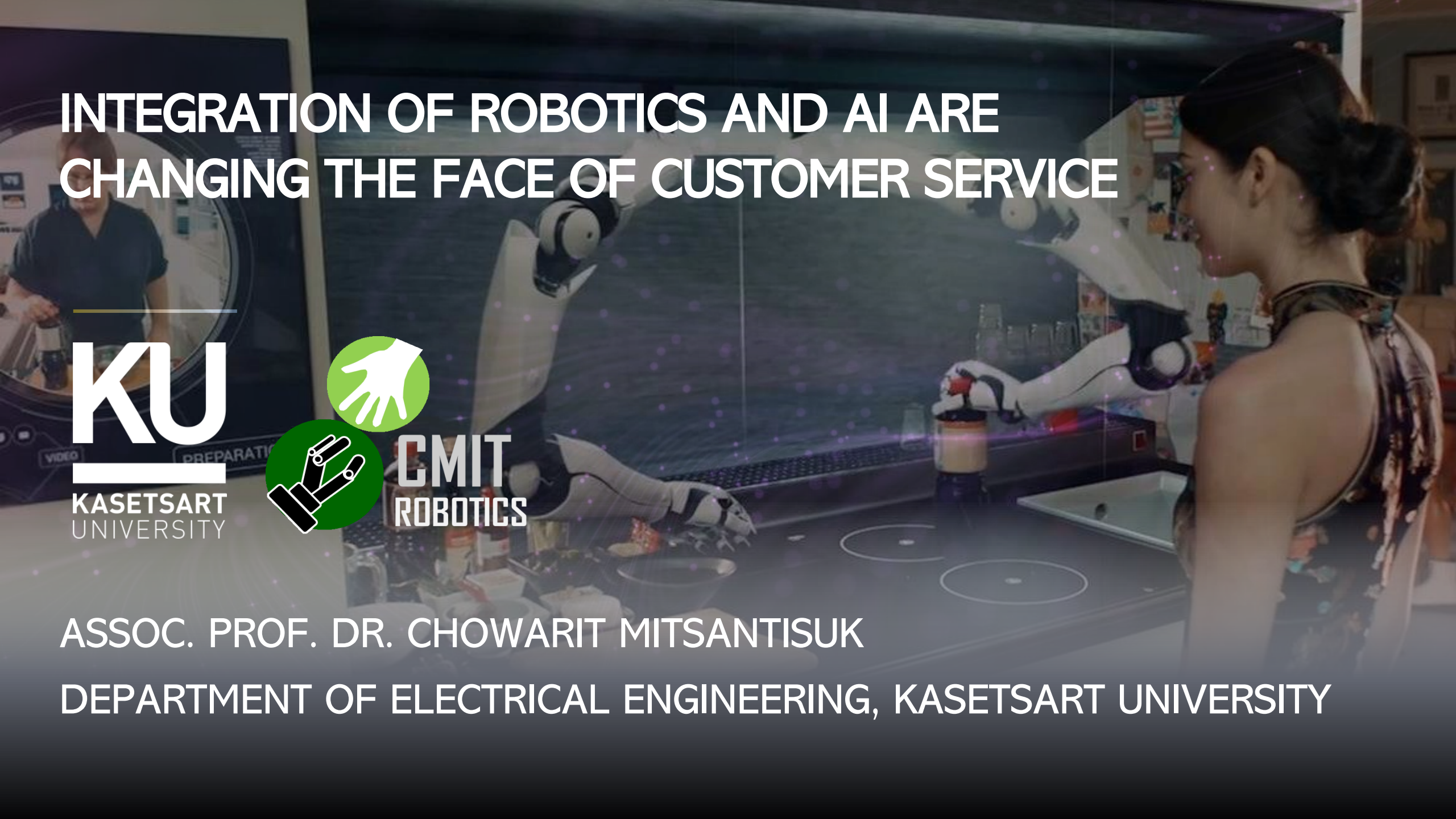
INTEGRATION OF ROBOTICS AND AI ARE CHANGING THE FACE OF CUSTOMER SERVICE



KU
KASETSART
UNIVERSITY

CMIT
ROBOTICS

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Traditional customer service

- Customer service traditionally involved direct human interaction, either in person, over the phone, or through written communication.

  Key characteristics of traditional customer service

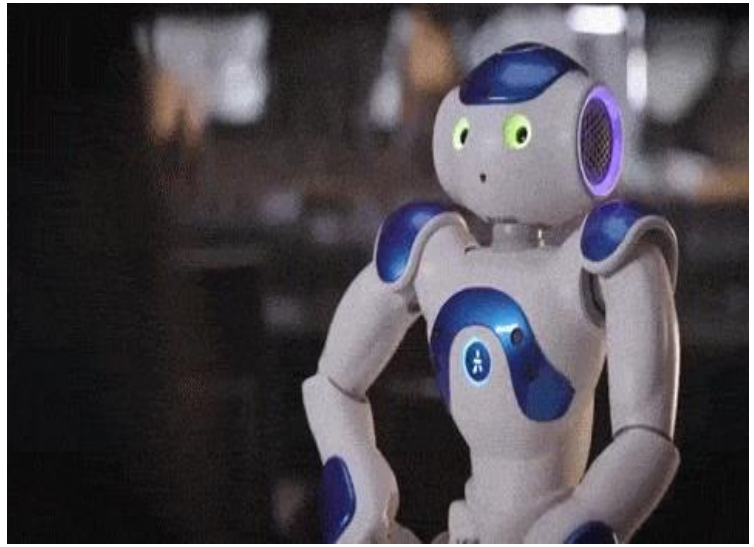
  - **Human-Centric Approach:** Customer interactions were heavily reliant on human agents who possessed knowledge, empathy, and problem-solving skills.
  - **Limited Availability:** Customer service was typically available during business hours, leading to delays in response times for queries outside those hours.
  - **Scalability Challenges:** As businesses grew, maintaining consistent and high-quality customer service became a challenge due to resource limitations.
  - **Subject to Human Errors:** Human agents were prone to errors in information dissemination and problem resolution, leading to inconsistent experiences.
  - **Dependency on Training:** The effectiveness of customer service depended on the quality of training provided to human agents.

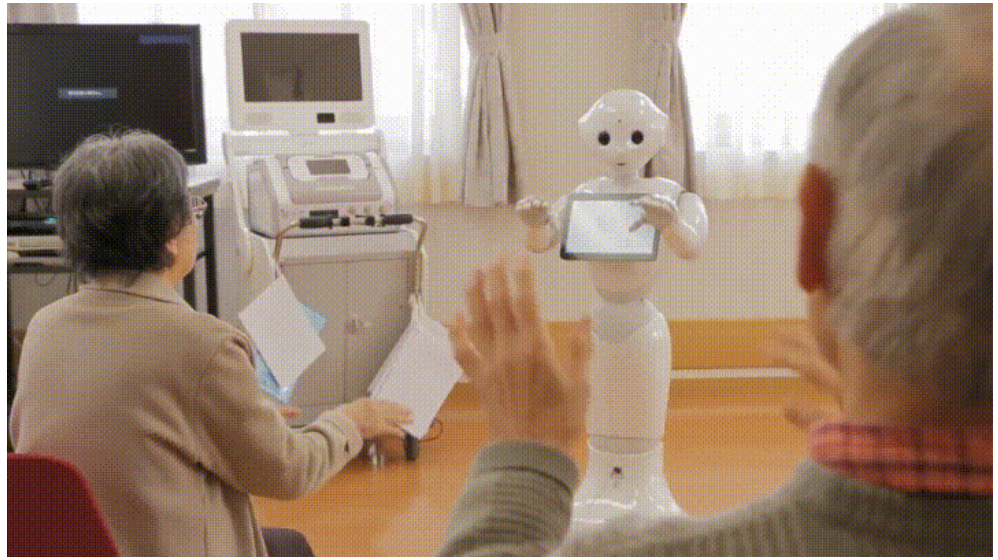
Robotics and AI in Customer Service

- In the Star Wars franchise, C-3PO is a protocol droid that serves on the front lines of galactic war, demonstrating advanced knowledge of etiquette across cultures and an ability to speak more than 7 million languages.

Robotics and AI in Customer Service

- Though this depiction of a robot assistant is fiction, it's not far from the robots that we see assisting on a different type of frontline: the frontlines of customer service. Robots like Hilton's "Connie" and Softbank's "Pepper," though not quite as advanced, utilize these robots' abilities in language and navigation to create better guest experiences in hotels, restaurants, and shops.

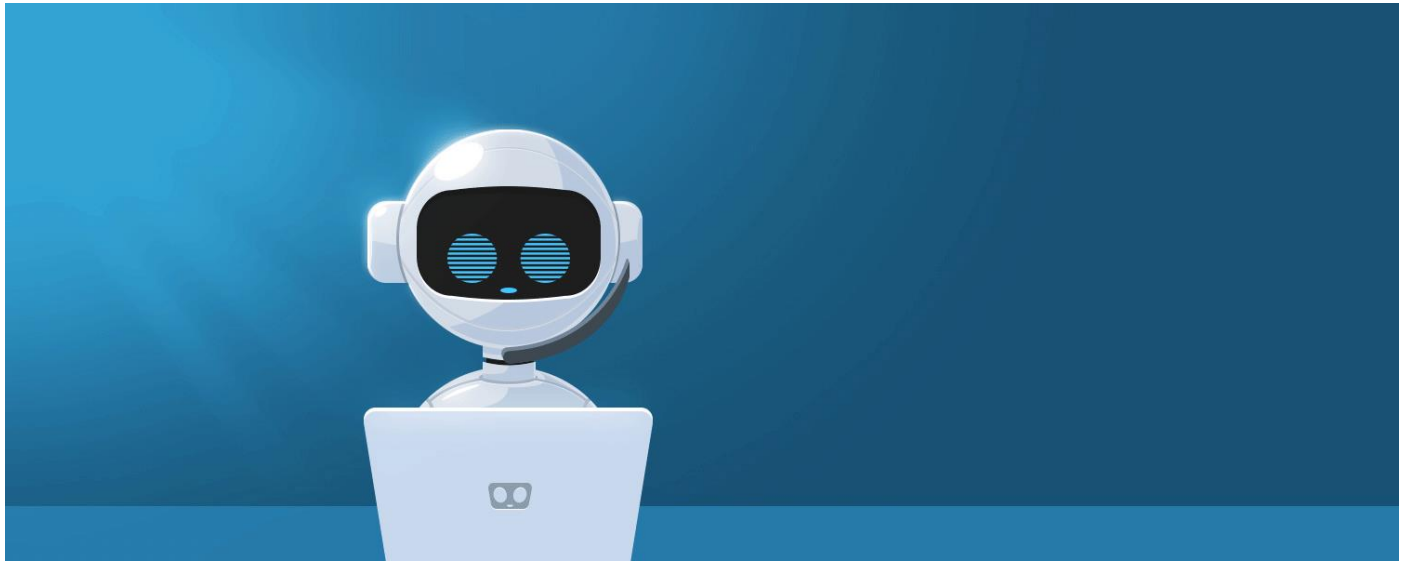




AI in Customer Service

The Rise of AI in Customer Service

- AI in customer service has been a significant and transformative trend in recent years. AI technologies are reshaping the way companies interact with their customers, providing more efficient, personalized, and responsive experiences. Here's how AI is making its mark in customer service

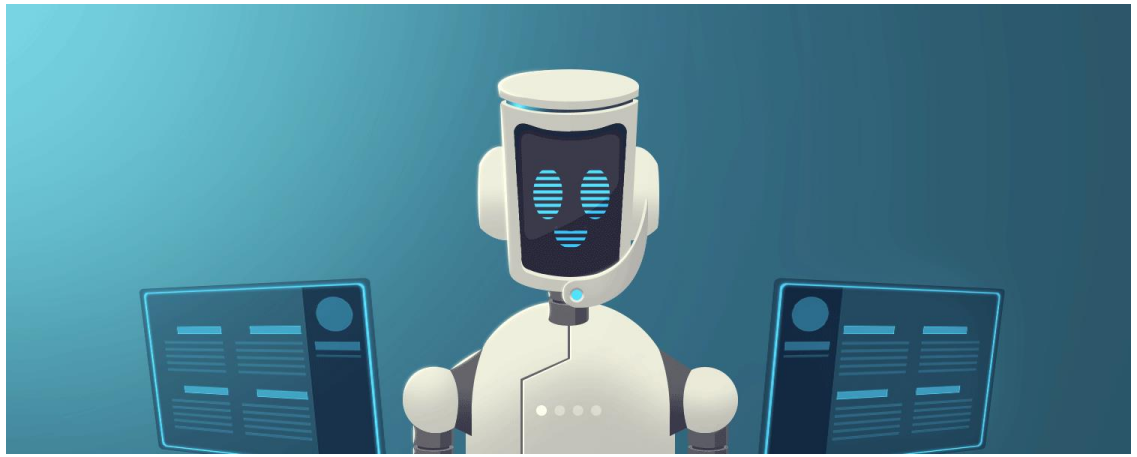


The Rise of AI in Customer Service

AI-driven chatbots and virtual assistants

- AI-powered chatbots and virtual assistants are becoming increasingly common on websites, messaging apps, and even voice interfaces. These bots can handle a wide range of customer inquiries, from basic FAQs to more complex interactions, providing immediate responses and freeing up human agents to focus on more complex issues.

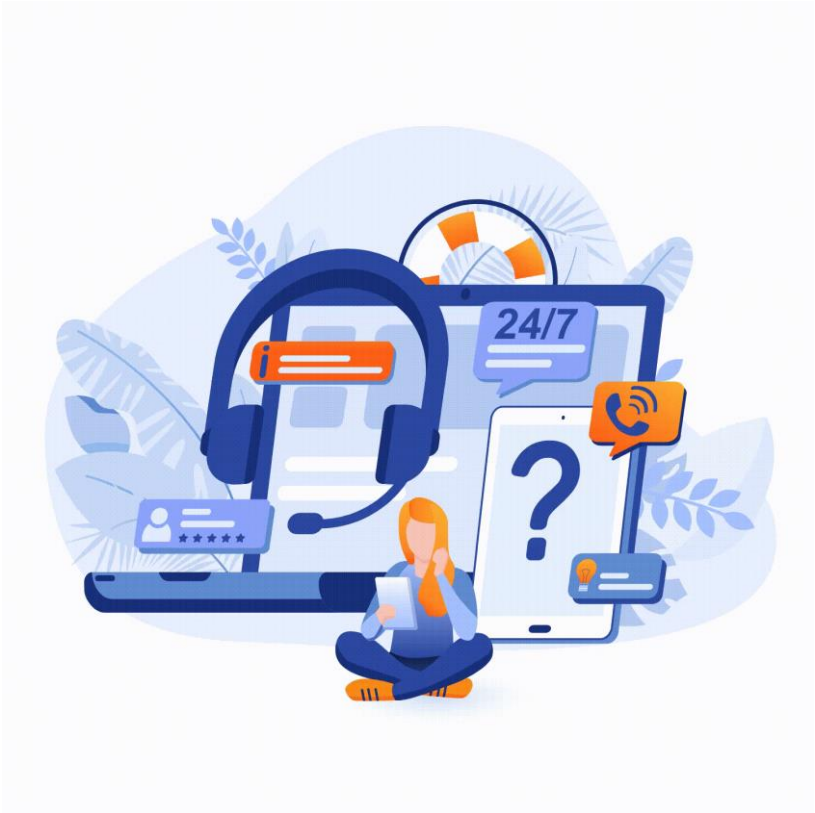
Advantages of AI-driven customer support



- AI-driven customer support offers several advantages that enhance the customer experience and streamline business operations. Here are some key advantages of utilizing AI for customer support

Advantages of AI-driven customer support

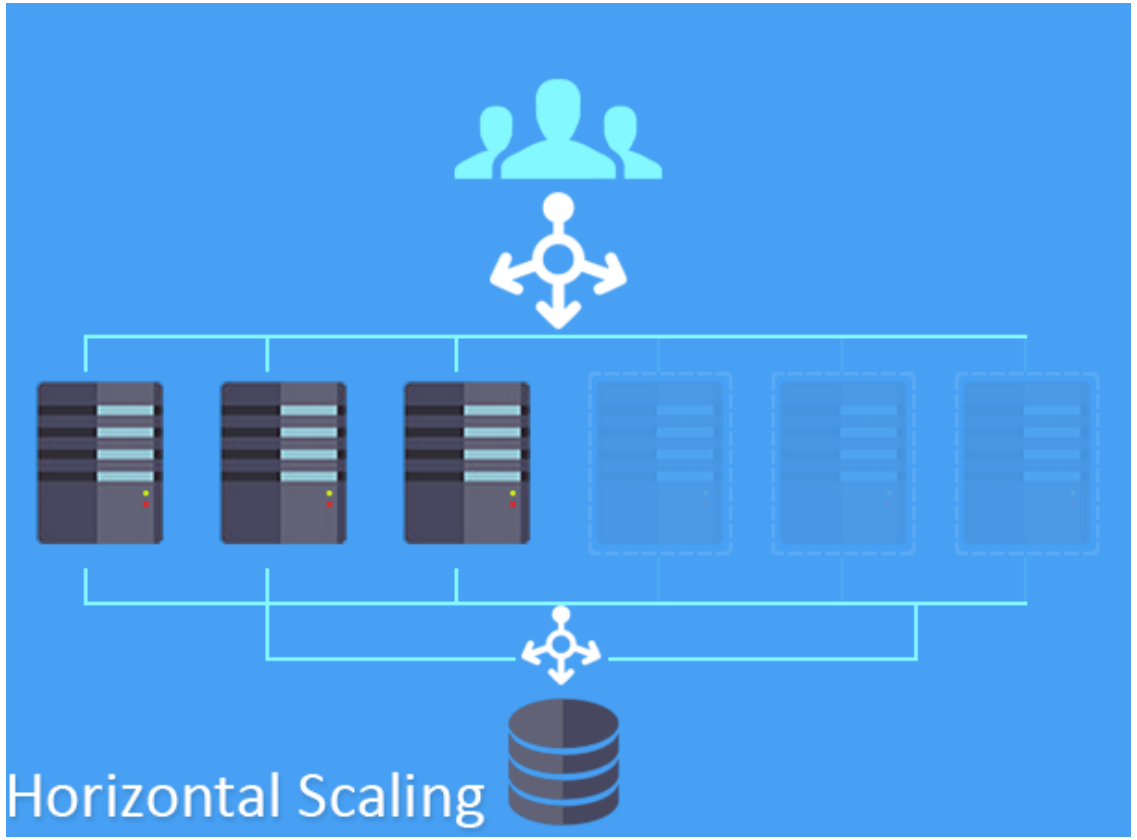
- 24/7 Availability: AI-powered systems can provide customer support around the clock, ensuring that customers can get assistance at any time, regardless of business hours or time zones



Advantages of AI-driven customer support

- Immediate Responses: AI-driven chatbots can provide instant responses to customer inquiries, reducing wait times and enhancing customer satisfaction.

Advantages of AI-driven customer support



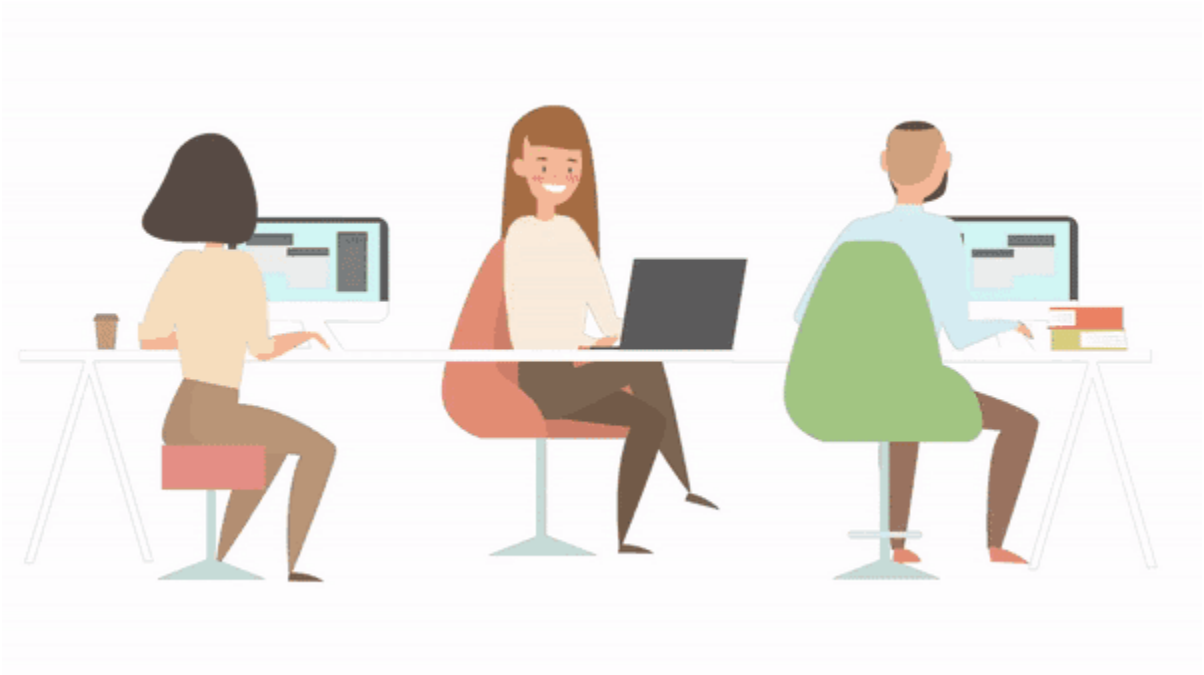
- Scalability: AI can handle a large volume of customer inquiries simultaneously, making it easy to scale up or down based on demand without the need to hire and train additional human agents

Advantages of AI-driven customer support

- Cost Efficiency: By automating routine tasks and inquiries, AI reduces the need for a large customer support team, resulting in significant cost savings over time.

