoming one of the leading companies in **data and robotic driven** logistics automation	Leading in automation – **#1 in Unit Dose Central Pharmacy and Material Transport.**	Improving productivity, resilience and sustainability by means of **digital manufacturing solutions**

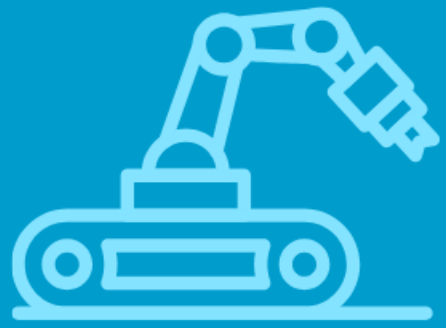
TOP 5 GLOBAL ROBOTICS TRENDS IN 2024

IFR International Federation of Robotics

1
AI AND MACHINE LEARNING

2
COBOTS IN NEW APPLICATIONS

3
MOBILE MANIPULATORS



4
DIGITAL TWIN

5
HUMANOIDS

Find out more at:
https://ifr.org/ifr-press-releases/news/top-5-robot-trends-2024

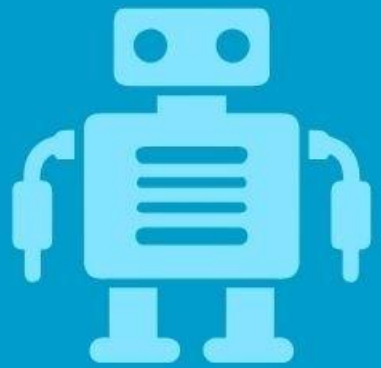
Source: International Federation of Robotics

TOP 5 GLOBAL ROBOTICS TRENDS IN 2025

IFR International Federation of Robotics

1
PHYSICAL, ANALYTIC & GENERATIVE AI

2
SINGLE PURPOSE HUMANOIDS



3
SUSTAINABILITY AND ENERGY CONSUMPTION

4
NEW FIELDS OF BUSINESS AND CUSTOMER SEGMENTS

5
ROBOTS ADDRESSING LABOR SHORTAGE

Find out more at:
https://ifr.org/ifr-press-releases/top-5-global-robotics-trends-2025

Source: International Federation of Robotics

KUKA | SWISSLOG

AI Offering – DevOps & Consultancy

Generative AI

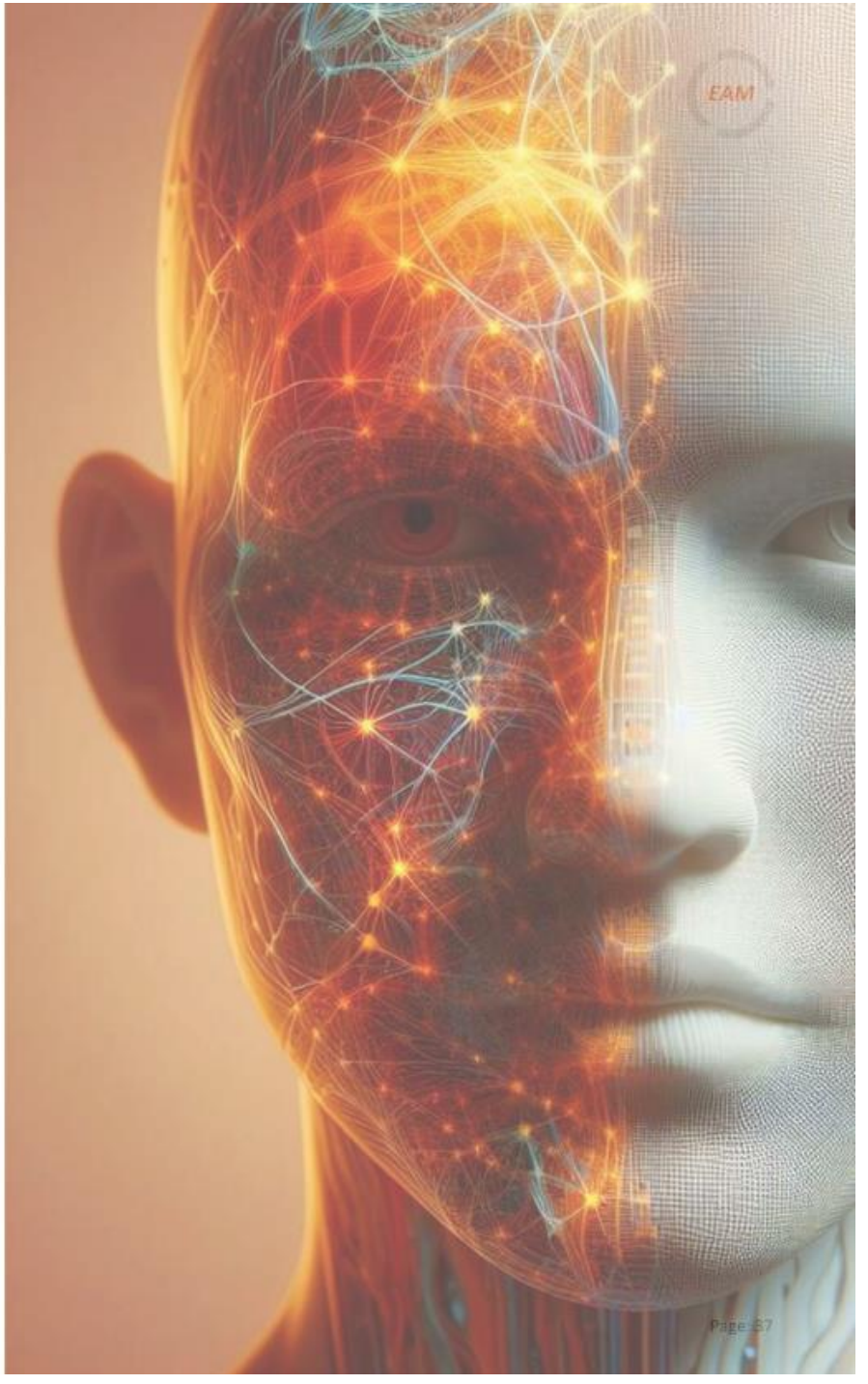
GenAI can create new and original content, such as text, images, music, and videos, by learning from examples. Most common GenAI Tool is “ChatGPT” from OpenAI.