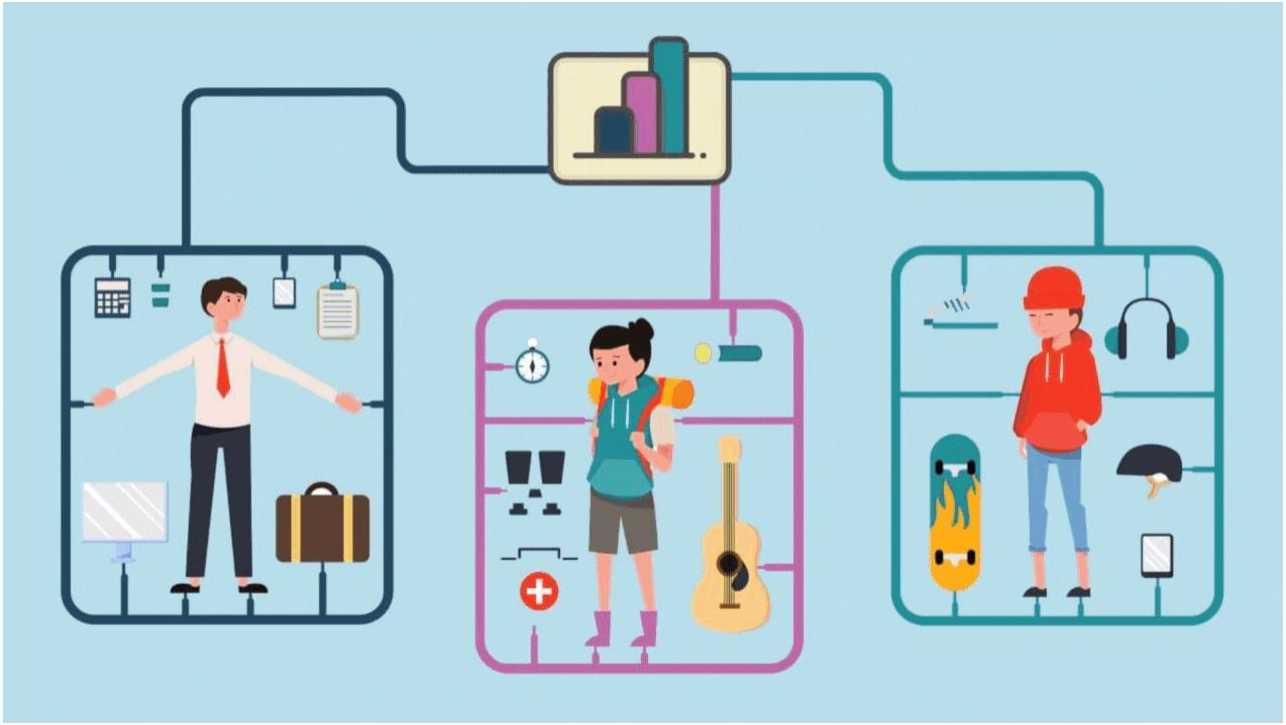
Advantages of AI-driven customer support

- Consistency: AI ensures consistent responses and information delivery across different interactions and channels, minimizing the risk of human error or inconsistency.

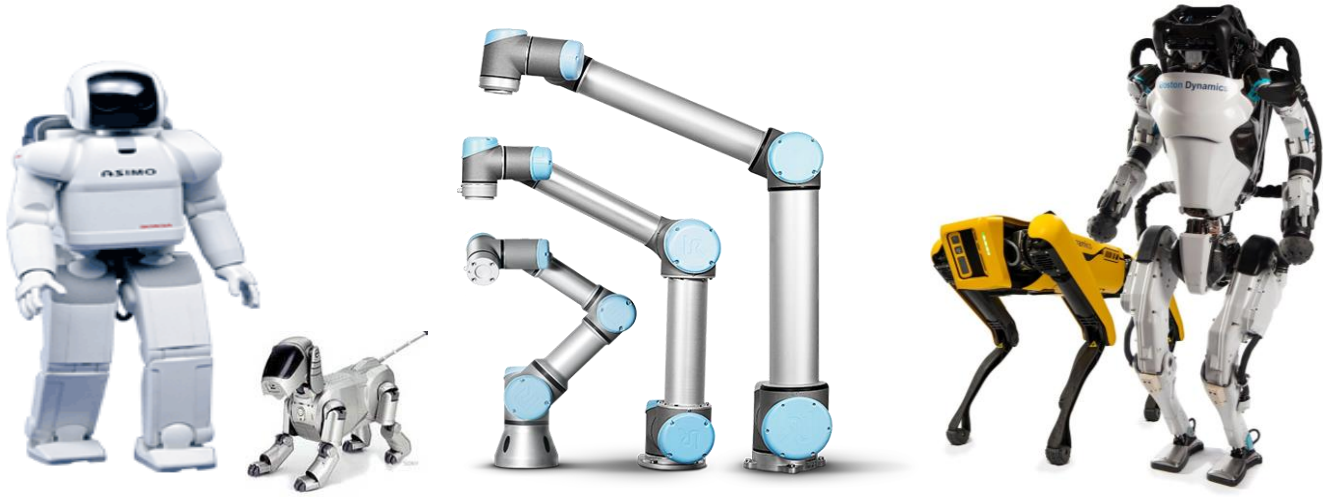


Advantages of AI-driven customer support

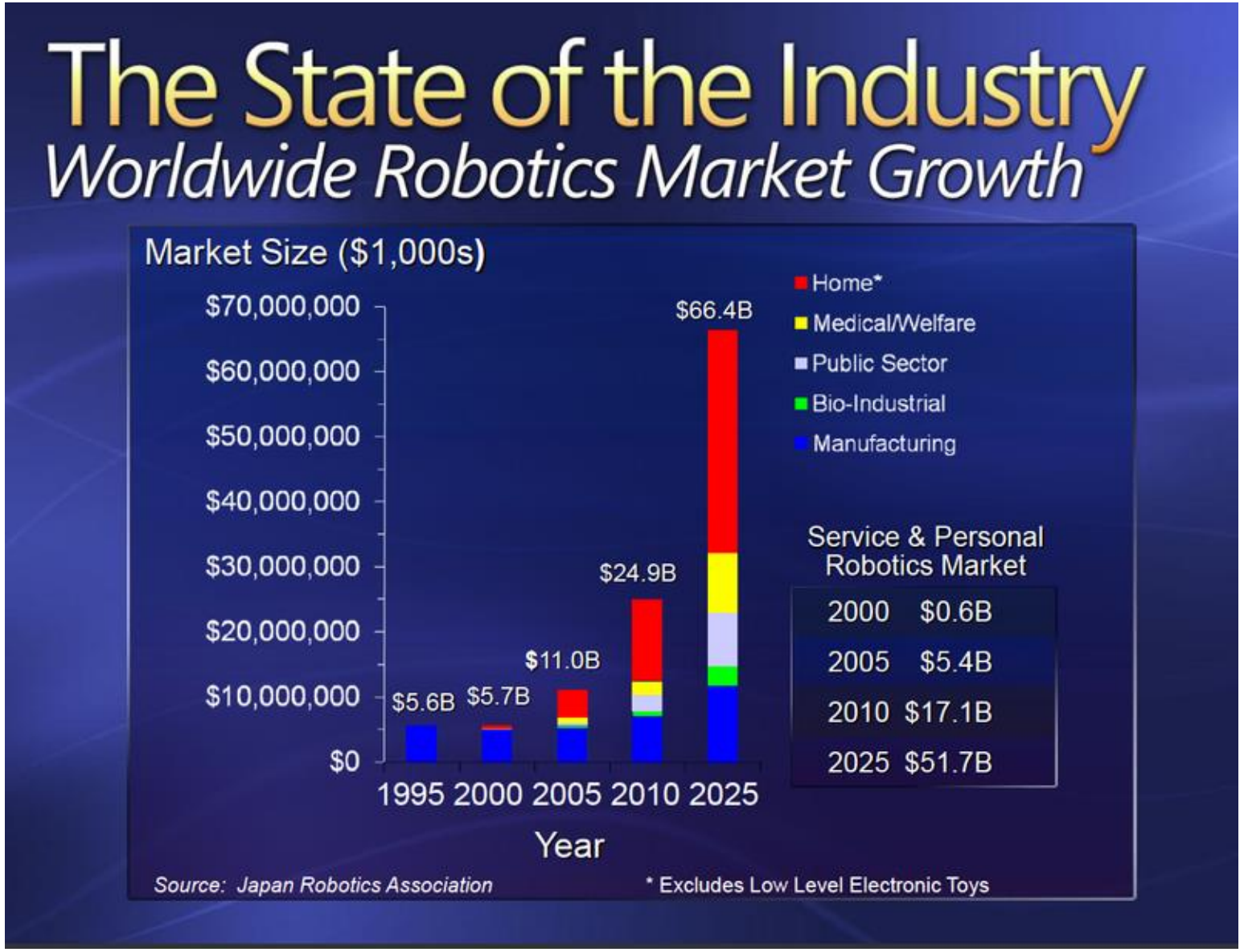
- Personalization: AI can analyze customer data to provide personalized recommendations, offers, and solutions, creating a more tailored and engaging customer experience.



Robotics in Customer Service



Worldwide Robotics Market Growth



Target of Motion Control

The Conventional Robot

- High Accuracy

- High Speed

- Cost effective

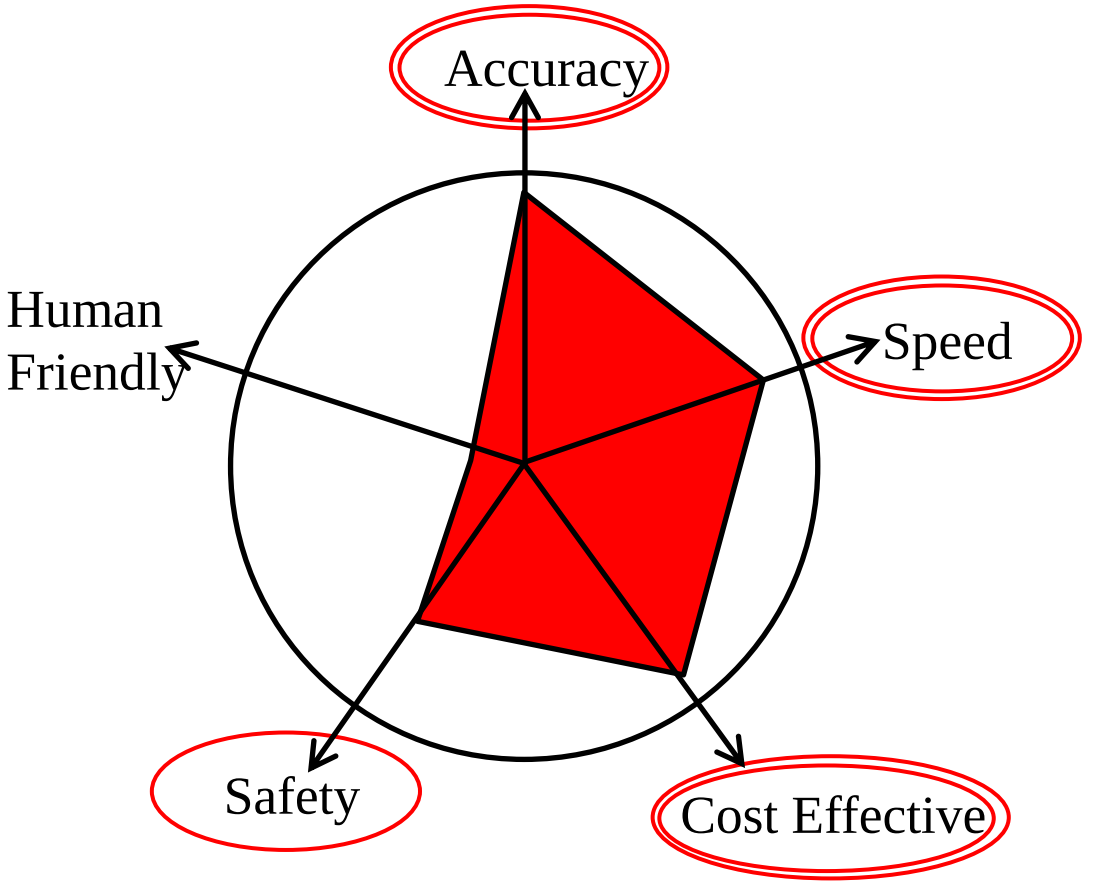


Fig. 1: The Conventional Robot Technology

The control stiffness is defined in the following equation,

Position control $K = \frac{\partial f}{\partial x} \longrightarrow \infty$

Industrial Robot

Industrial robot applications

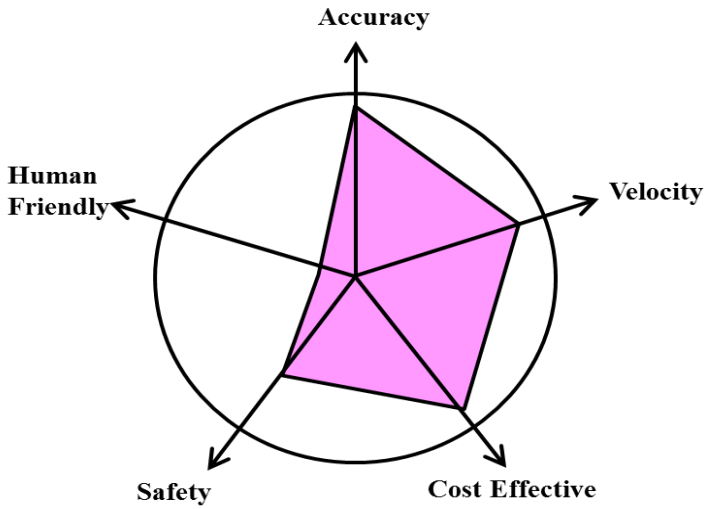
- Car manufacturing
- Welding robot
- Material handling robot

Specification of robot

1. High speed movement
2. Position control

High Stiffness Controller

$$K = \frac{\partial f}{\partial x} \qquad (K \rightarrow \infty)$$



Conventional Robotic Systems

The Future Robot Technology

Safety

Human Friendly

The target of motion control

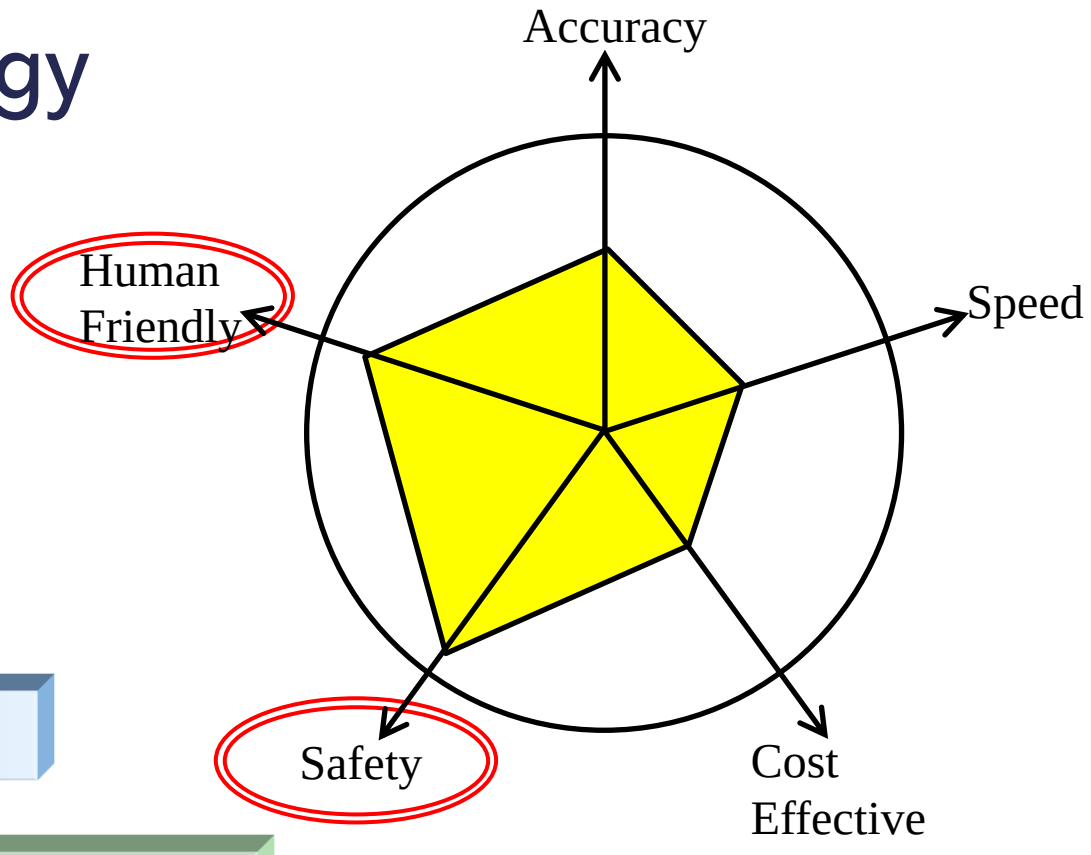


Fig. 2: The Future Robot Technology

1.Robustness in motion control system

2.An ability to contact unknown environment (Human)

Force control $K = \frac{\partial f}{\partial x} \longrightarrow 0$

Future of Robot

Future robot applications

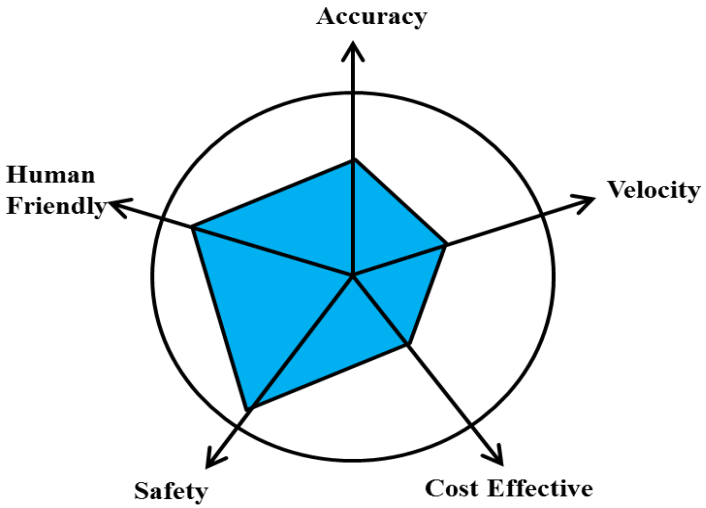
- Household robot
- Human support robot
- Surgical robot system

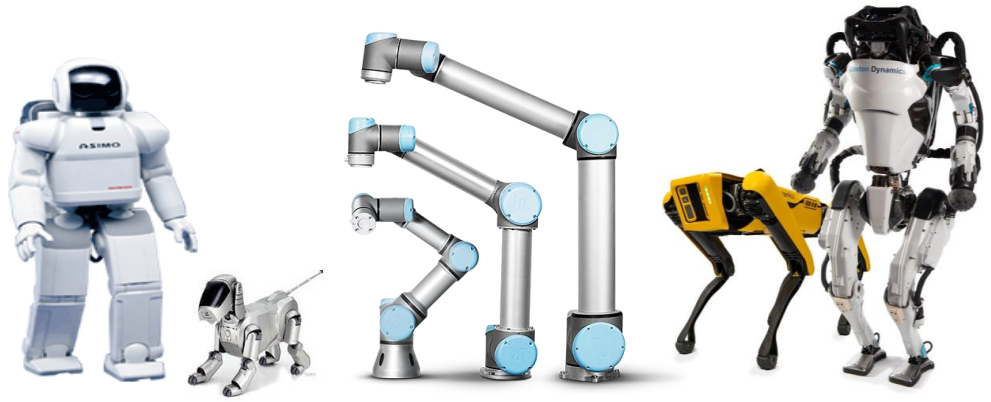
Specification of robot

1. High safety
2. Force control

Soft Stiffness Controller

$$K = \frac{\partial f}{\partial x} \qquad (K \rightarrow 0)$$





Future of robots

https://youtu.be/gvzljfK-PiU https://youtu.be/-e1_QhJ1EhQ https://youtu.be/yYUuWWnfRsk

Target of Motion Control

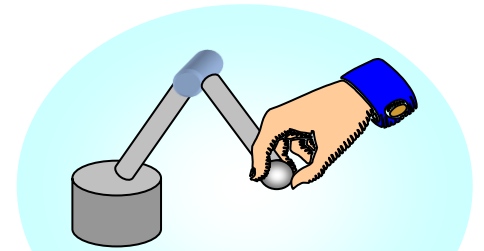
Motion control technology in **open environment** will be more and more important. The recent robots are required to **contact with unknown environment**. Future robots should have **haptic ability**.

- Closed space
- Disturbance suppression
- High stiff control

Open Environment

Adaptation

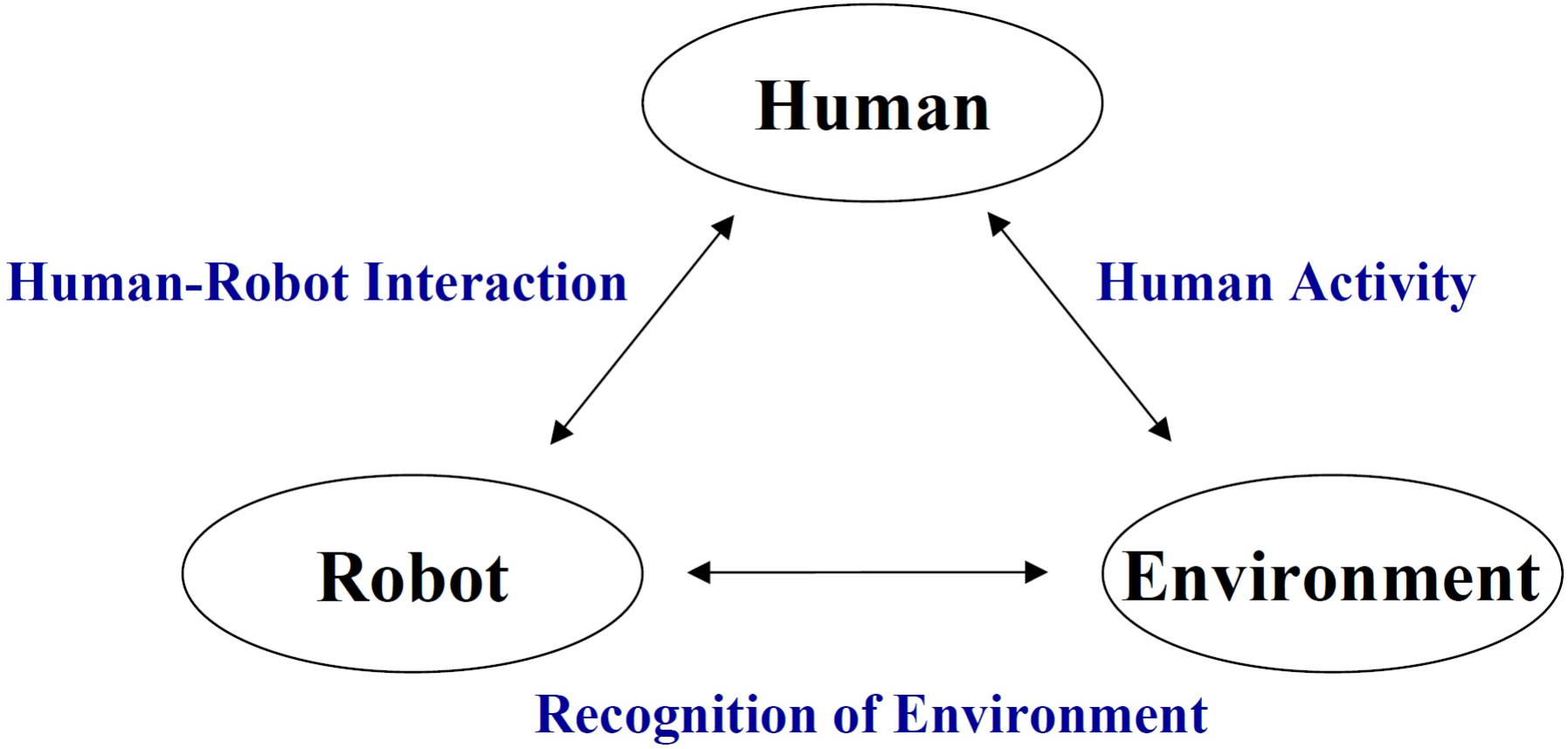
Force control



Haptic Ability

Adaptive motion to **unknown environment: Position control + Force control**

Quarry of Environmental Information



Robotics in Customer Service

- Robotics is increasingly being integrated into customer service to improve efficiency, reduce costs, and enhance the customer experience. Here are several ways in which robotics is playing a role in customer service

Boston Dynamics “Robot Dog”

Robotics in Customer Service

- Delivery Robots: Some companies use robots to deliver packages, food, or other items to customers' doors, providing a unique and efficient delivery experience.

Robot waiters in restaurants

Delivery Robots

Robotics in Customer Service

- Automated Receptionists: Robots can greet customers at physical locations, answer basic inquiries, and provide information about products, services, or directions.

Service robots in hotel

Robotics in Customer Service

- Shopping Assistants: Robots equipped with cameras and screens can provide virtual shopping assistance, helping customers explore products and make informed choices.

Robots in retail

Robotics in Customer Service

- Automated Guided Vehicles (AGVs): AGVs are robotic vehicles that navigate predefined paths to transport goods within a warehouse. They are used for material movement, such as transporting items from one location to another, replenishing stock, and delivering goods to picking stations.

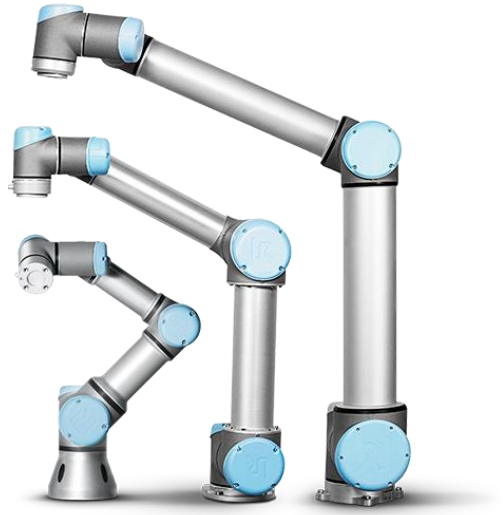
Automated Guided Vehicles in warehouse

Collaborative Robots: Universal Robot

Collaborative robotics is a new paradigm in industrial robotics, where humans and robots share the same environment and collaborate at the same tasks.

New collaborative robots (cobots) are now entering the market and all the major robot manufacturers have their collaborative solution.

Though still a niche in the big market of industrial robotics, collaborative robotics is growing fast and is expected to be a breakthrough in the coming years.



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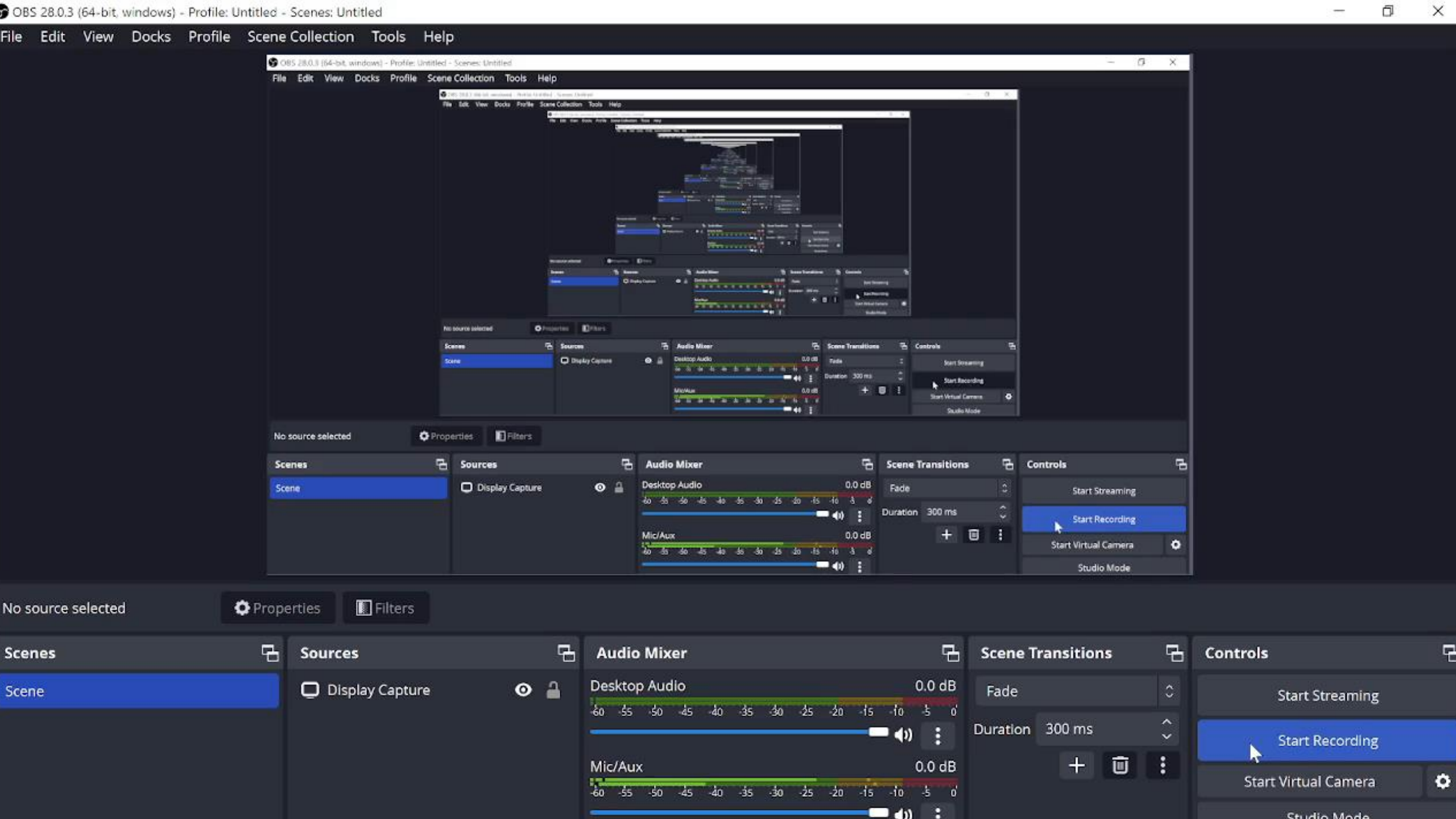
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Properties
Filters
Scenes
Scene
Sources
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Audio Mixer
Desktop Audio 0.0 dB
Mic/Aux 0.0 dB
Scene Transitions
Fade
Duration 300 ms
Controls
Start Streaming
Start Recording
Start Virtual Camera
Studio Mode

Collaborative Robots: KUKA LBR iiwa

- Humans and robots collaborating at the same task
- Protective fences are not needed
- Particularly interesting for SMEs (reduced cost, reduced foot print)

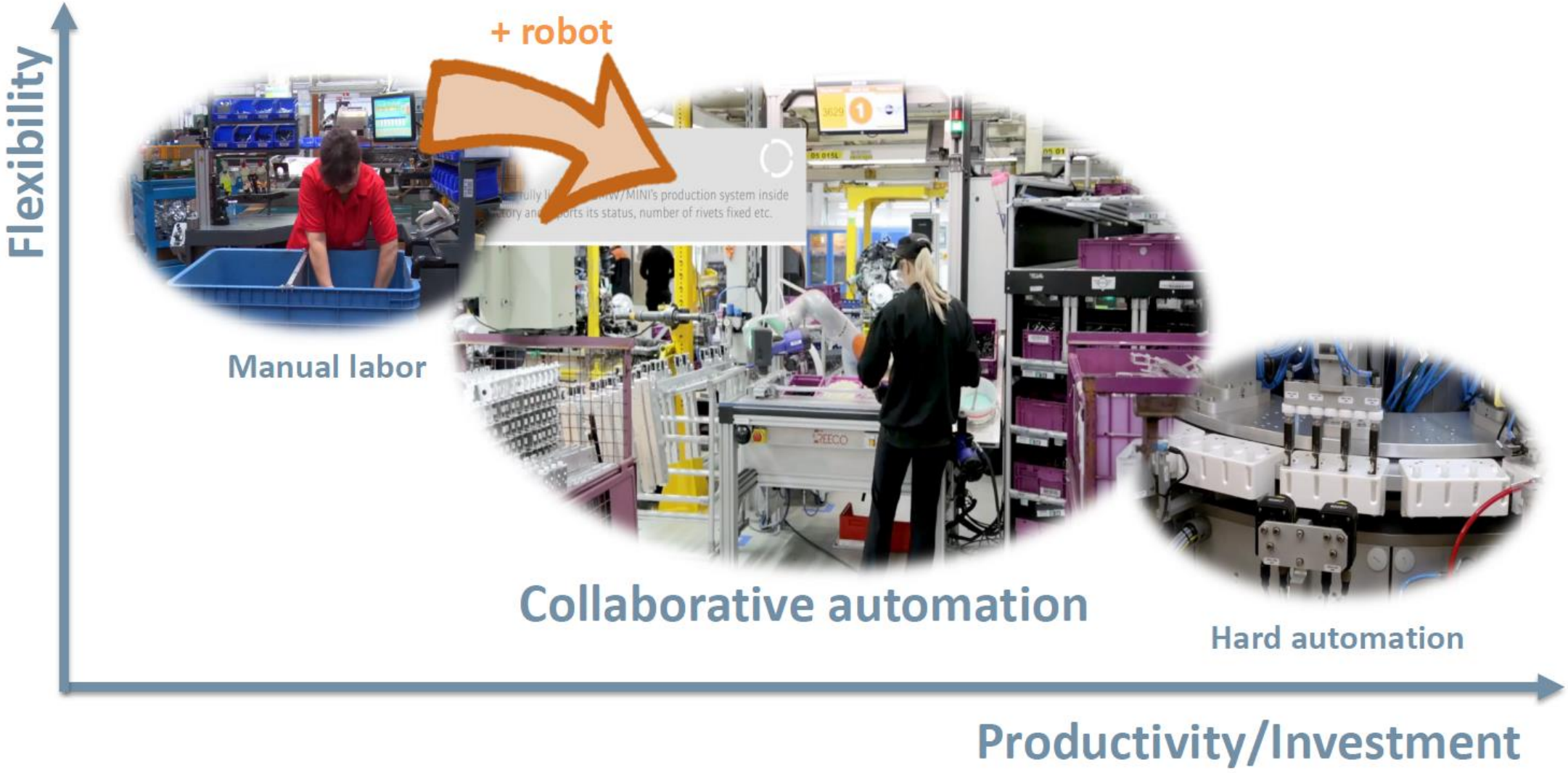
Source: KUKA

Collaborative Robots: ABB Yumi

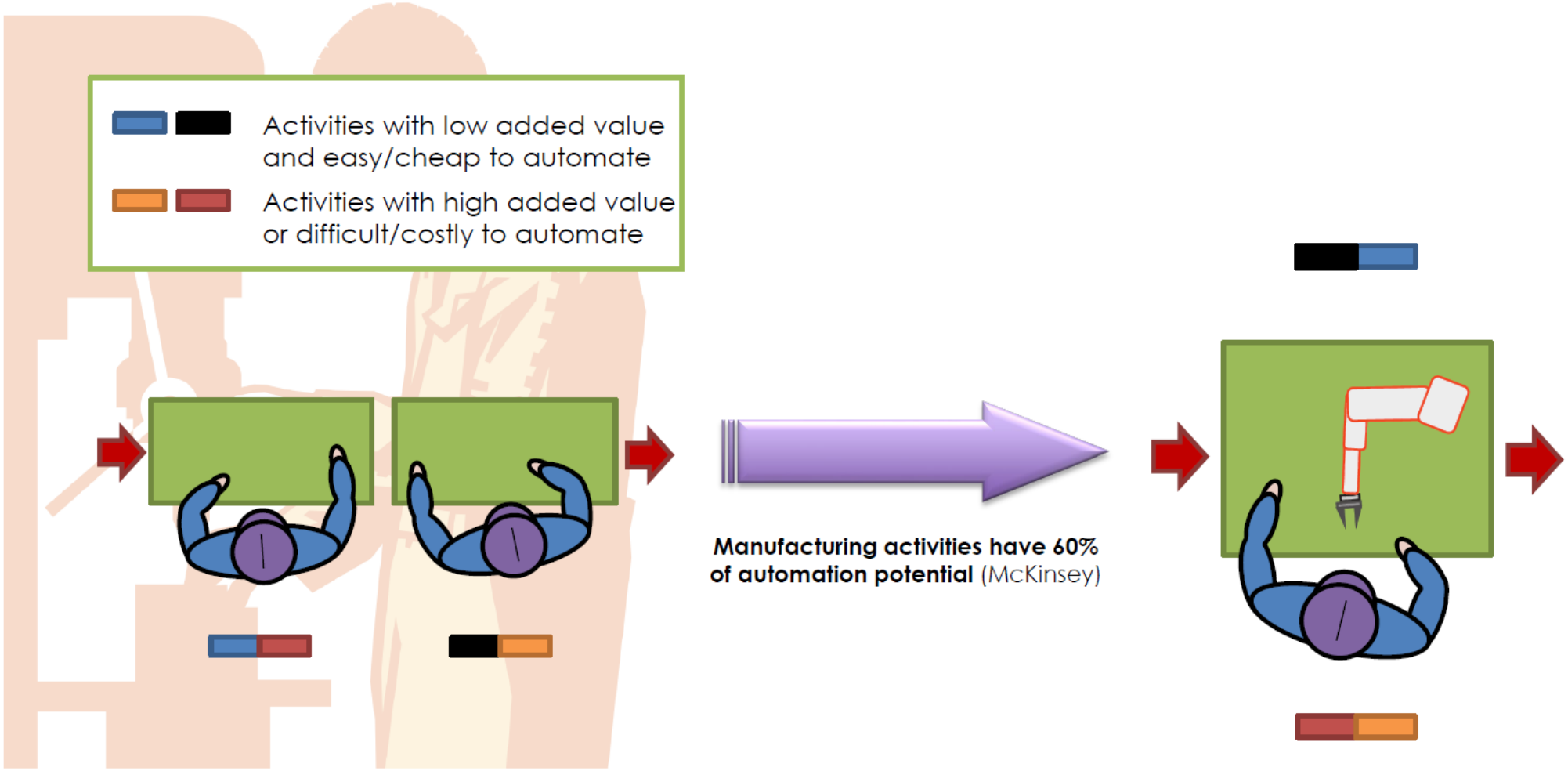
- Redundant, dual arm manipulators, characterized by low inertia and low payload (reduced risk when impact)
- Still good precision available
- Good potential for assembly of electronic parts)

Source: ABB

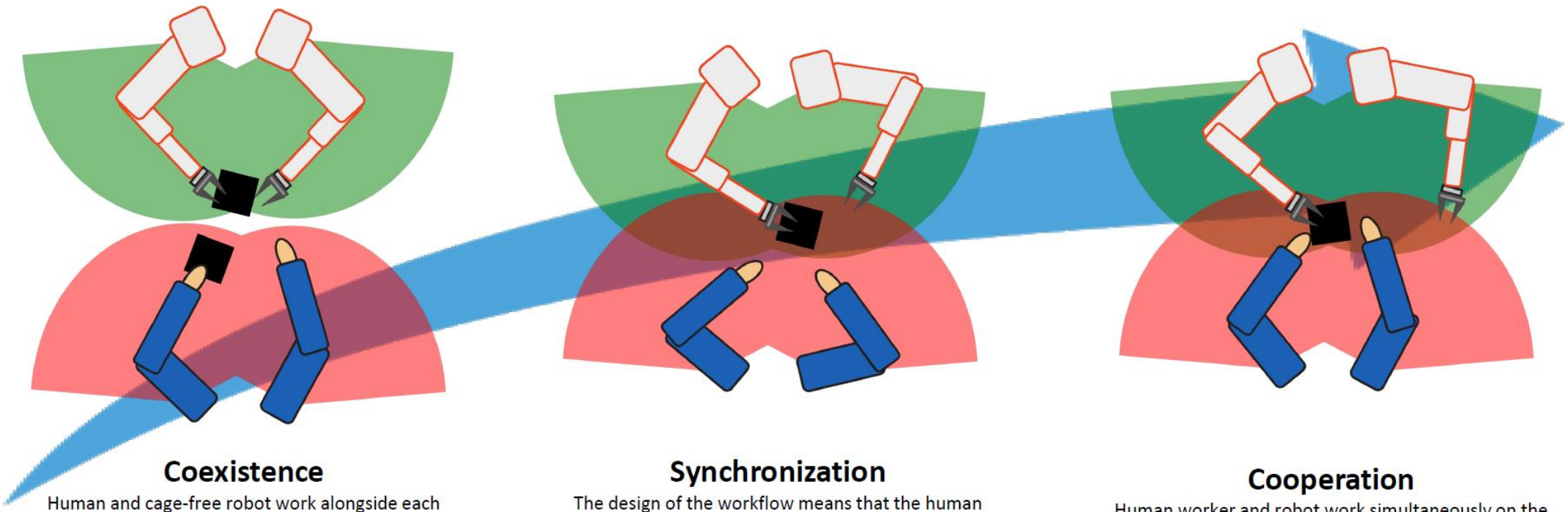
Collaborative Robots Assembly



Opportunity



An evolving paradigm



Coexistence

Human and cage-free robot work alongside each other but do not share a workspace. Humans can work away, but may need to *sporadically* access the workspace of the robot (e.g. to load/unload parts).