Computer Vision

Giving eyes to a computer, allowing it to see and understand pictures and videos just like humans do. It helps machines recognize objects, people, and scenes in the visual world.

Data Science

Involves analyzing large amounts of data to find patterns, trends, and insights. It's like being a detective, using data to uncover hidden stories and information that can help make better decisions



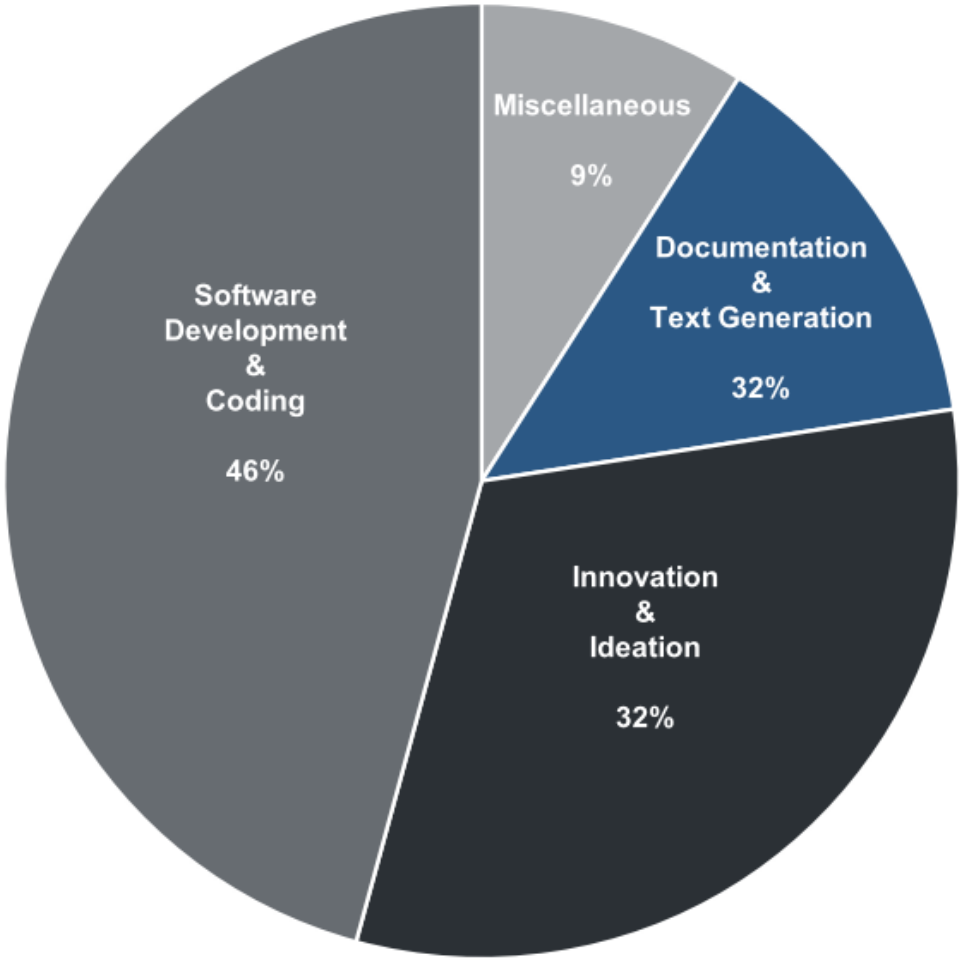
How do the employees of KUKA Group want to use the Azure Open AI Services? Analysis of 356 use cases of the pilot registration process.

Software Development & Coding

- "As a Software Developer i want to generate code and i want to check my docu writings, and many elses"
- "Code generation in Java and python for my projects. Chatbot functionality for knowledge base"

Innovation & Ideation

- "Developing new and innovative solutions to complex problems."
- "Brainstorming new ideas and approaches using Open AI technology."



Documentation & Text Generation

- "Quick creation of documentation and requirement specification: keyword-based creation of texts."
- "I would like to test the Open AI service to evaluate a Use Case, which is about text summarization and QnA on the content of the document."