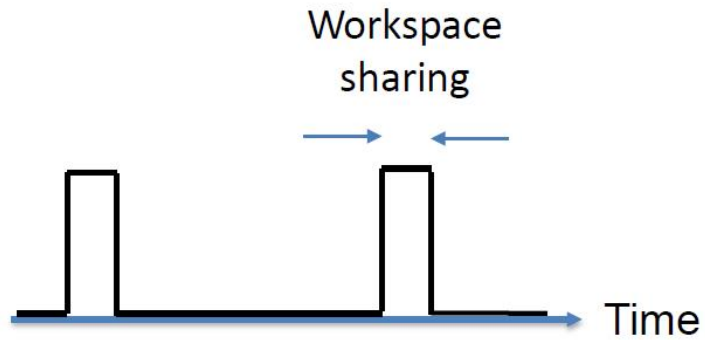
Synchronization

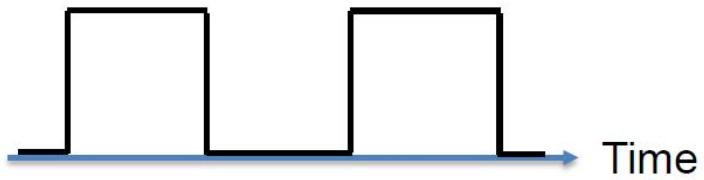
The design of the workflow means that the human worker and the robot share a workspace but that only one of the interaction partners is actually present in the workspace at any one time, or they do not work simultaneously on the same product or component.

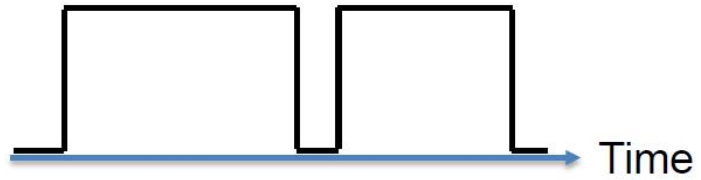
Cooperation

Human worker and robot work simultaneously on the same product or component.

An evolving paradigm







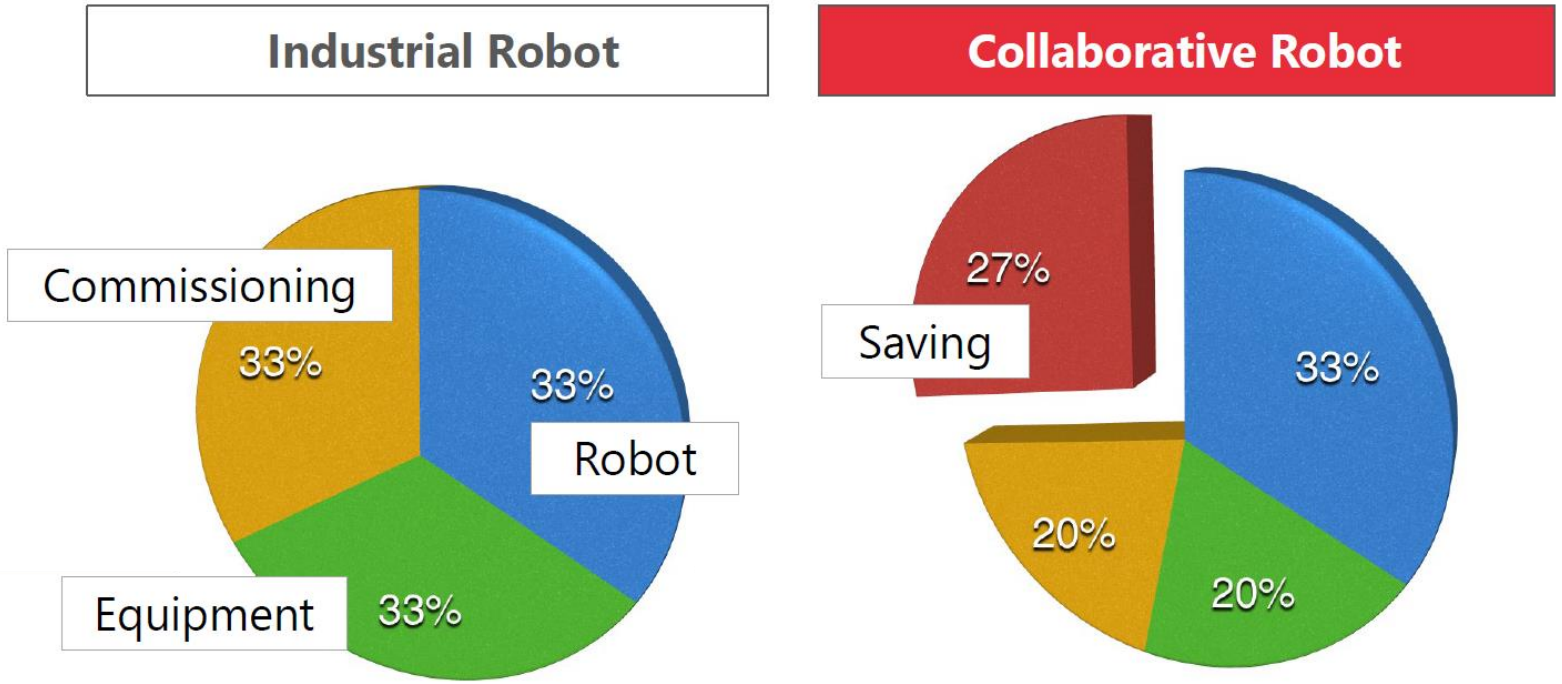
Sporadic

Frequent

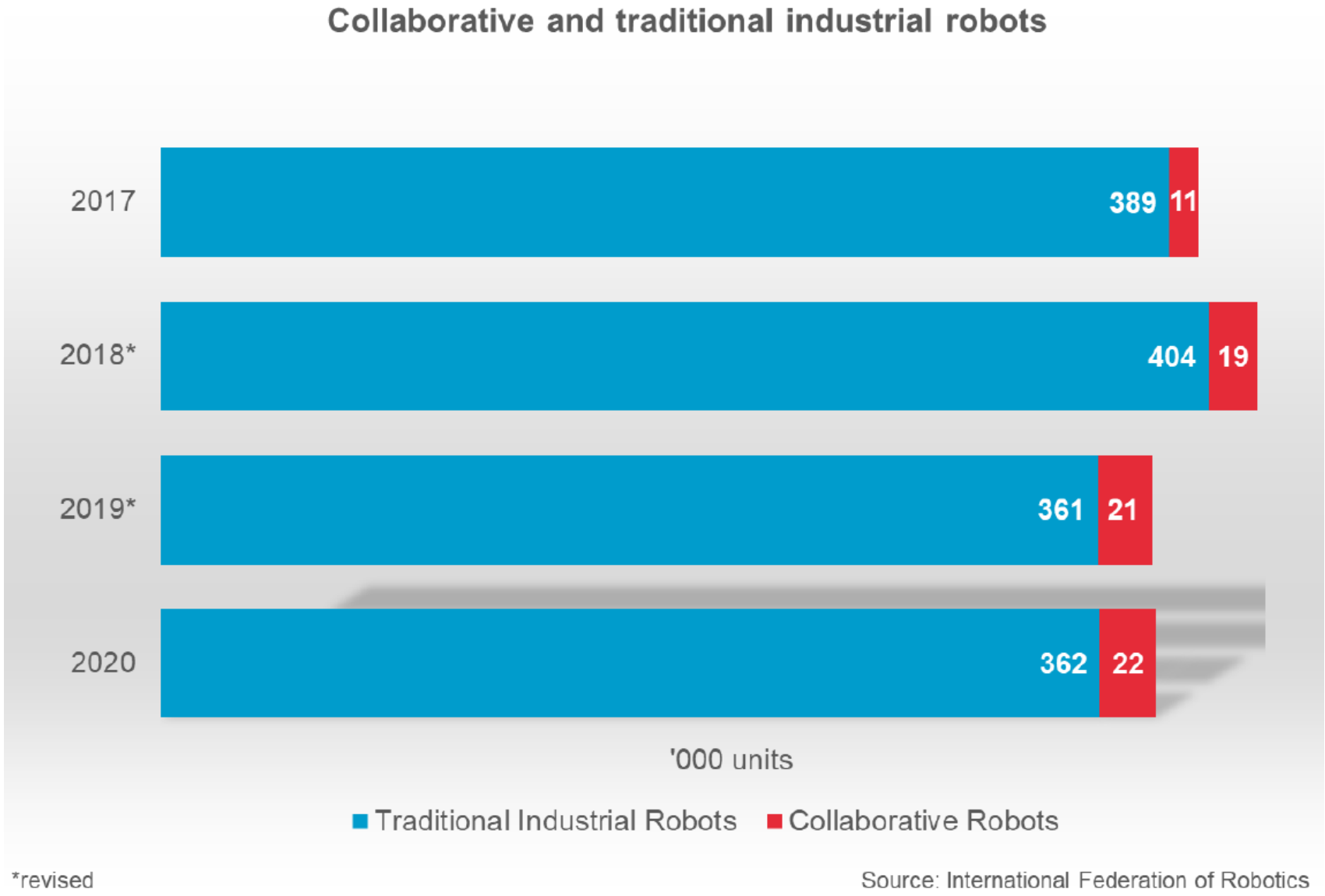
Persistent

Collaborative Robots Assembly

- Collaborative robots have no (or reduced) physical protection devices to allow the human operator to directly interact with them.
- The limited need of safeguarding devices allows a smaller footprint, making cobots more affordable, especially for SMEs, as compared with traditional industrial robots.



Collaborative Robots Market Sizes



*revised

Source: International Federation of Robotics

Benefits of robots

Efficiency and Speed

Robots are designed to perform tasks tirelessly and consistently, without the need for breaks or rest. This leads to increased efficiency and speed in various industries. Robots can work 24/7, enabling faster production cycles, streamlined processes, and quicker task completion.

Reducing Human Error

Humans are prone to errors, especially when performing monotonous or intricate tasks. Robots are programmed to execute tasks with precision, reducing the likelihood of errors caused by fatigue, distractions, or other factors.

Personalization Opportunities with Integrated AI

Robots equipped with artificial intelligence (AI) can analyze data and adapt their actions based on changing conditions or specific requirements. This allows for personalization and customization of products and services.

Benefits of robots

Consistency and Standardization

Robots can maintain a consistent level of quality and adherence to standards. This is particularly important in industries where maintaining uniformity is critical, such as manufacturing and food production

Risk Reduction in Hazardous Environments

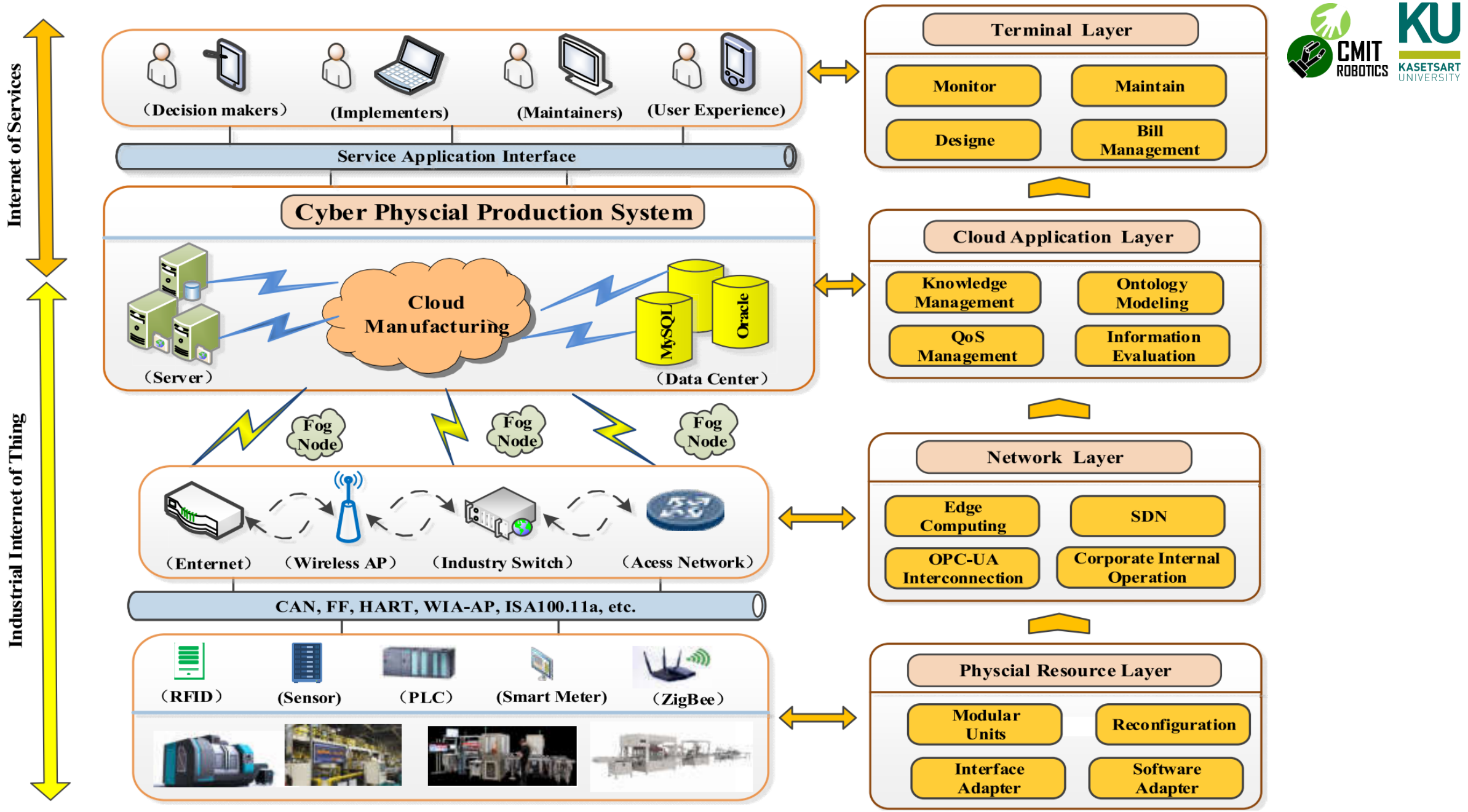
Robots are ideal for tasks that are dangerous or hazardous for humans. They can be deployed in environments where exposure to toxins, radiation, extreme temperatures, or other risks is a concern.

Data Collection and Analysis

Robots equipped with sensors and AI can collect vast amounts of data from their surroundings. This data can be used for analysis, optimization, and decision-making

Labor Cost Reduction

While the initial investment in robots and AI technology can be significant, over time, they can lead to cost savings by reducing labor expenses


Internet of Services
Industrial Internet of Thing
(Decision makers)
(Implementers)
(Maintainers)
(User Experience)
Service Application Interface
Cyber Physcial Production System
Cloud Manufacturing
(Server)
MySQL
Oracle
(Data Center)
Fog Node
Fog Node
Fog Node
(Enternet)
(Wireless AP)
(Industry Switch)
(Acess Network)
CAN, FF, HART, WIA-AP, ISA100.11a, etc.
(RFID)
(Sensor)
(PLC)
(Smart Meter)
(ZigBee)
Terminal Layer
Monitor
Maintain
Designe
Bill Management
Cloud Application Layer
Knowledge Management
Ontology Modeling
QoS Management
Information Evaluation
Network Layer
Edge Computing
SDN
OPC-UA Interconnection
Corporate Internal Operation
Physcial Resource Layer
Modular Units
Reconfiguration
Interface Adapter
Software Adapter

Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Job Displacement and Workforce Impact

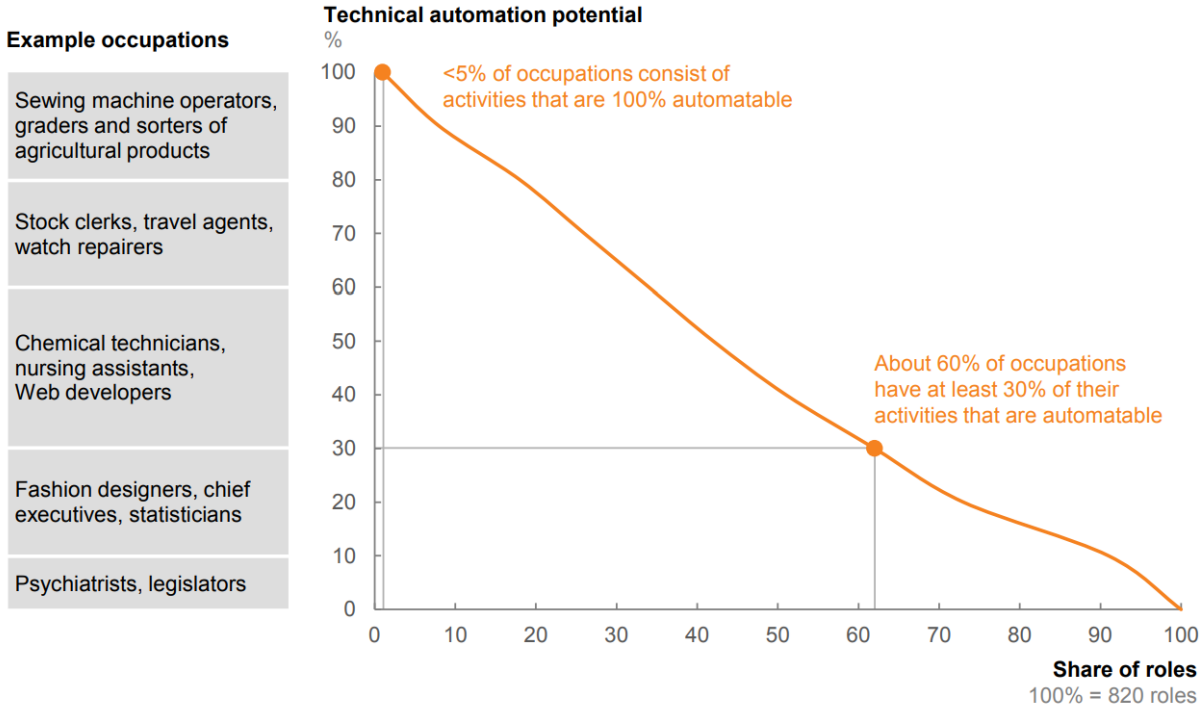
- The Concern: One of the primary concerns is the fear of job displacement. As automation takes over routine tasks, there's a worry about human jobs becoming obsolete.
- The Challenge: Businesses need to adopt a holistic approach that includes reskilling and upskilling their workforce. Automation can free up employees to focus on more complex tasks that require human creativity and empathy.

Potential of Automation

Almost half the activities people are paid almost $16 trillion in wages to do in the global economy have the potential to be automated by adapting currently demonstrated technology, according to our analysis of more than 2,000 work activities across 800 occupations.

Source: McKinsey Global Institute

Automation potential based on demonstrated technology of occupation titles in the United States (cumulative)[1]



While less than 5 percent of all occupations can be automated entirely using demonstrated technologies, about 60 percent of all occupations have at least 30 percent of constituent activities that could be automated. More occupations will change than will be automated away.

Potential of Automation

Source: McKinsey Global Institute

To assess the technical potential of automation, we structure our analysis around 2,000 distinct work activities

Occupations

- **Retail salespeople**
- Food and beverage service workers
- Teachers
- Health practitioners
- ▪
- ▪
- ▪

~800 occupations

Activities

- **Greet customers**
- Answer questions about products and services
- Clean and maintain work areas
- Demonstrate product features
- Process sales and transactions
- ▪
- ▪
- ▪

~2,000 activities assessed across all occupations

Capability requirements

Sensory perception
- Sensory perception

Cognitive capabilities
- Retrieving information
- Recognizing known patterns/categories (supervised learning)
- Generating novel patterns/categories
- Logical reasoning/problem solving
- Optimizing and planning
- Creativity
- Articulating/display output
- Coordination with multiple agents

Natural language processing
- Natural language generation
- Natural language understanding

Social and emotional capabilities
- Social and emotional sensing
- Social and emotional reasoning
- Emotional and social output

Physical capabilities
- Fine motor skills/dexterity
- Gross motor skills
- Navigation
- Mobility

SOURCE: McKinsey Global Institute analysis

Potential of Automation

Source: McKinsey Global Institute

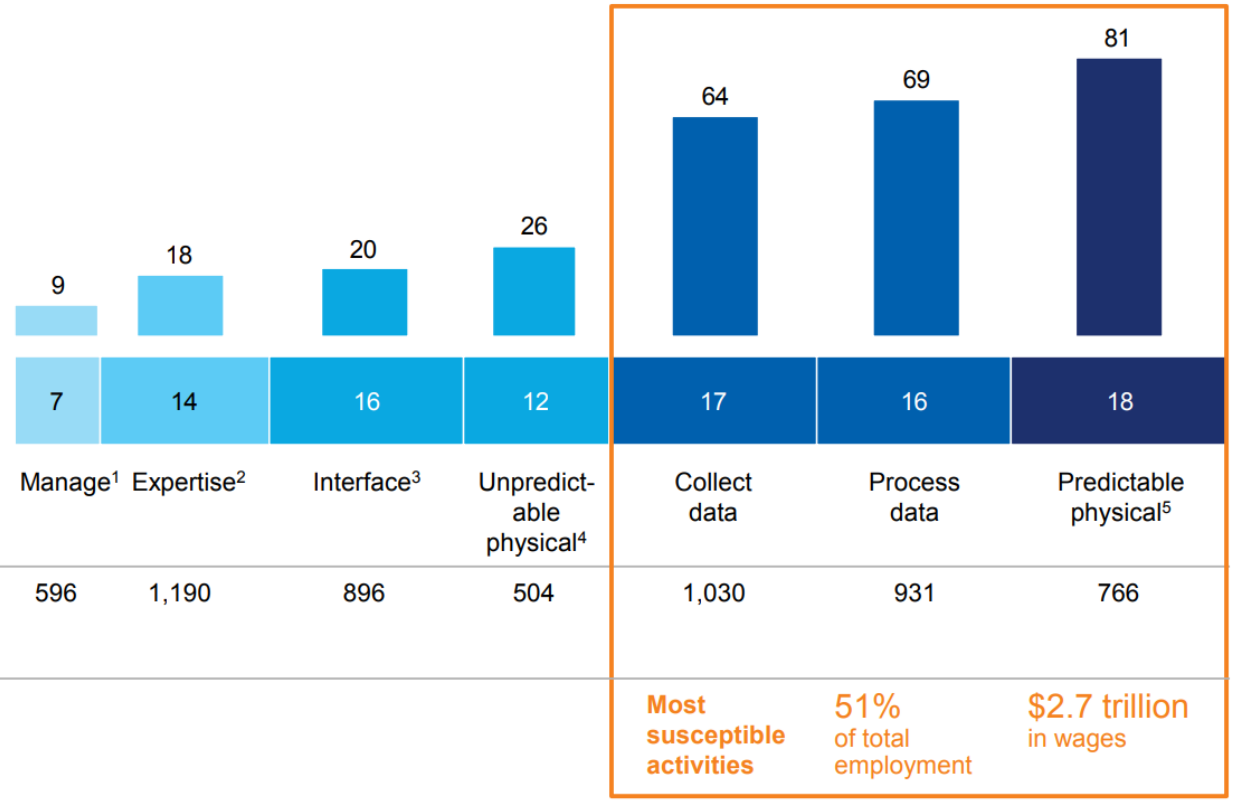
Automation of activities can enable businesses to improve performance, by reducing errors and improving quality and speed, and in some cases achieving outcomes that go beyond human capabilities. Automation also contributes to productivity, as it has done historically. At a time of lackluster productivity growth, this would give a needed boost to economic growth and prosperity and help offset the impact of a declining share of the working-age population in many countries. Based on our scenario modeling, we estimate automation could raise productivity growth globally by 0.8 to 1.4 percent annually.

Automation: A risk or An opportunity?

Source: McKinsey Global Institute

Three categories of work activities have significantly higher technical automation potential

Time spent on activities that can be automated by adapting currently demonstrated technology
%



	Manage[1]	Expertise[2]	Interface[3]	Unpredict-able physical[4]	Collect data	Process data	Predictable physical[5]
Time spent in all US occupations %							
Total wages in US, 2014 $ billion	596	1,190	896	504	1,030	931	766

Most susceptible activities

51% of total employment

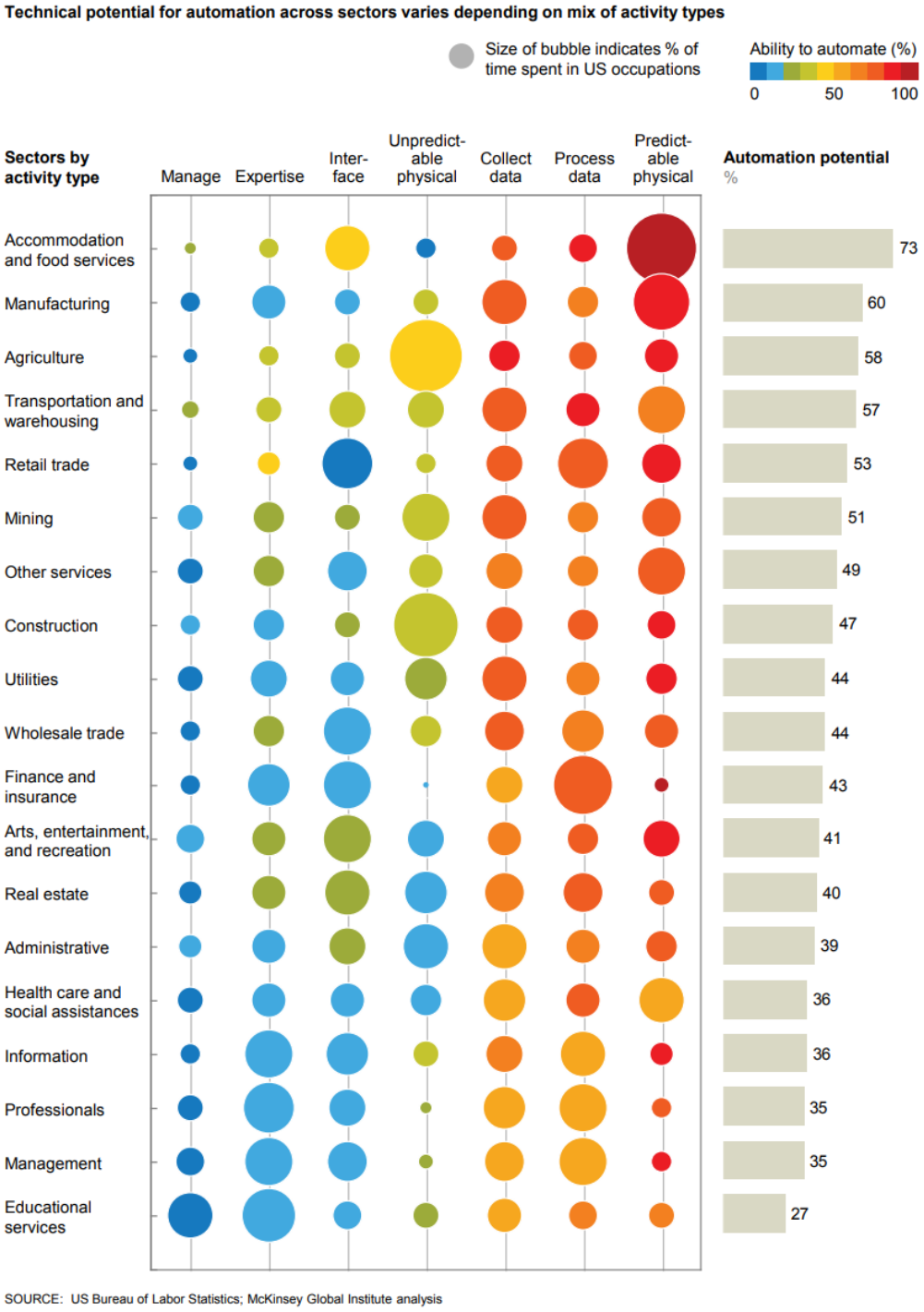
$2.7 trillion in wages

1 Managing and developing people.
2 Applying expertise to decision making, planning, and creative tasks.
3 Interfacing with stakeholders.
4 Performing physical activities and operating machinery in unpredictable environments.
5 Performing physical activities and operating machinery in predictable environments.
NOTE: Numbers may not sum due to rounding.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Potential of Automation

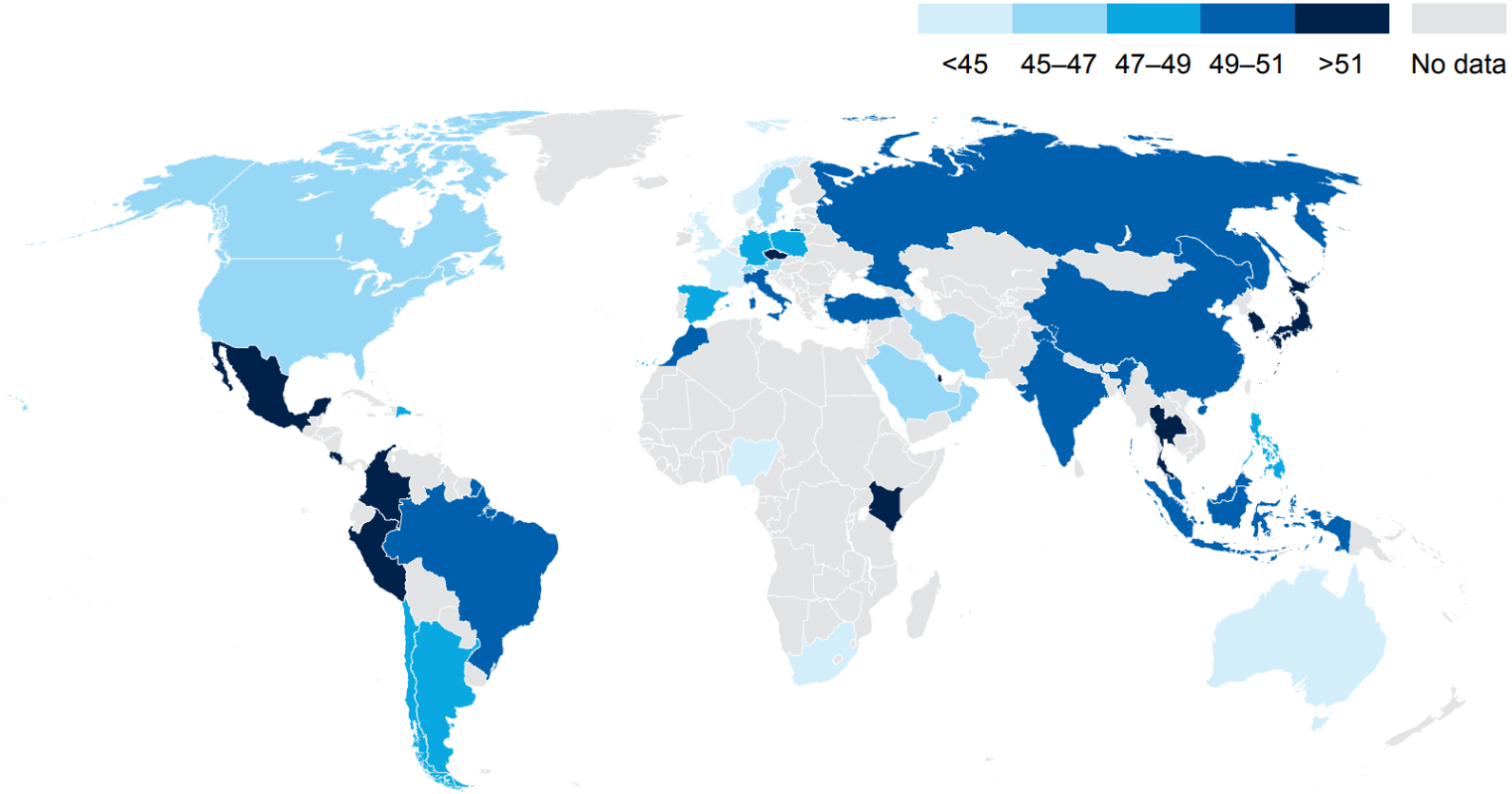
Source: McKinsey Global Institute



Potential of Automation

The technical automation potential of the global economy is significant, although there is some variation among countries

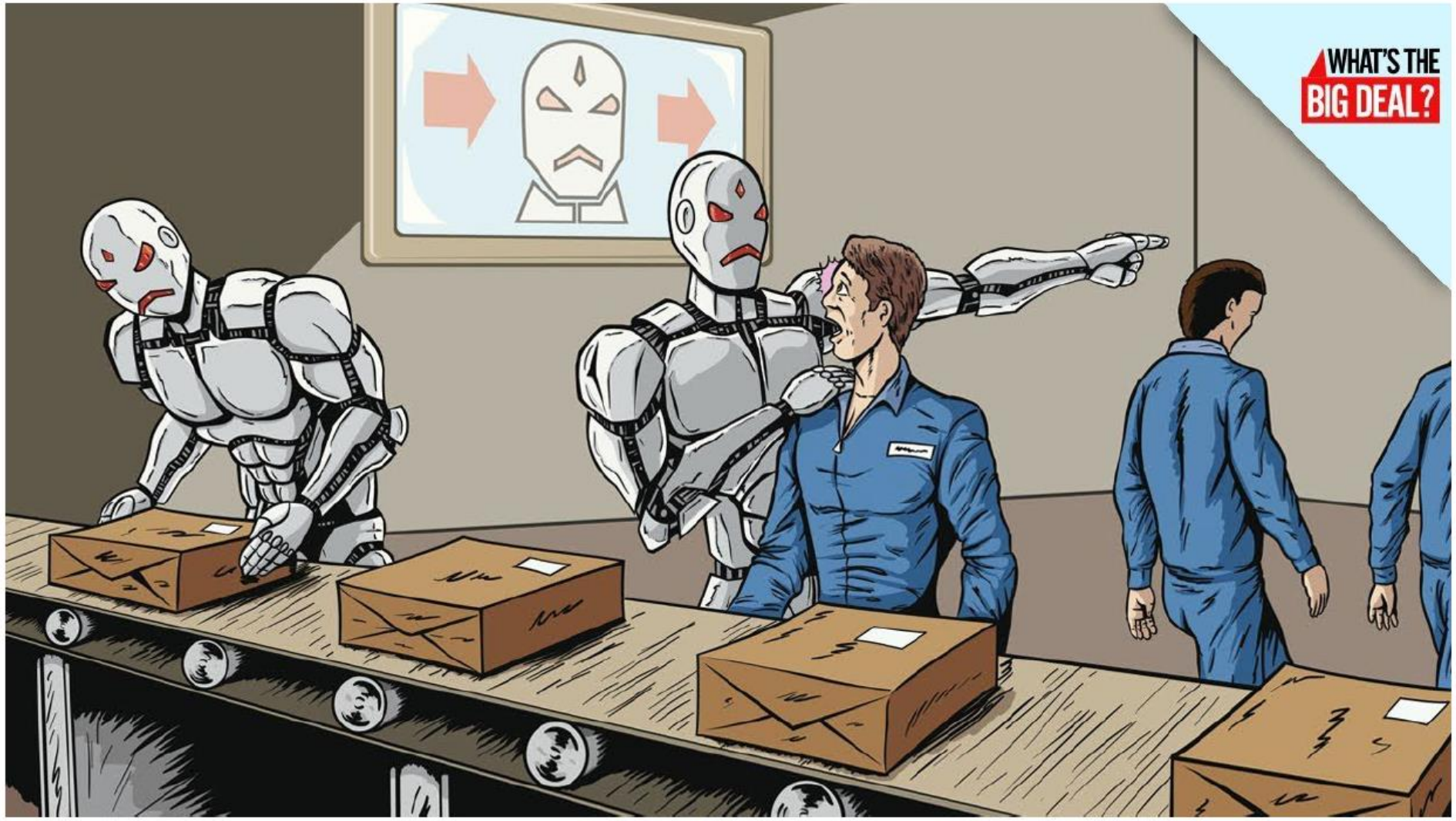
Employee weighted overall % of activities that can be automated by adapting currently demonstrated technologies



Technical automation potential is concentrated in countries with the largest populations and/or high wages

Potential impact due to automation, adapting currently demonstrated technology (46 countries)

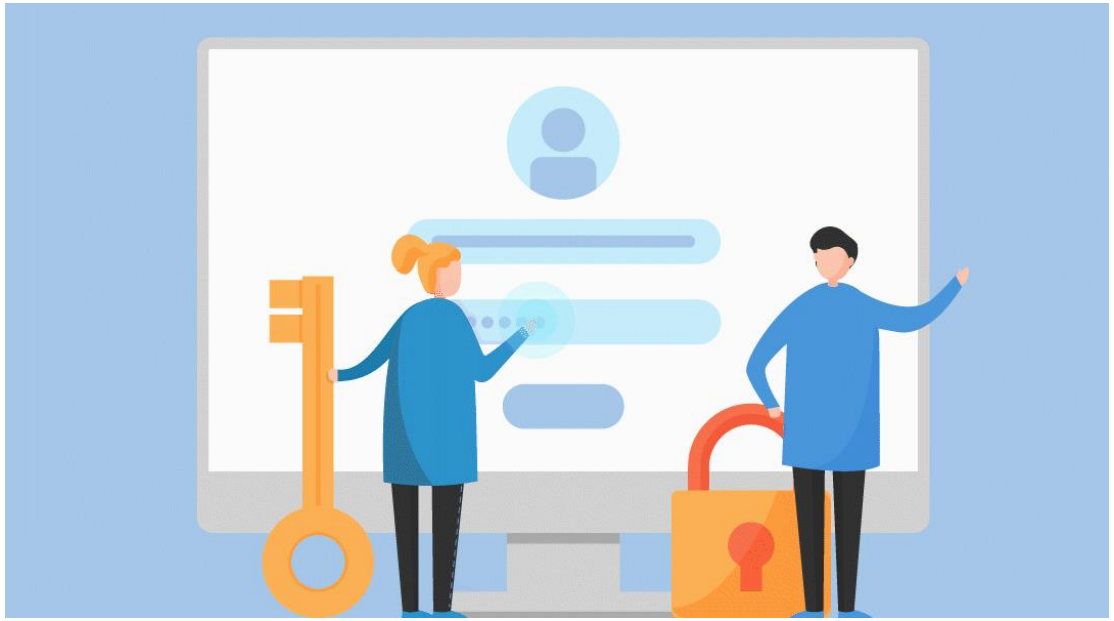
Will workers disappear from the factories



Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Data Privacy and Security

- The Concern: With AI and robotics handling sensitive customer data, concerns about data privacy and security are paramount.
- The Challenge: Implementing robust data protection measures, complying with relevant regulations, and ensuring transparent communication with customers about data usage are essential steps.



Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Customer Trust and Acceptance

- The Concern: Customers might be hesitant to interact with robots or AI systems, fearing impersonal experiences or a lack of understanding.
- The Challenge: Education and gradual implementation are key. Transparently communicate the role of AI and robots, emphasizing their role in enhancing, not replacing, human interactions.

Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Technical Reliability and Failures

- The Concern: Technical failures in robots or AI systems can lead to disruptions in customer service, potentially damaging customer relationships.
- The Challenge: Rigorous testing, continuous monitoring, and a reliable backup plan are essential to minimize the impact of technical glitches.

Concerns and Challenges in the Integration of Robotics and AI in Customer Service

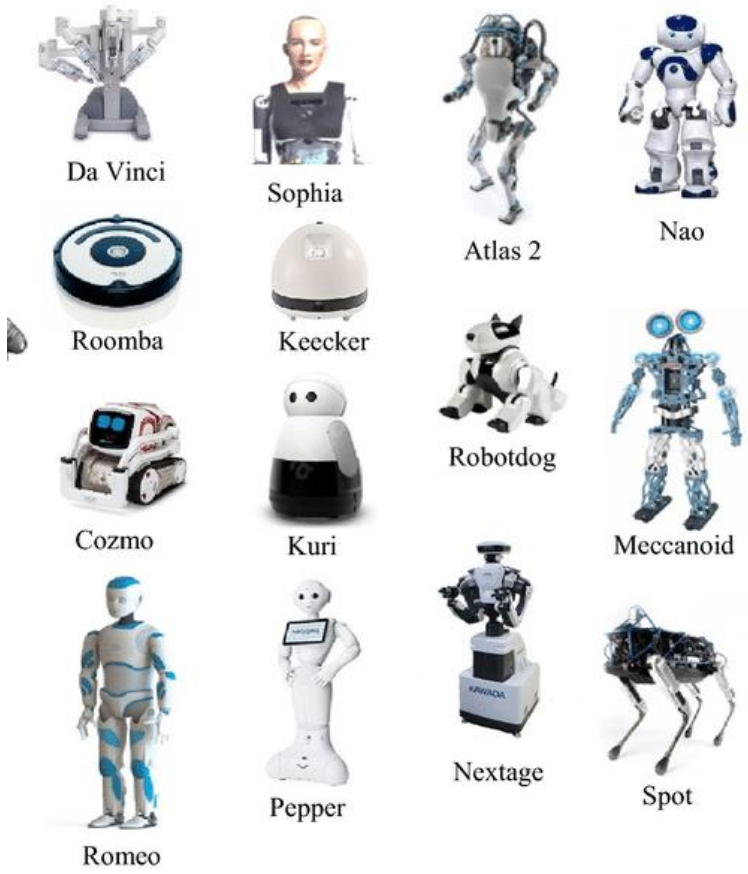
Human-Robot Collaboration

- The Concern: Balancing the interaction between humans and robots requires careful design to ensure a seamless and effective collaboration.
- The Challenge: Design AI and robots to complement human abilities, augmenting their strengths rather than attempting to replace them. Develop intuitive interfaces for human-robot collaboration.