Miscellaneous

- "I would like to use it to search for legislation and legal cases"
- "Assisting in develop marketing activities, roadshow content and mailings to customers. The use of AI greatly makes our daily work more effective"

Object identification through AI algorithm (neural network)

KRL Code Generation

“Create a palletizing program that picks different colored blocks from a conveyor and sorts them on two pallets. Each color of block goes to its own pallet”

+ clarify prompt if needed:
“can you modify the program so that it places the blocks in 9x9 patterns on the pallet”

KRL Copilot

Welcome to the KUKA KRL Copilot Chatbot.

Important Information

Please be aware that your chat data and feedback is stored to improve KRL Copilot. Please don't include personal or sensitive data in your chat.

Please test the generated code before using it on a real robot.

Create a palletizing program that picks different colored blocks from a conveyor and sorts them on two pallets. Each color of block goes to its own pallet

DAT file:

```
DEFDAT PalletizingProgram
  ;Declaration of variables
  DECL E6POS ConveyorPos={X 1000.0, Y 0.0, Z 500.0, A 0.0, B 0.0, C 0.0, S
  DECL E6POS Pallet1Pos={X 2000.0, Y 500.0, Z 500.0, A 0.0, B 0.0, C 0.0, S
  DECL E6POS Pallet2Pos={X 2000.0, Y -500.0, Z 500.0, A 0.0, B 0.0, C 0.0,
  DECL CHAR BlockColor
ENDDAT
```

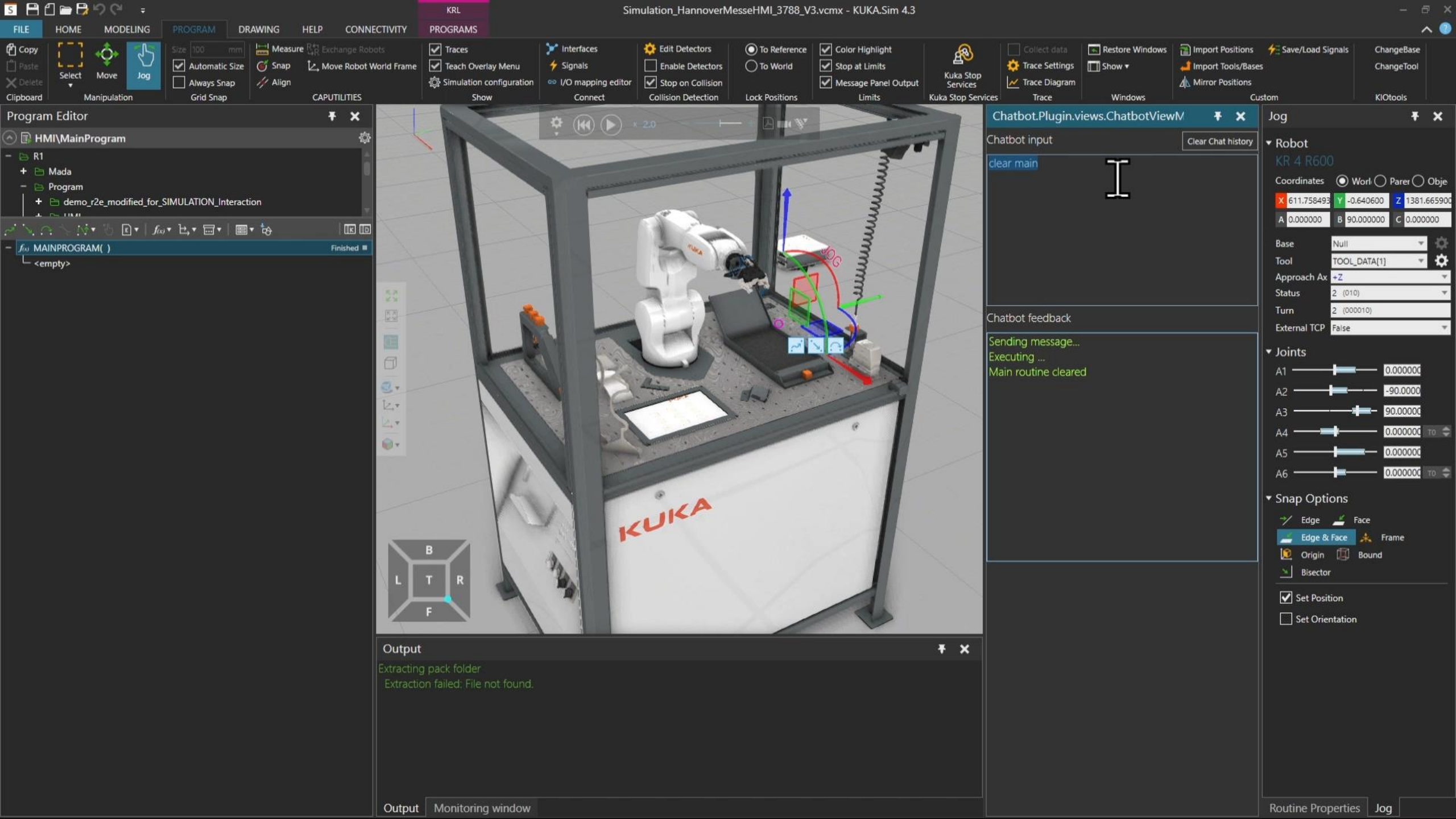
AI@Simulation

Use Cases:

- Create 3D scenes and layouts
- KRL-Code generation

Advantages:

- Significant reduction in programming effort
- Reduced time for testing
- Less susceptibility to errors