Concerns and Challenges in the Integration of Robotics and AI in Customer Service

Cultural and Ethical Considerations

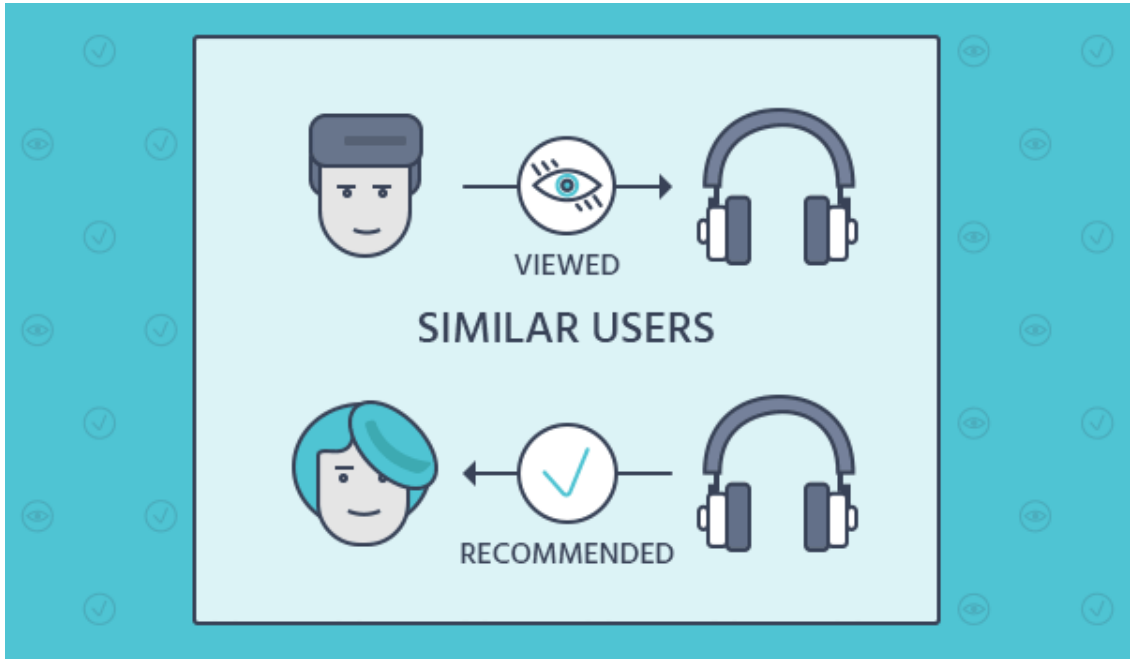
- The Concern: Different cultures and ethical perspectives might react differently to robots and AI in customer service.
- The Challenge: Customize the deployment of robots and AI to align with cultural norms and ethical values in different regions. Foster open dialogue with customers to understand their expectations.



Future Predictions

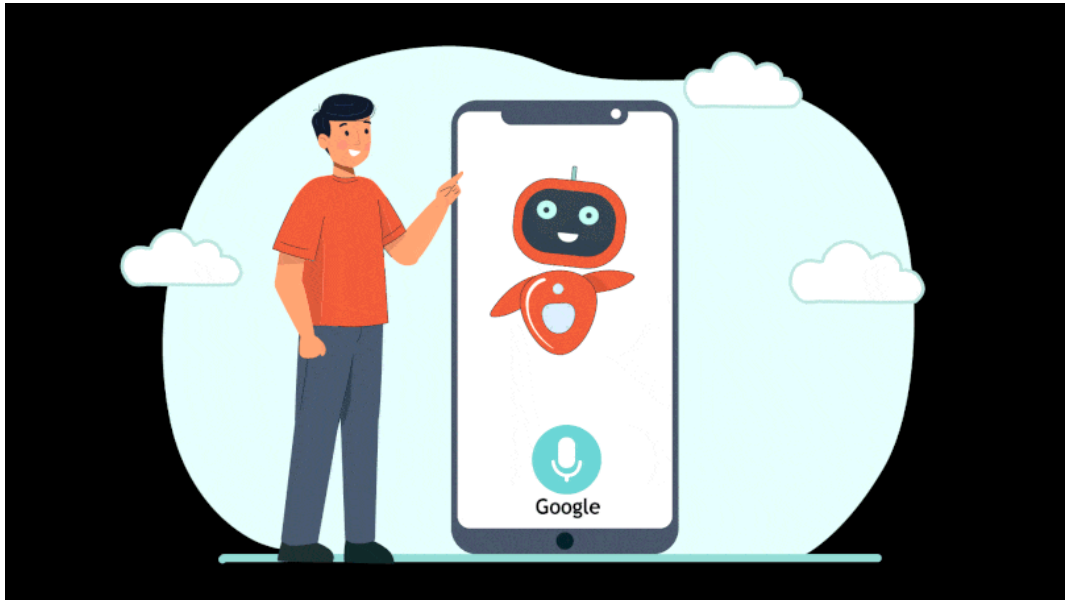
Hyper-Personalization

- Prediction: AI will evolve to the point where customer interactions become even more personalized, anticipating needs and preferences almost intuitively.
- Scenario: Imagine an AI system that not only recognizes your purchase history but also predicts your upcoming needs, offering tailored suggestions even before you realize you need them.



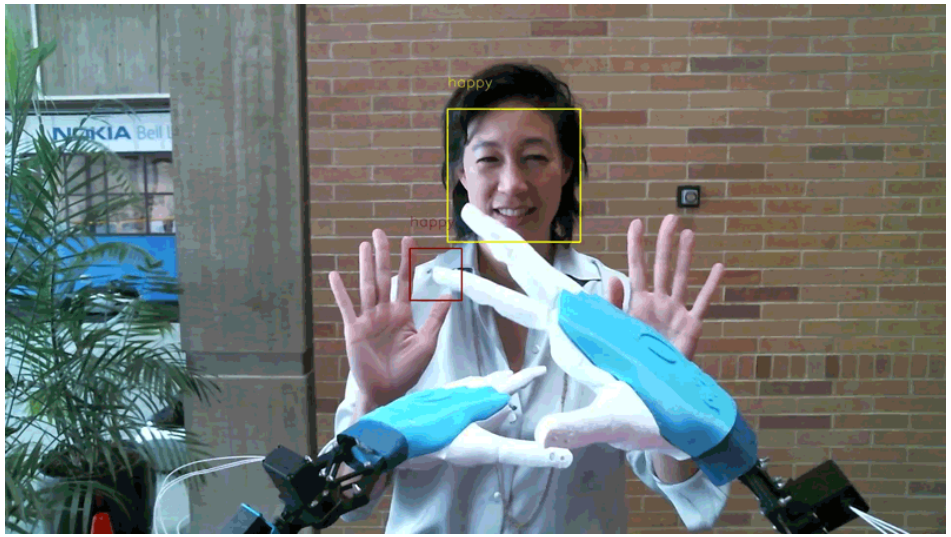
Seamless Multichannel Experiences

- Prediction: The integration of robotics and AI will result in seamless interactions across various channels, making the transition from chatbots to robots and back virtually indistinguishable.
- Scenario: A customer could initiate a query with a chatbot on a company's website, continue the conversation with a robot in a physical store, and receive a follow-up message from an AI-powered virtual assistant on their smartphone.



Emotionally Aware AI

- Prediction: AI will be designed to recognize and respond to human emotions, creating more empathetic and emotionally resonant interactions.
- Scenario: Imagine an AI-powered robot that detects a customer's frustration and responds with comforting language and gestures, turning a negative experience into a positive one.



Collaborative Customer Service Ecosystems

- Prediction: Businesses will collaborate in creating shared customer service ecosystems where AI and robots seamlessly assist customers across multiple brands and industries.
- Scenario: A customer service robot at an airport could assist with flight information, dining suggestions, and even guide passengers to various shops, regardless of the brand or business

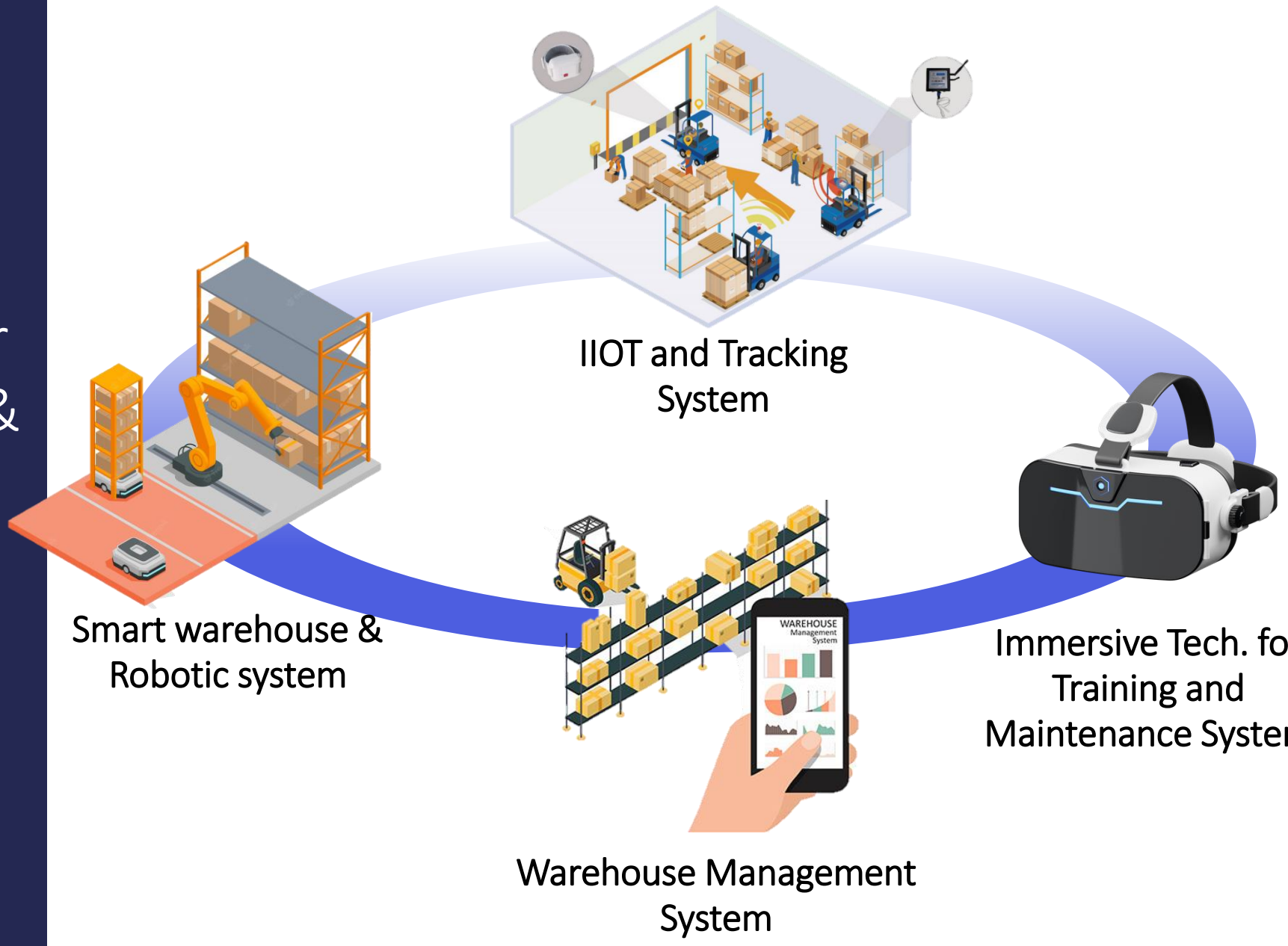
Autonomous Service Deliver

- Prediction: Robots and AI systems will become more autonomous, handling tasks from start to finish without human intervention.
- Scenario: In a retail store, robots could autonomously manage inventory, assist customers, and even complete the checkout process without any human assistance.

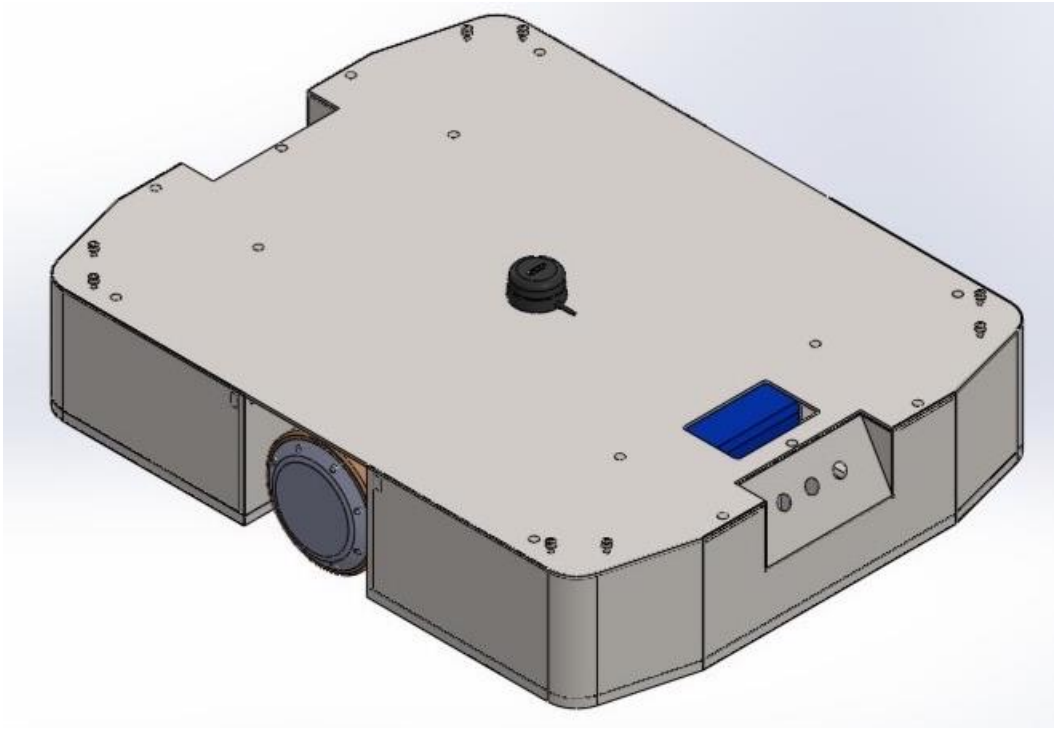
depa HUAWEI THAILAND 5G Ecosystem Innovation Center

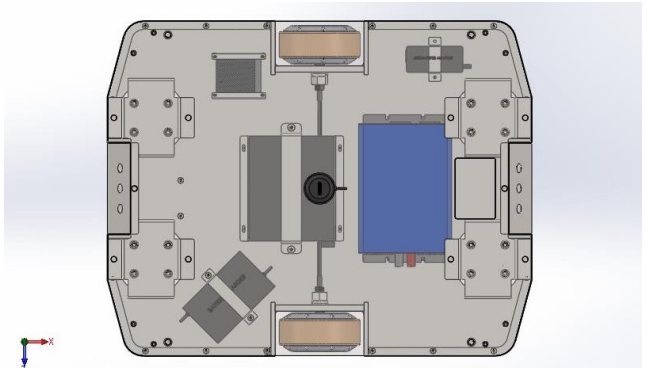
CMIT Robotics LAB

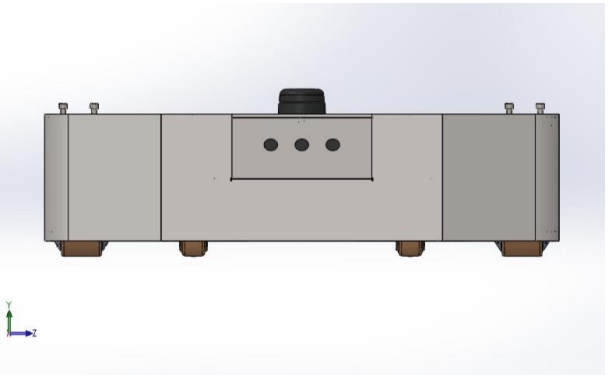
System Platform for Smart Warehouse & Logistic

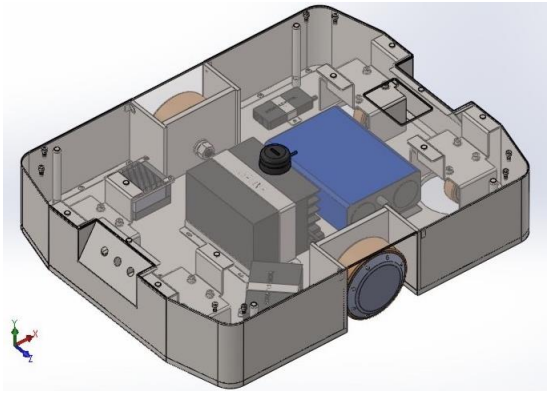


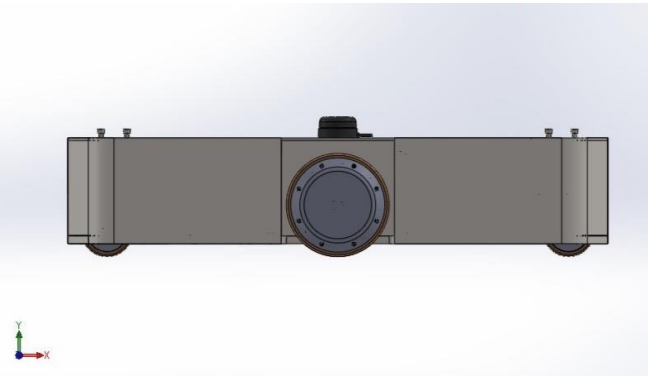
Design and Fabrication of Automatically Learning Air-purifier Robotic System



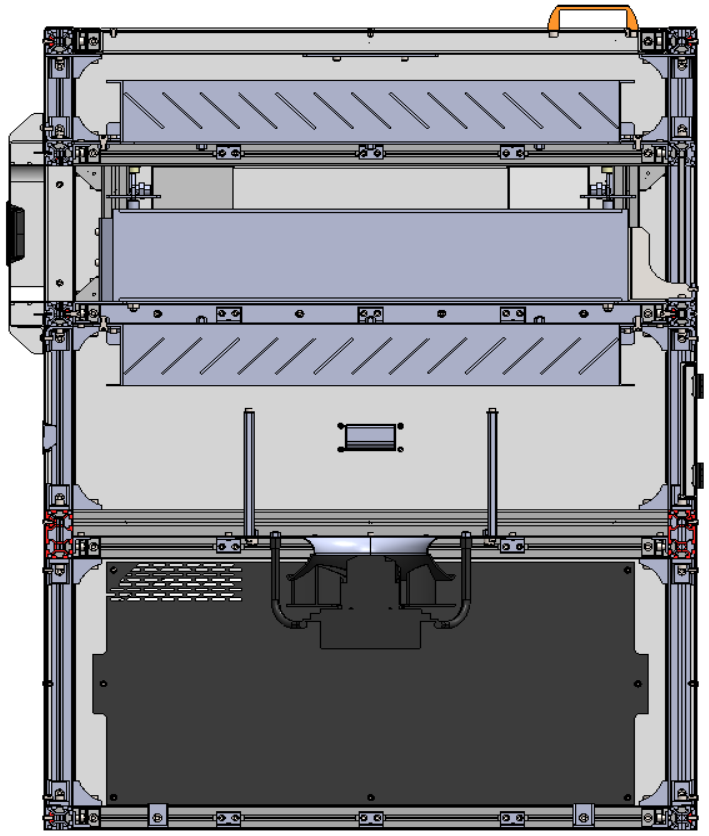


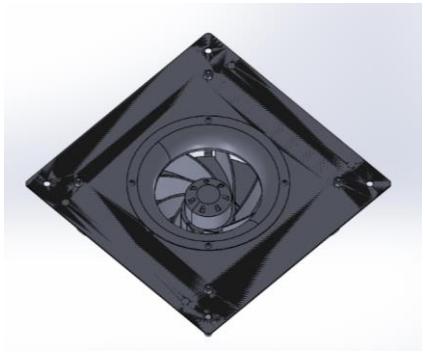


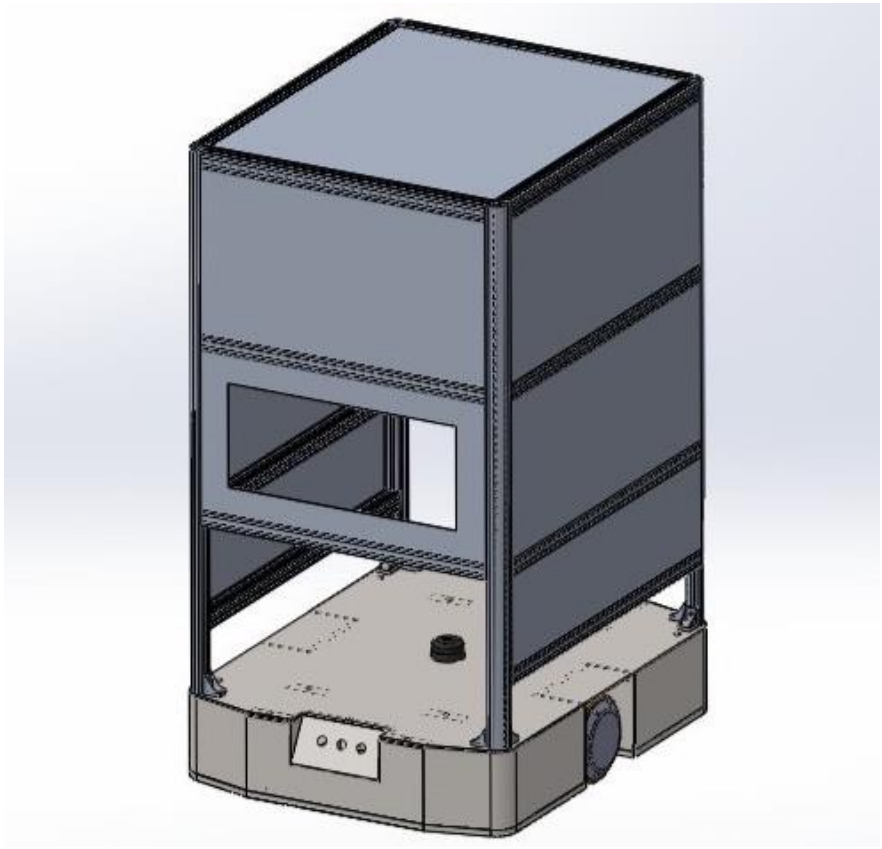




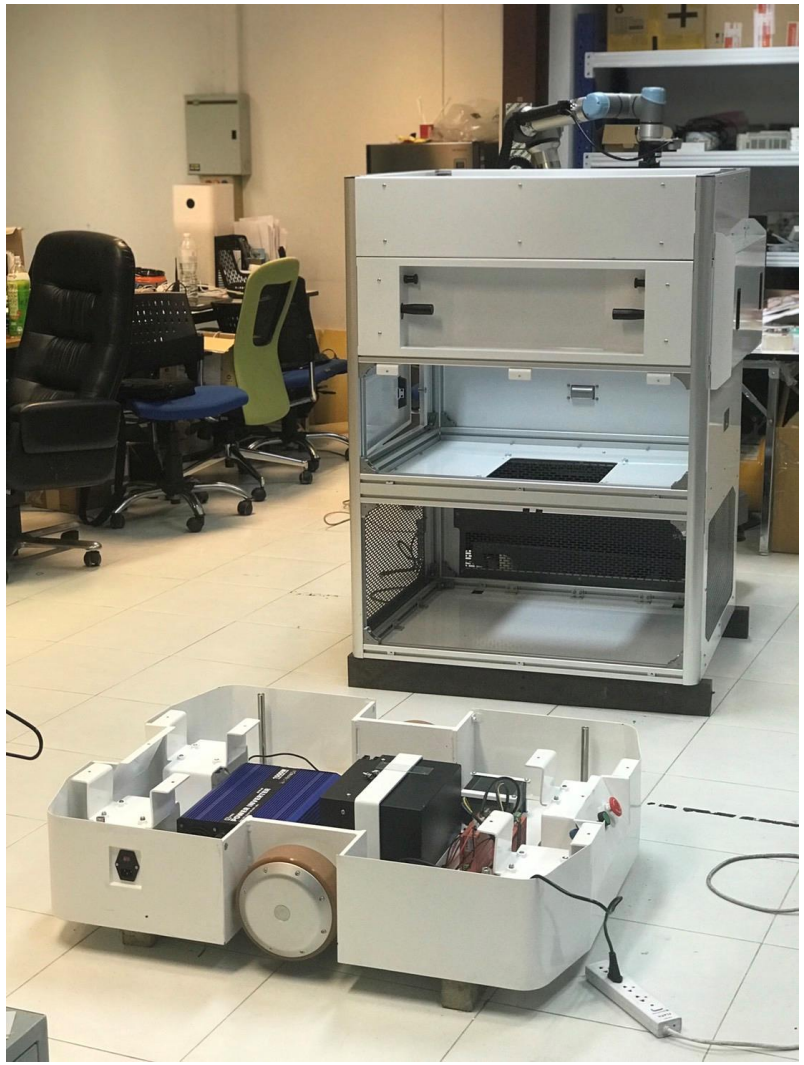
Design and Fabrication of Automatically Learning Air-purifier Robotic System

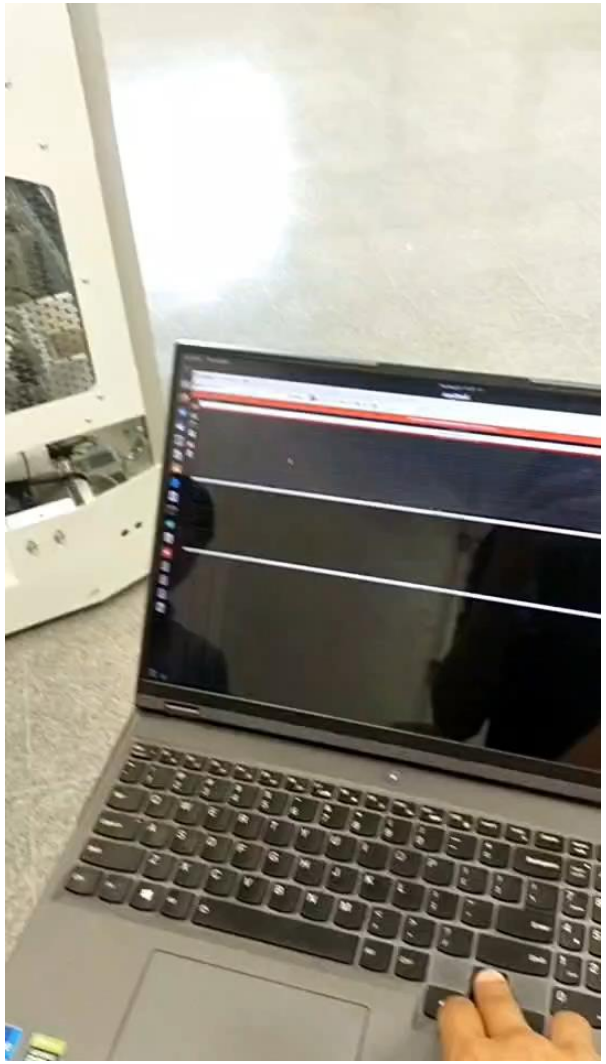


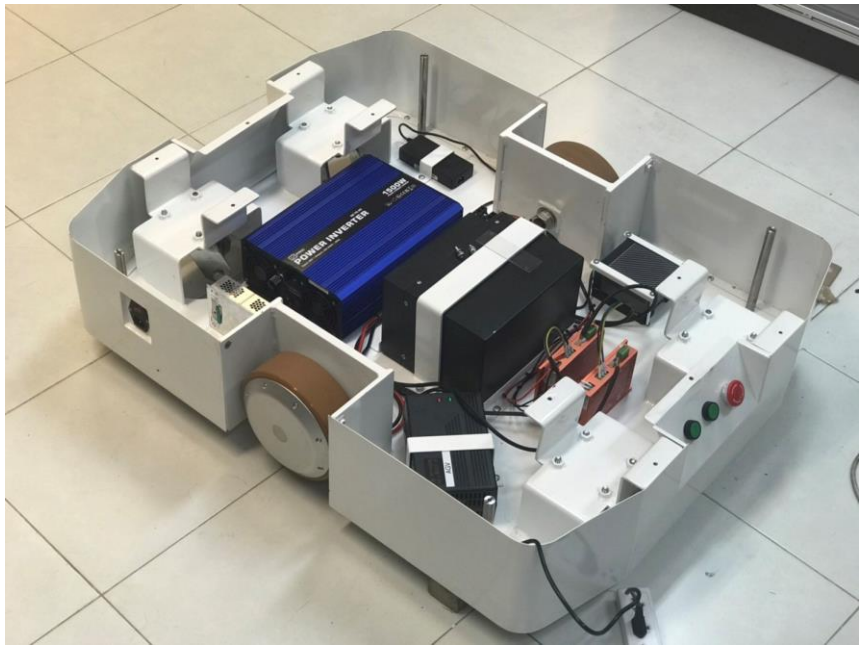




Design and Fabrication of Automatically Learning Air-purifier Robotic System

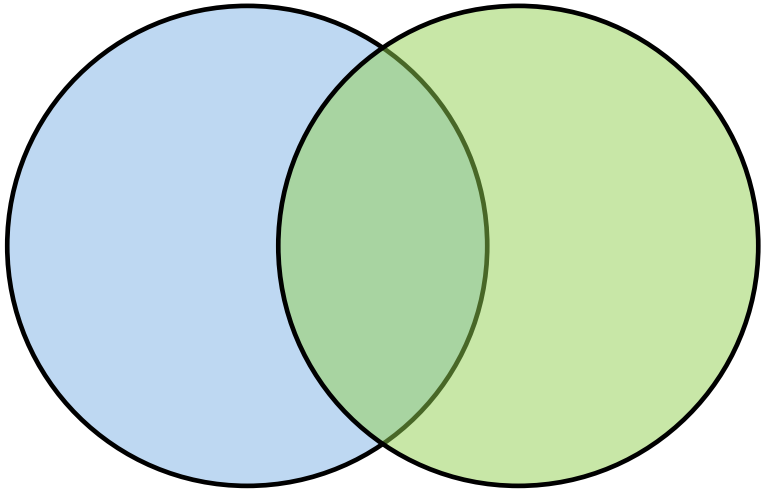






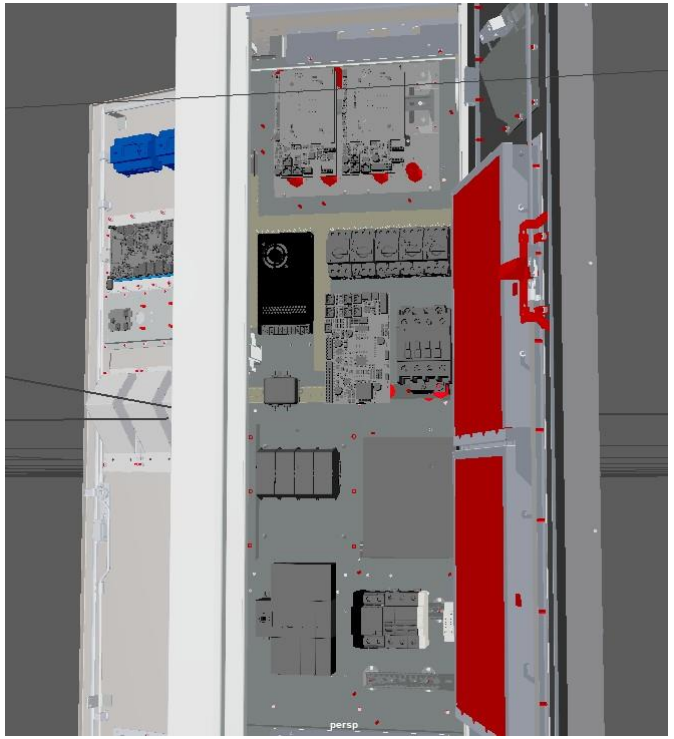
Reference of our previous work

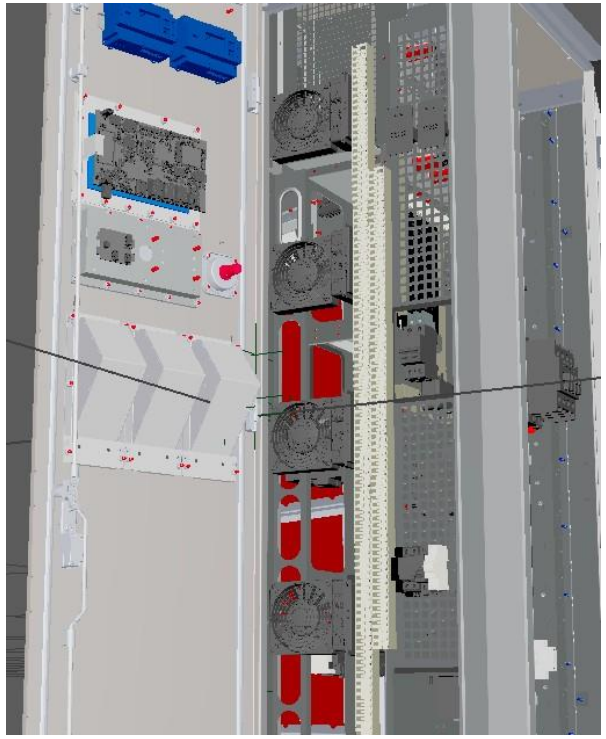
Graphic Design Engineer Team



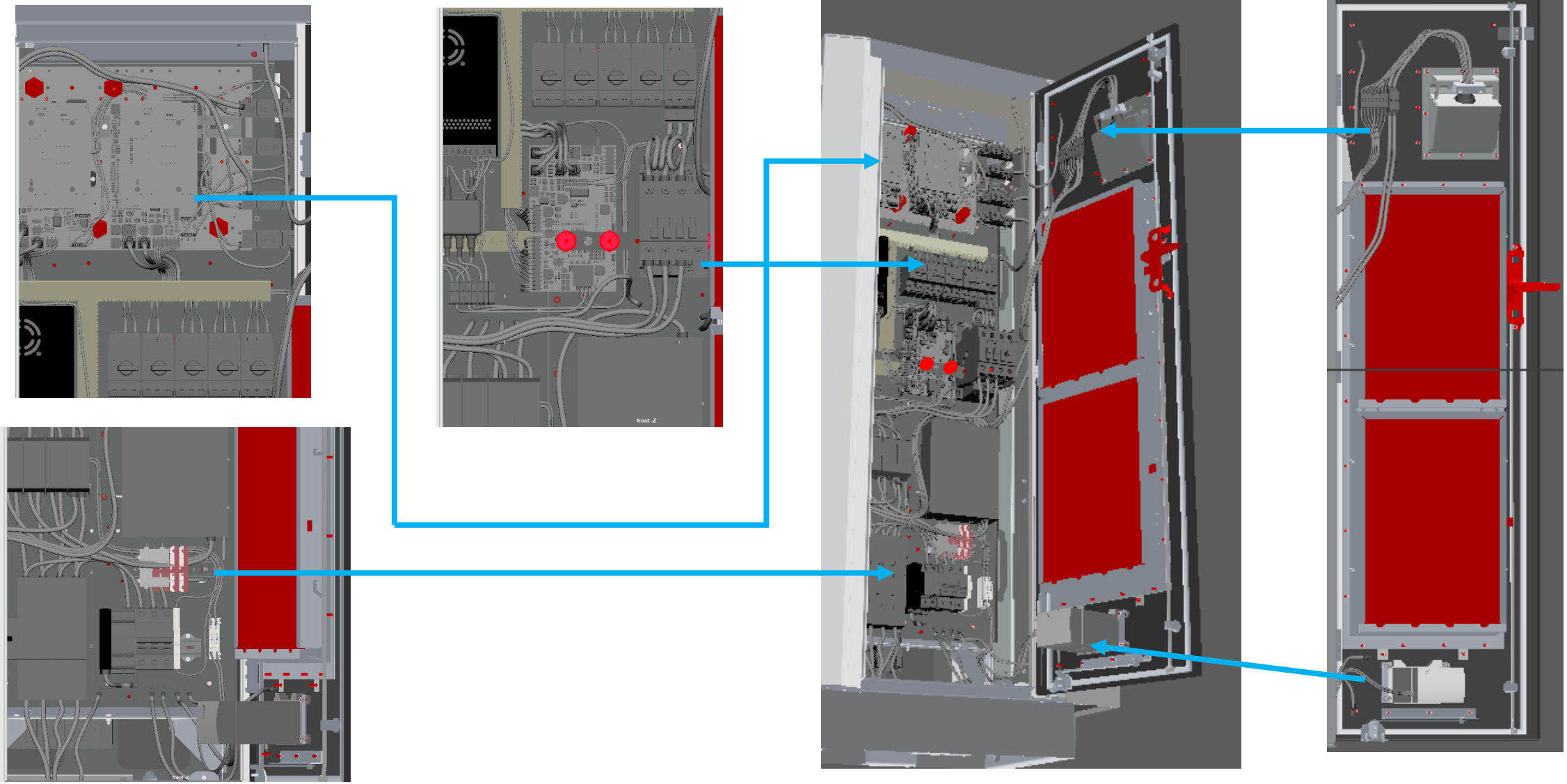
Mechatronic Engineer Team

Simulator and VR Training Platform for Customer Service





Simulator and VR Training Platform for Customer Service




2D Pan/Zoom : persp

VR Training for Logistic and Supply Chain

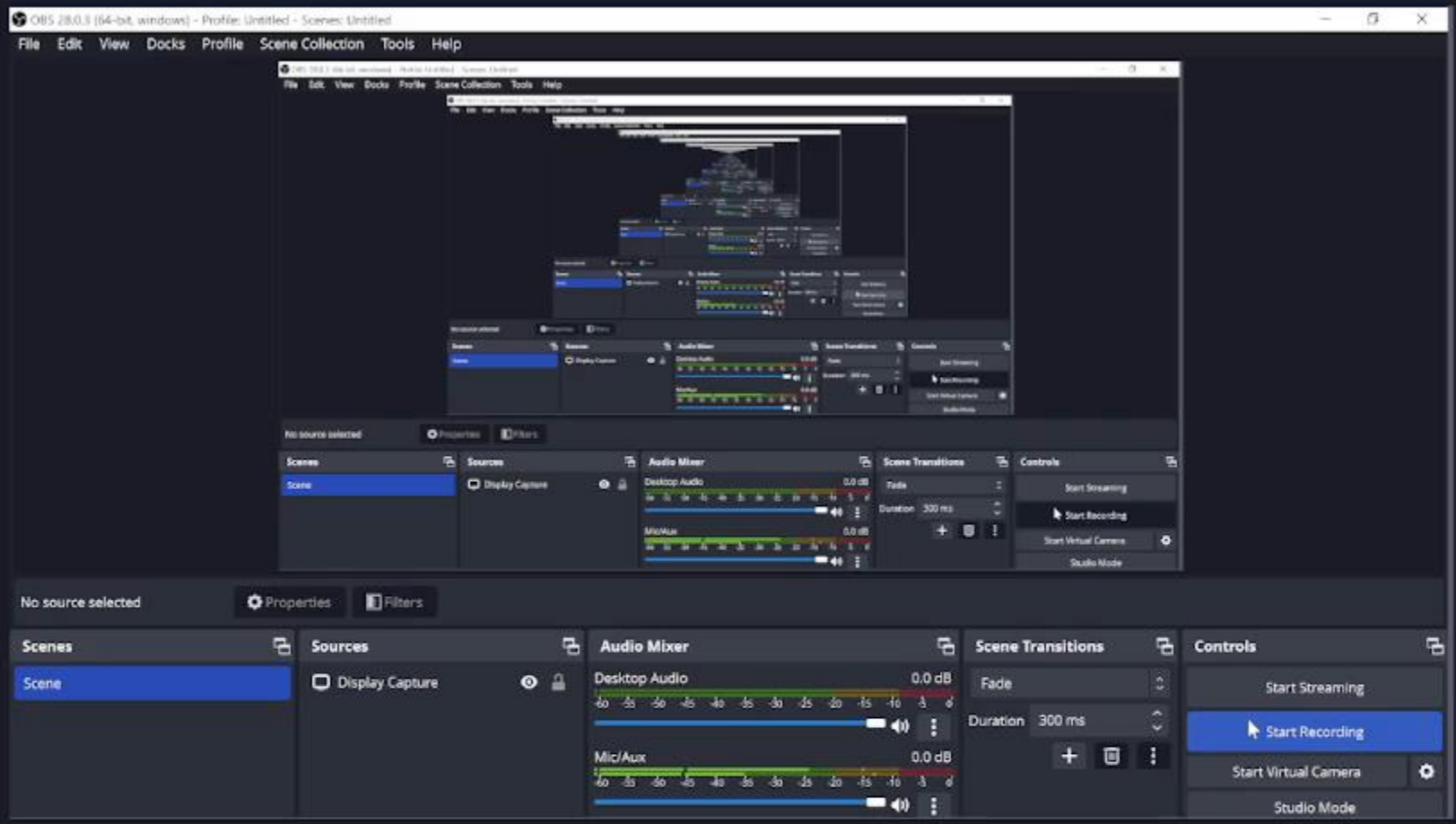
"Sripathum University's College of Logistics and Supply Chain, in the course of Technology and Innovation for Logistics Management, has a total of 723 students.