KRL
Simulation_HannoverMesseHMI_3788_V3.vcmx - KUKA.Sim 4.3
FILE
HOME
MODELING
PROGRAM
DRAWING
HELP
CONNECTIVITY
PROGRAMS
Copy
Paste
Delete
Clipboard
Select
Move
Jog
Manipulation
Size 100 mm
Automatic Size
Always Snap
Grid Snap
Measure
Snap
Align
Exchange Robots
Move Robot World Frame
CAPUTILITIES
Traces
Teach Overlay Menu
Simulation configuration
Show
Interfaces
Signals
I/O mapping editor
Connect
Edit Detectors
Enable Detectors
Stop on Collision
Collision Detection
To Reference
To World
Lock Positions
Color Highlight
Stop at Limits
Message Panel Output
Limits
Kuka Stop Services
Kuka Stop Services
Collect data
Trace Settings
Trace Diagram
Trace
Restore Windows
Show
Windows
Import Positions
Import Tools/Bases
Mirror Positions
Save/Load Signals
Custom
ChangeBase
ChangeTool
KIOtools
Program Editor
HMI\MainProgram
R1
Mada
Program
demo_r2e_modified_for_SIMULATION_Interaction
MAINPROGRAM( )
Finished
<empty>
KUKA
B
L
T
R
F
Chatbot.Plugin.views.ChatbotViewM
Chatbot input
Clear Chat history
clear main
Chatbot feedback
Sending message...
Executing ...
Main routine cleared
Jog
Robot
KR 4 R600
Coordinates
World
Parent
Object
X 611.758493
Y -0.640600
Z 1381.665900
A 0.000000
B 90.000000
C 0.000000
Base
Null
Tool
TOOL_DATA[1]
Approach Ax
+Z
Status
2 (010)
Turn
2 (000010)
External TCP
False
Joints
A1 0.000000
A2 -90.0000
A3 90.00000
A4 0.000000
A5 0.000000
A6 0.000000
Snap Options
Edge
Face
Edge & Face
Frame
Origin
Bound
Bisector
Set Position
Set Orientation
Output
Extracting pack folder
Extraction failed: File not found.
Output
Monitoring window
Routine Properties
Jog

KUKA

Xaba

The problem

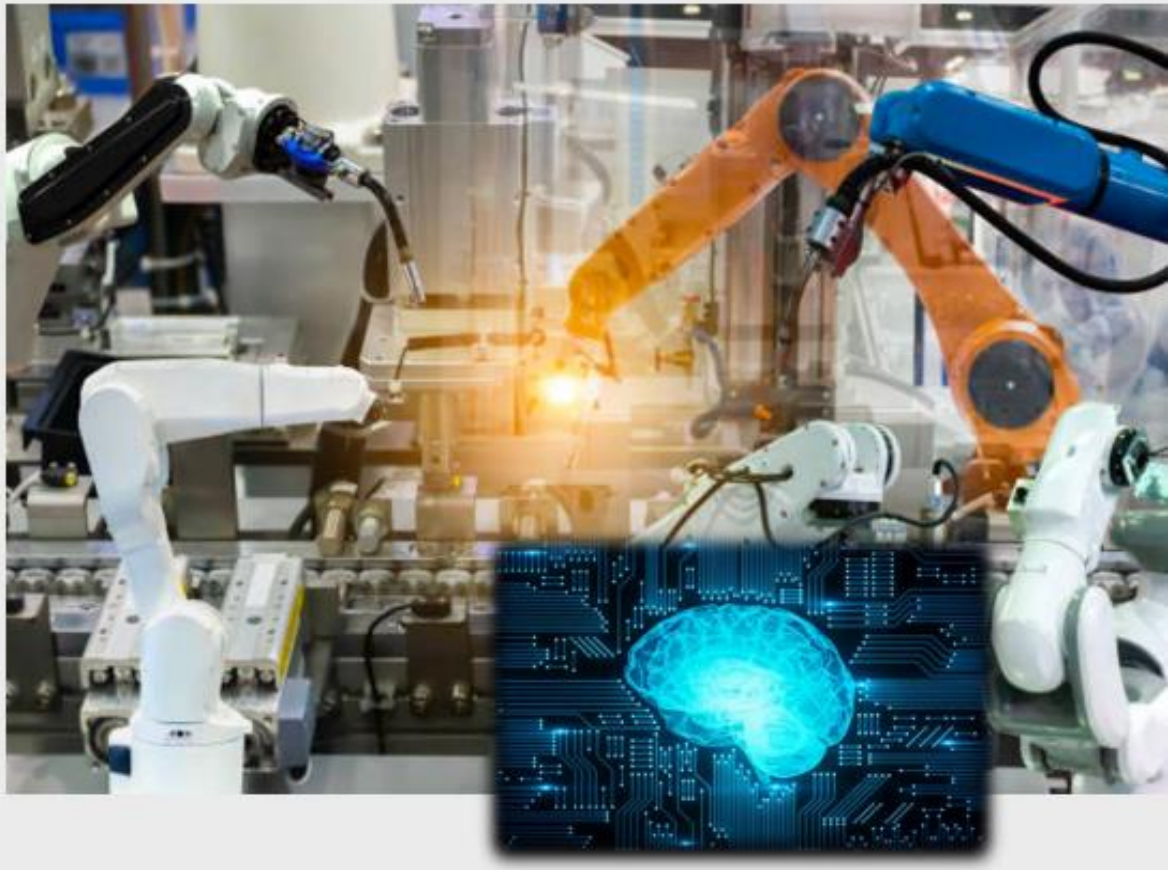
Robots are a powerful way to automate manufacturing processes, but are very expensive to purchase and operate:

- Average cost of an industrial robot: ~ $70k
- Cost to install, program and calibrate it : ~$300k
- Difficult to program: from a few weeks up to a few months for a single program
- **Approximately $7 billion is spent annually on programming and deploying industrial robotics** due to the labor-intensive nature of the manual trial-and-error process involved
- Skilled labor shortage in robotics programming and deployment

The solution

xCognition, a proprietary AI-powered software solution that greatly reduces the need for costly setup and maintenance.

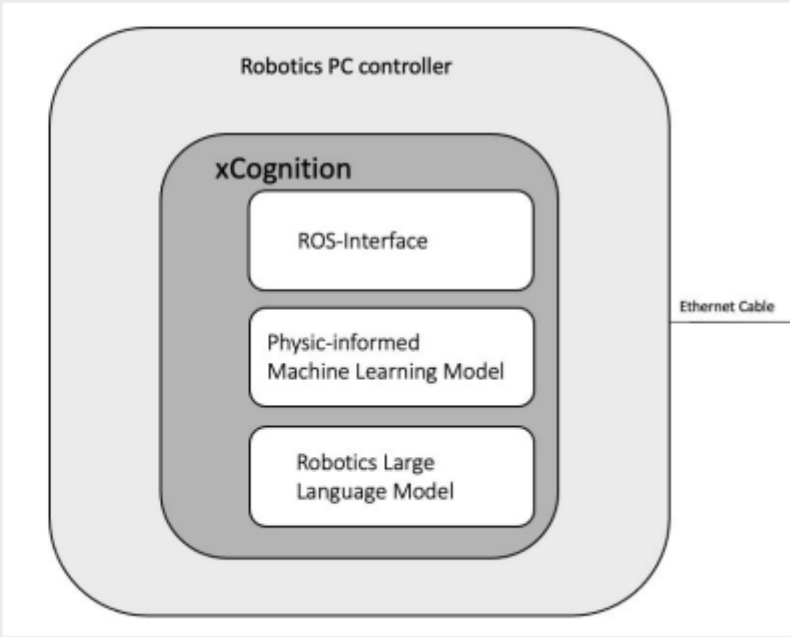
xCognition uses AI to learn precisely how and where a robot needs to move, automatically generating its control programs and self-correcting the robot when it gets off course.



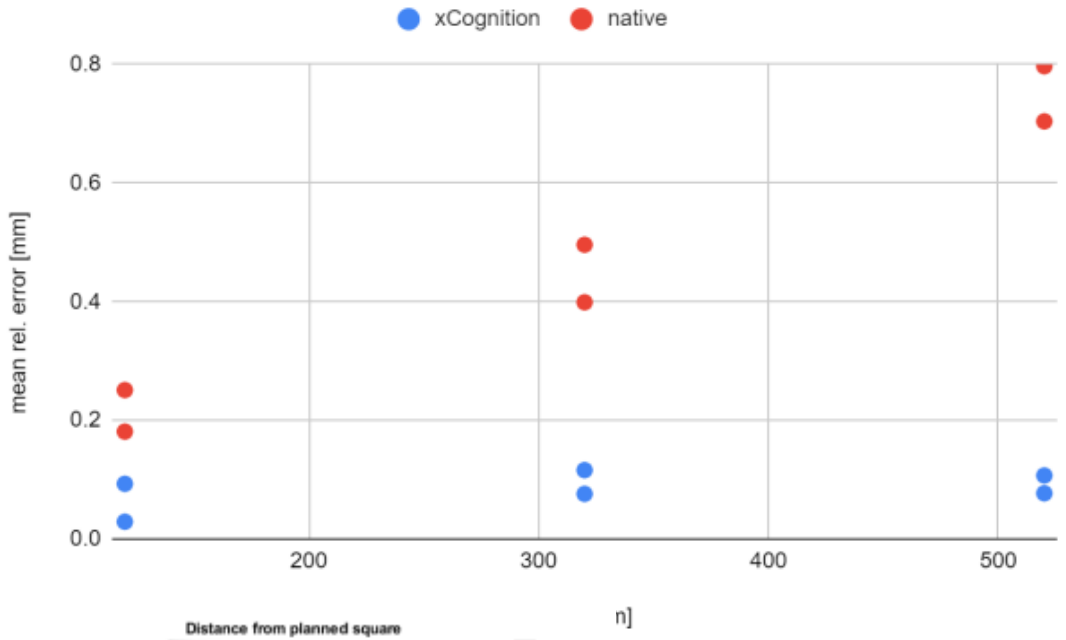
What is xCognition

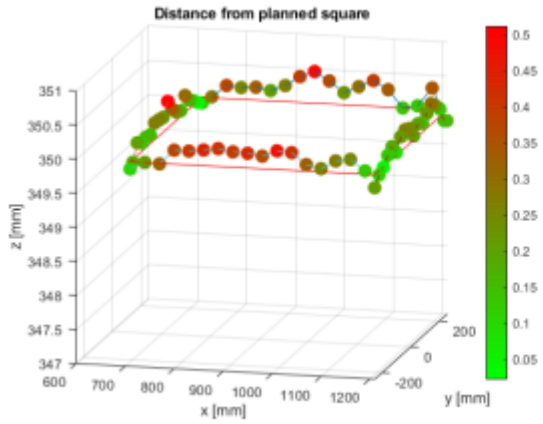
xCognition is a software application composed of three critical modules:

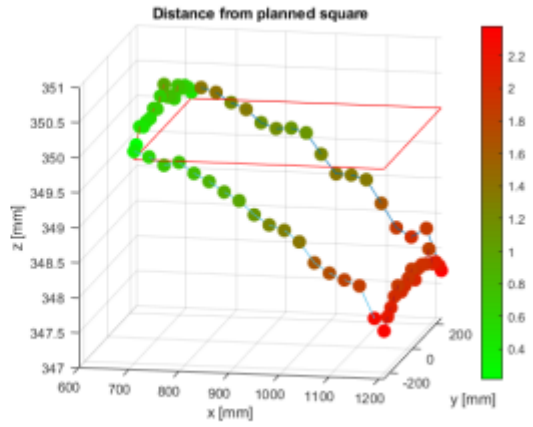
- **A proprietary Physics-informed Machine Learning model** representing a true digital twin, adaptable to any form of fabrication equipment and motion platforms.
- **A proprietary robotics rule-based Language Model** to automatically generate programs for robot.
- **A proprietary universal interface**
  Enabling Machine Learning models to be integrated into any existing or new process control equipment driving CNC machines, robotics or hybrid systems.



xCognition physics-informed Machine Learning software







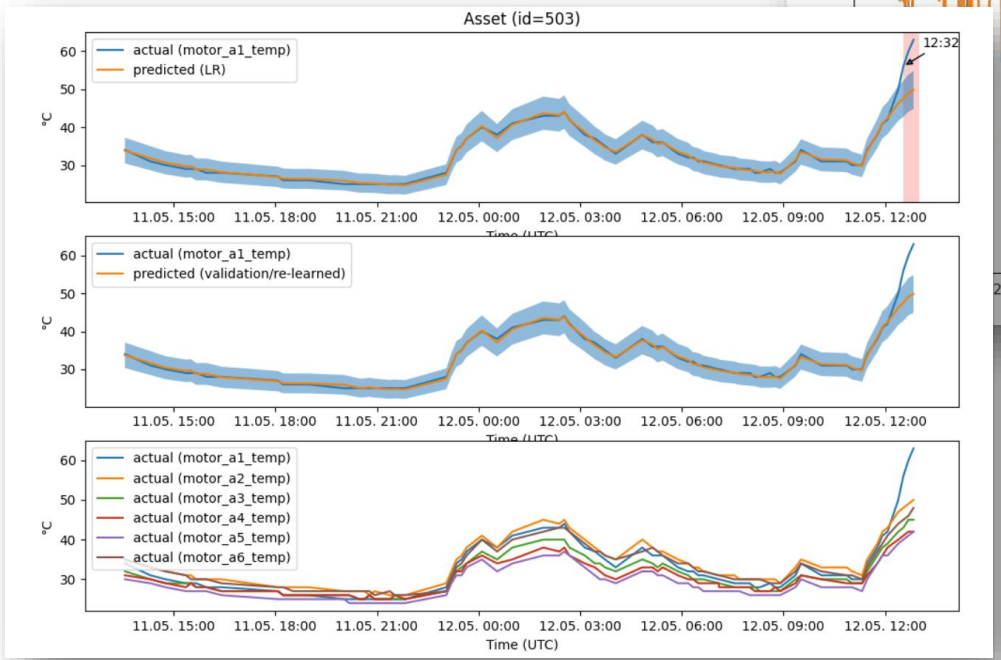
Cognitive Robotics Machining

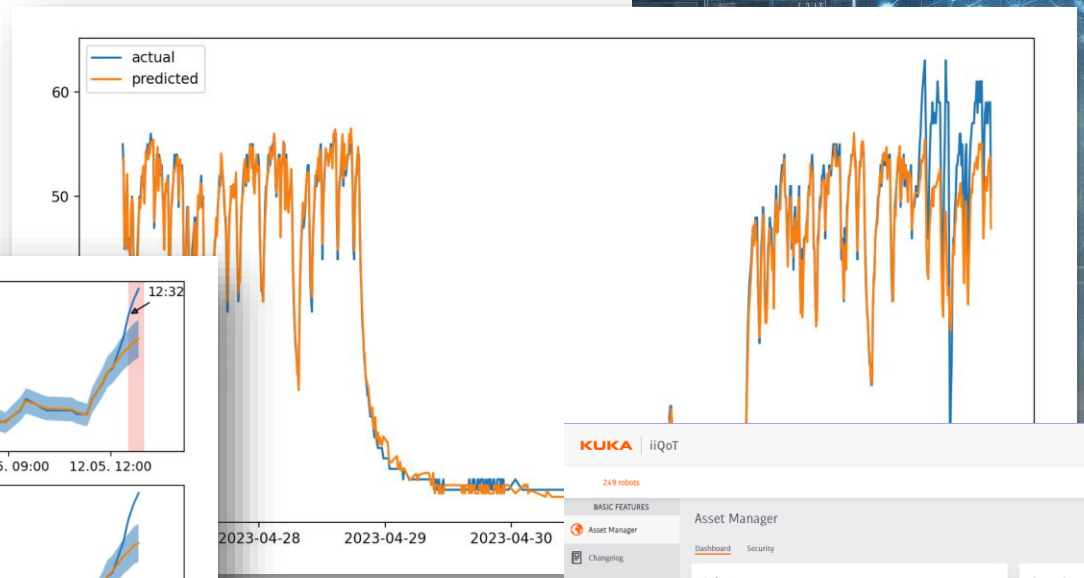
Kuka Robotics Machining Aluminum Casting

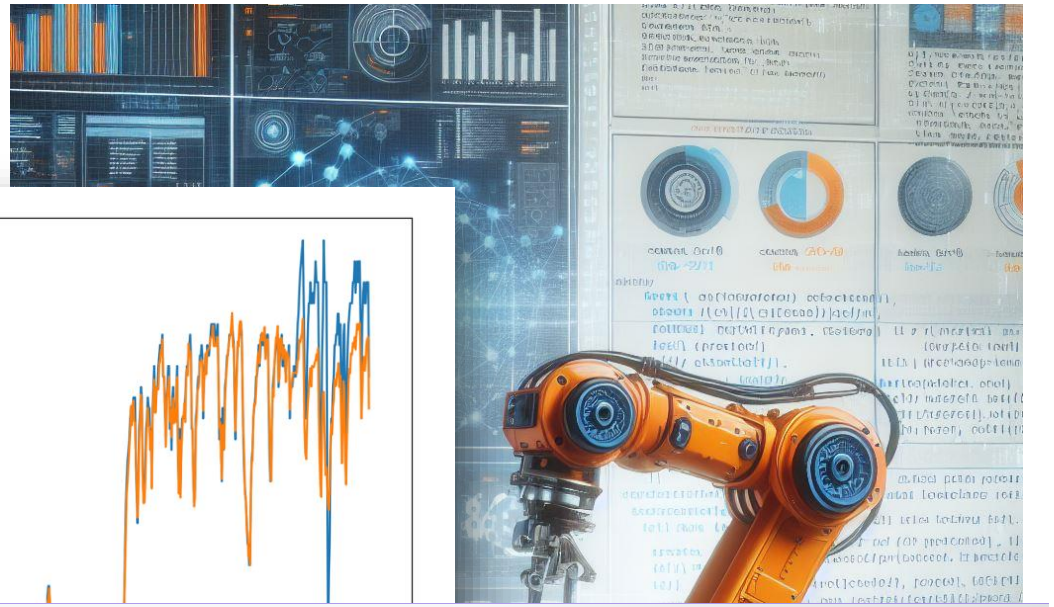
Highlights

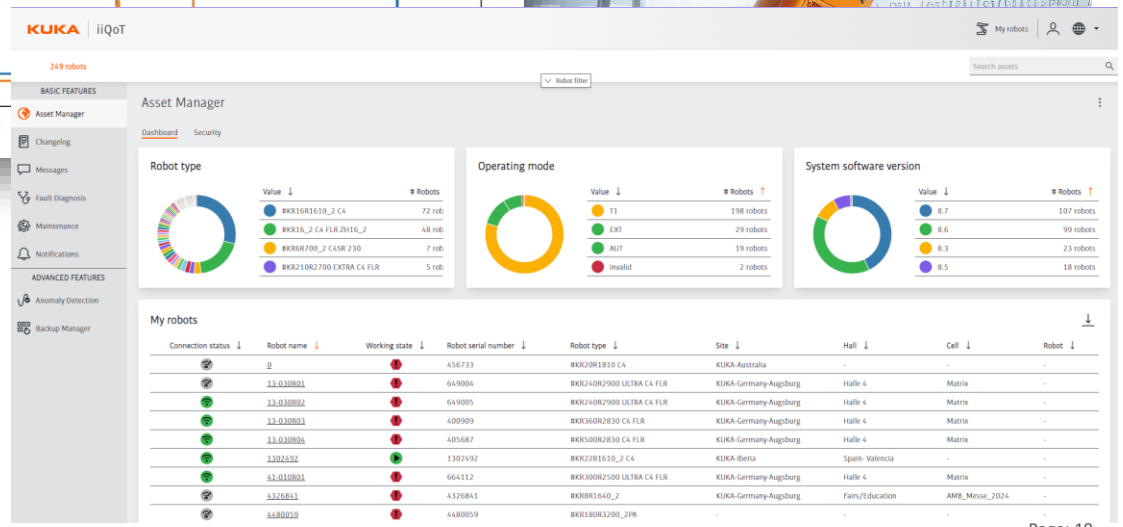
- Enables robots to Precise Machining on metallic casting
- Eliminates costs for expenses jigs and fixtures compensating for unpredictable machining tolerances
- Significantly reduce assembly costs

Predictive Maintenance | AI + iiQoT









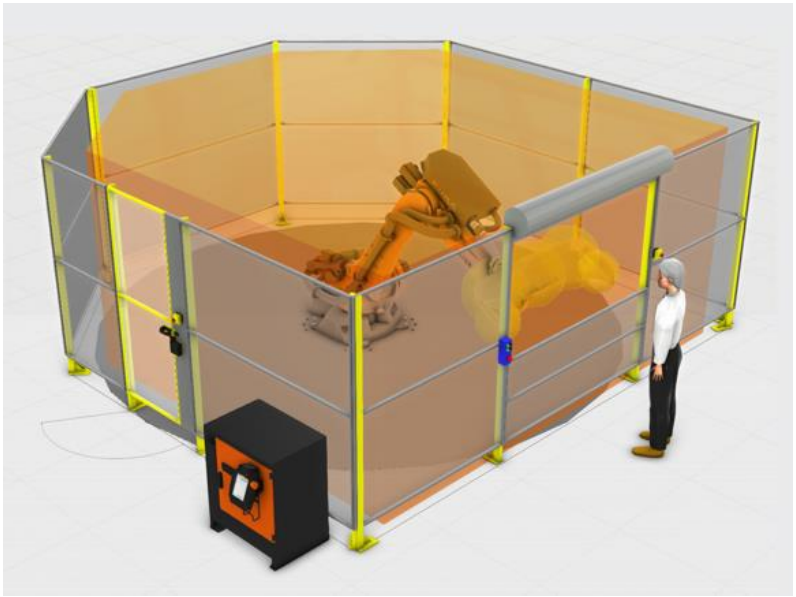
KUKA MixedReality

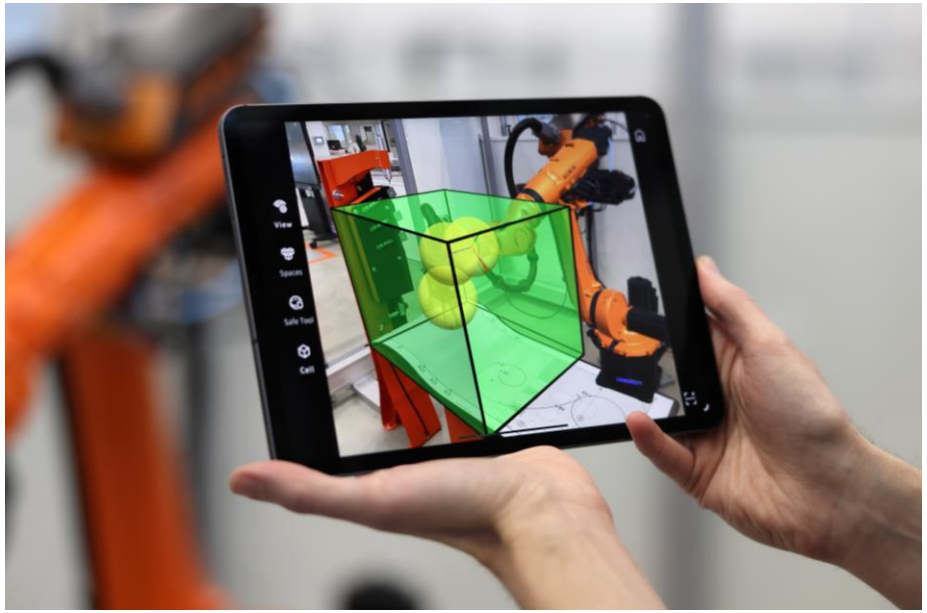
The next step to simplify robot commissioning

KUKA MixedReality
Visualisation of data to speed up and simplify commissioning

Mobile Application

Mixed Reality | Improvement of the safety acceptance process





Problem:

Users do not know exactly where the security rooms are today

Overview over safe configuration within a few moments, avoidance of incorrect configurations

Speed – Support for validating the configuration of KUKA.SafeOperation saves time

IFR statements for Robotics and AI

The use of Artificial Intelligence offers a tremendous opportunity for the robotics industry to respond to these customer and societal needs.

AI itself is not new to robotics. Vision and learning intelligence has been built into robots for many years. Robots excel at tasks humans find difficult – strenuous, repetitive, dull, dirty or dangerous. AI can make robots better at fulfilling those tasks: more capable of learning; able to learn by experience, rather than programming; able to work in dynamic environments, or around people. It is rapidly changing what is possible.

What does this mean in practice?

Independent studies have suggested that Japan may face a shortage of more than 11 million workers by 2040, as its population ages rapidly. Similar forecasts in the U.S. suggest more than 2.1 million manufacturing jobs there will be unfilled by 2030. And earlier this year, more than half Germany's companies said they were struggling to fill vacancies due to a lack of skilled workers.

Elsewhere, robots today use vision and learning abilities to navigate autonomously without guidance, to transport items efficiently around the factory or warehouse.

AI can even enhance maintenance in the production line. Using AI planning and programming software, designing the most efficient movement path for a robotic arm takes a fraction of the time of an engineer programming the same path manually; turning a 90-minute maintenance task into a two-second adjustment.

Ease of use and access to automation is more important than ever for more industries, segments and geographies. Generative AI has the potential to be a game changer – making robots even more accessible for small and medium-sized businesses, by making programming and coding faster and easier, lowering barriers even further for robots to be integrated and adapted to different environments.

Imagine being able to just speak to a robot and it performs a new task straight away: the intelligence it needs to do that is in AI.

The new generation of AI is a powerful tool to help us continue this journey, to make work better – for individuals, for businesses and for the environment.

Grazie per l’attenzione

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mobile 335 8483219

Our most significant **Opportunities**
will be found in times of **greatest Challenges**