Using VR to simulate situations for storing goods in a warehouse, categorizing products, and identifying types of products.

https://youtu.be/yvI5RHZfZhc

OBS 28.0.3 (64-bit, windows) - Profile: Untitled - Scenes: Untitled

File Edit View Docks Profile Scene Collection Tools Help



No source selected

Properties

Filters

Scenes

Scene

Sources

Display Capture

Audio Mixer

Desktop Audio 0.0 dB

-60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 0

Mic/Aux 0.0 dB

-60 -55 -50 -45 -40 -35 -30 -25 -20 -15 -10 -5 0

Scene Transitions

Fade

Duration 300 ms

Controls

Start Streaming

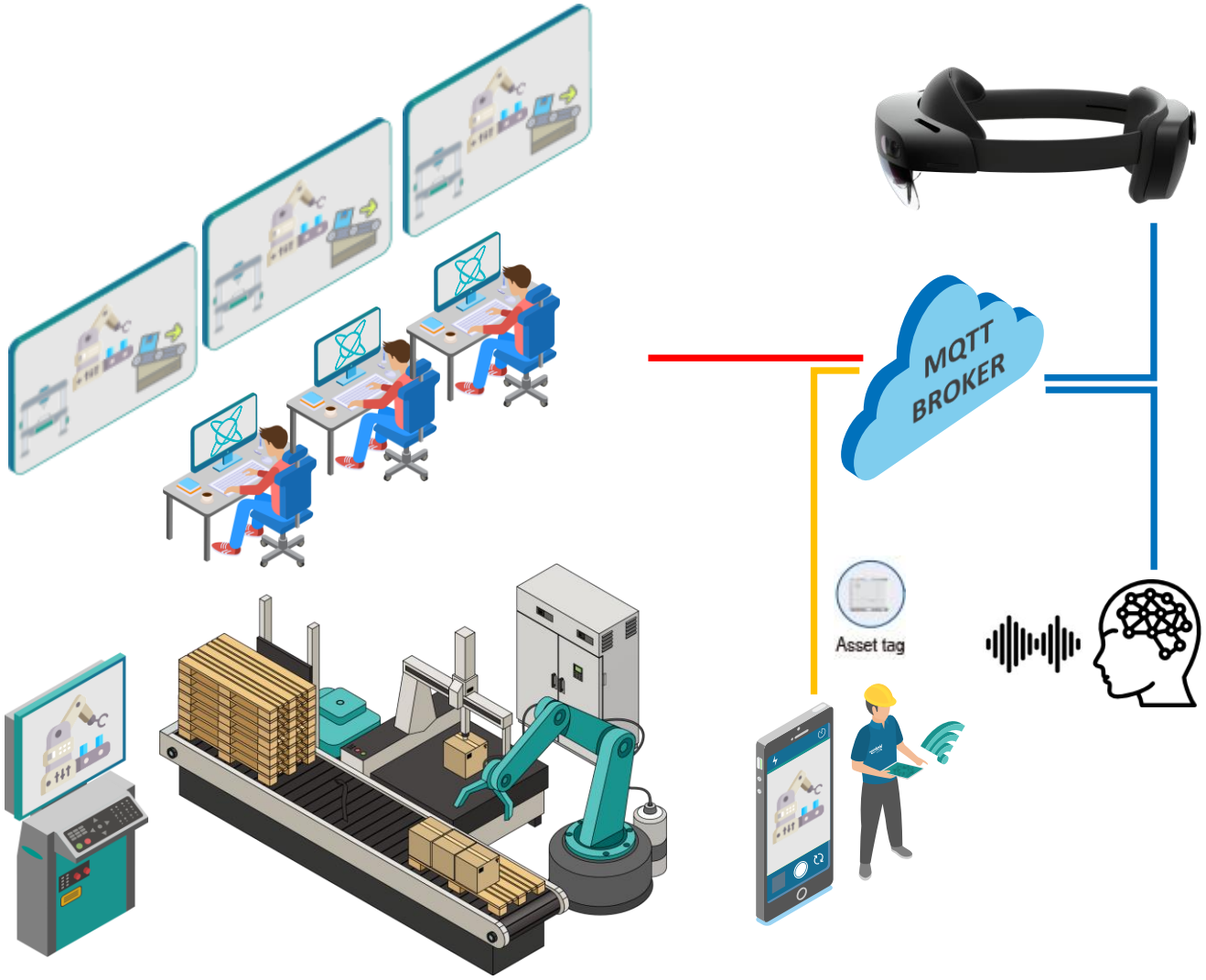
Start Recording

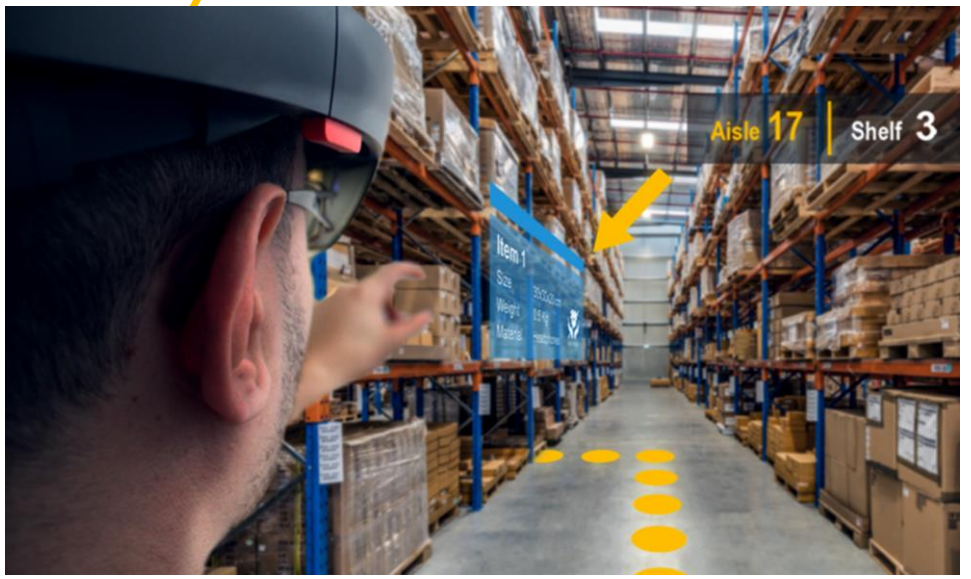
Start Virtual Camera

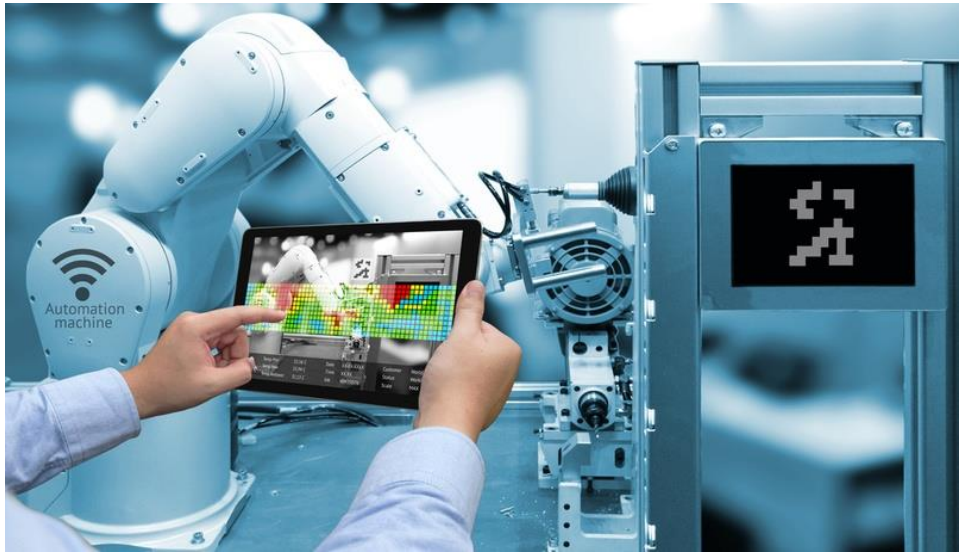
Studio Mode


FactoryEnvironment Preview [NetMode: Standalone] (64-bit/SM5)
REFLECTION CAPTURES NEED TO BE REBUILT (unbuilt)

NEXT-GEN SCADA
2D → 3D Immersive Technology (AR/MR)







System overview

lierda

5G

5G/WIFI

BECKHOFF

TwinCAT® 3

System Platform Software and Database

MQTT BROKER

5G

Rokid

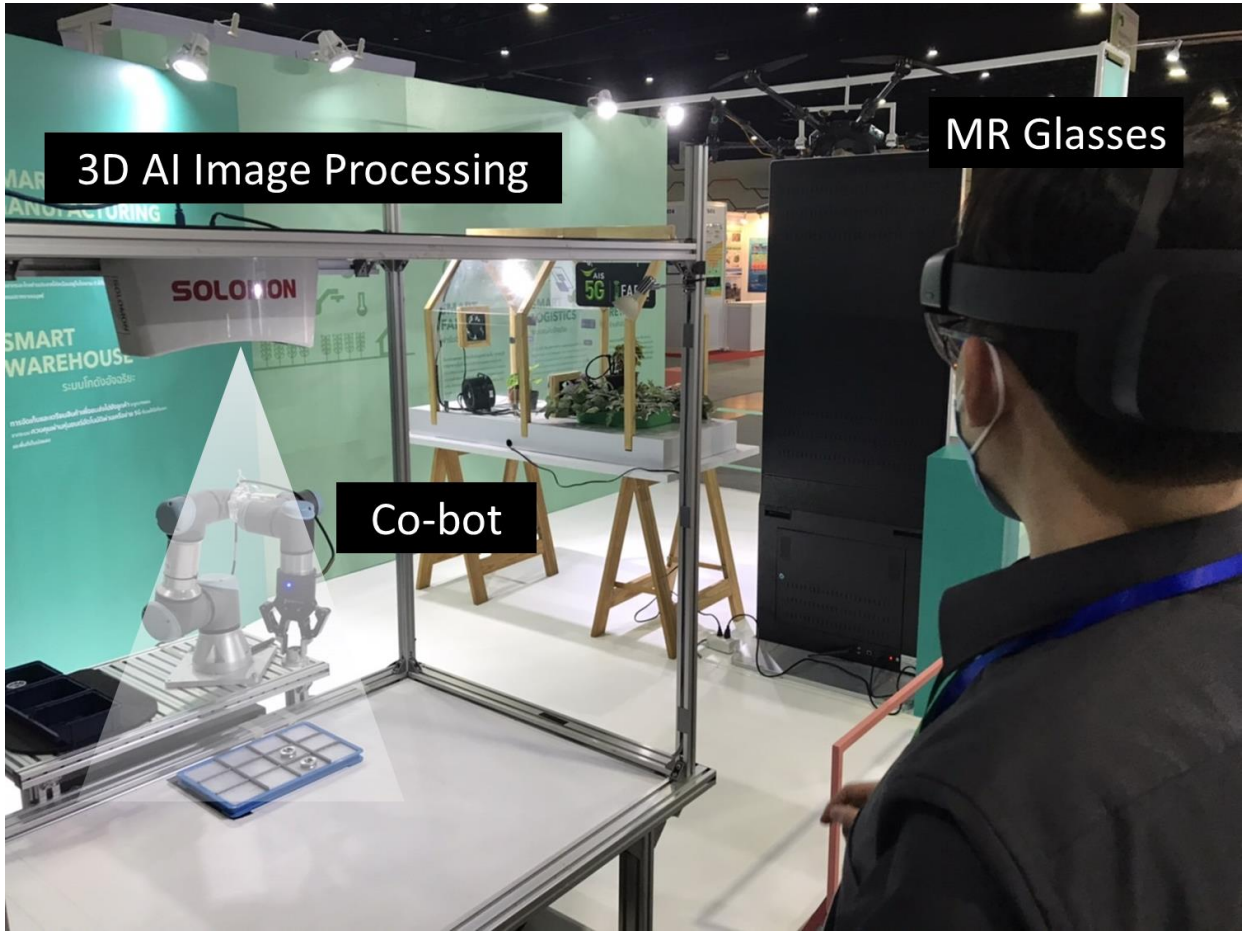
5G

5G

Microsoft

WIFI

PLC data is visualized by MR glasses



MOVE TCP

X : 169.42	RX :2.21
Y : -131.78	RY :-2.22
Z : 174.72	RZ :0

MOVE JOINT

J1 : -0.24	J4 : -108.62
J2 : -61.28	J5 : 90.09
J3 : -100.3	J6 : 0

COBOT

NAME : UNIVERSAL ROBOT

STATUS : Connected

X-PERT SYSTEM AUTOMATIO

CAMERA SCANNER

STATUS : Connected

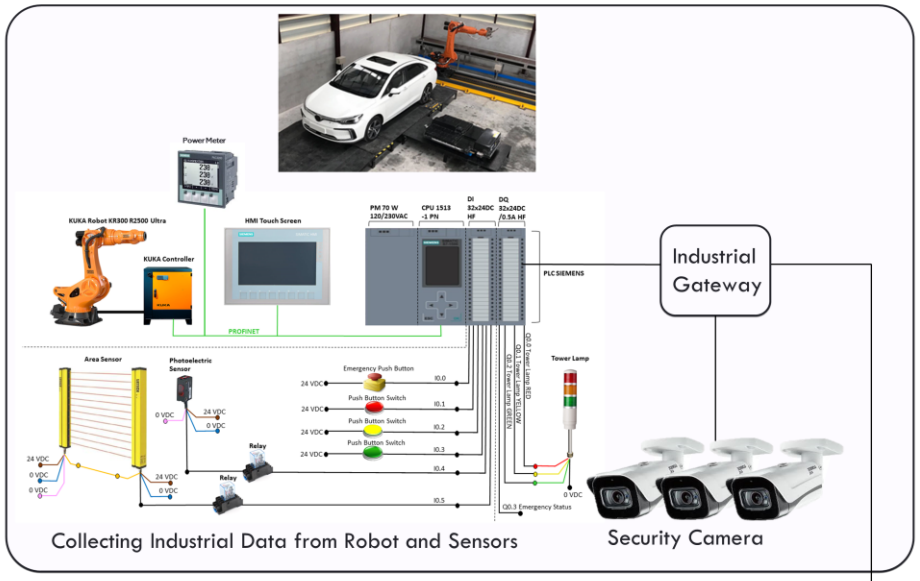
Item Detected : 6

Item Picking : None

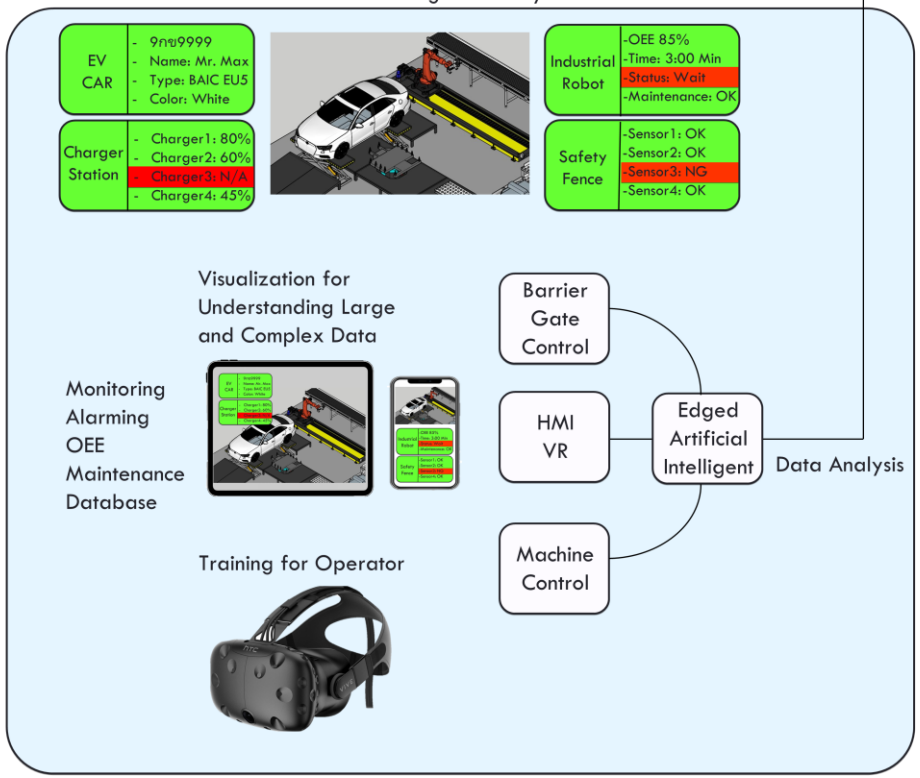
Total Pick 0

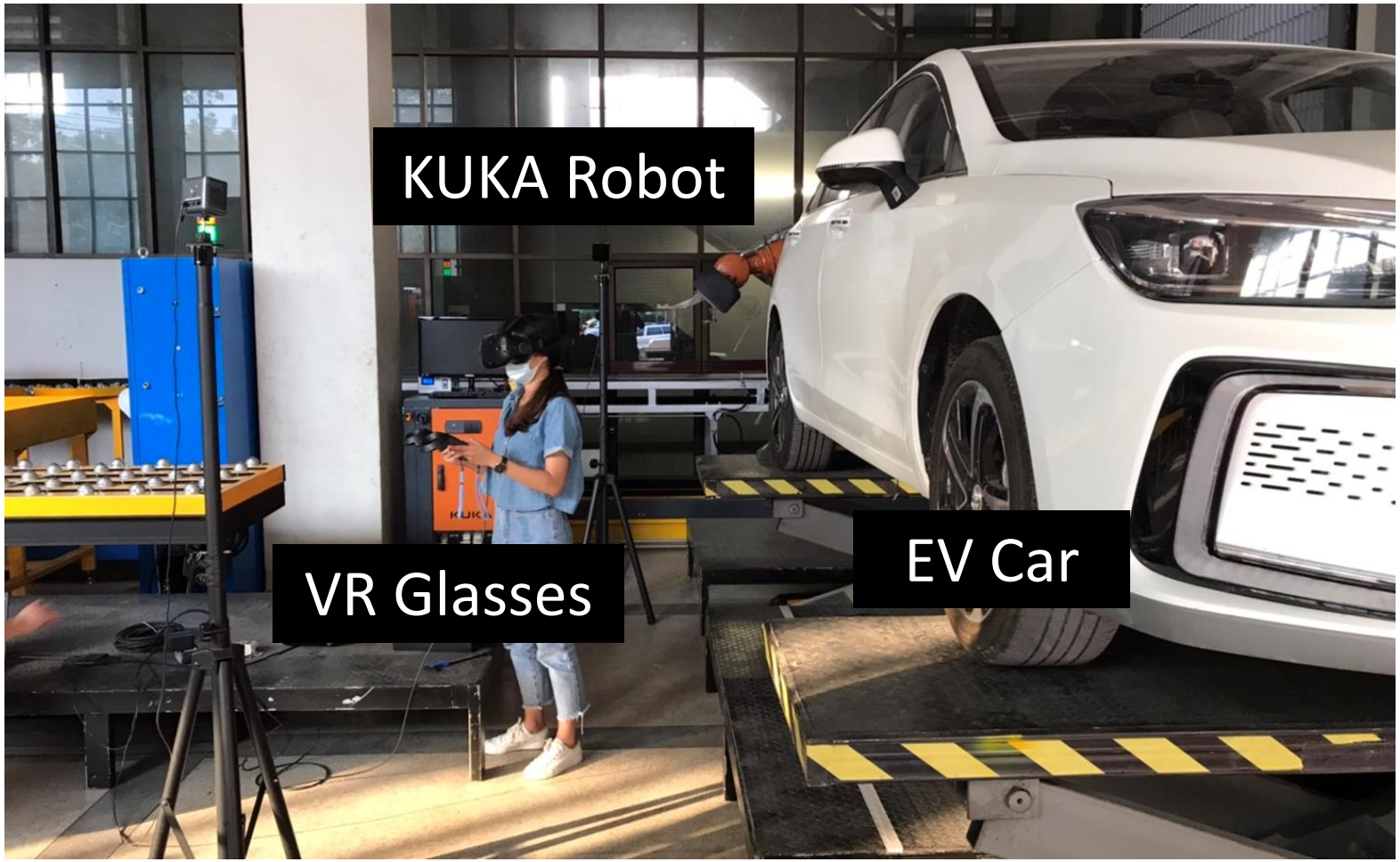
Battery Swapping Station, Kasetsart University

VR Training for Battery Swapping Station



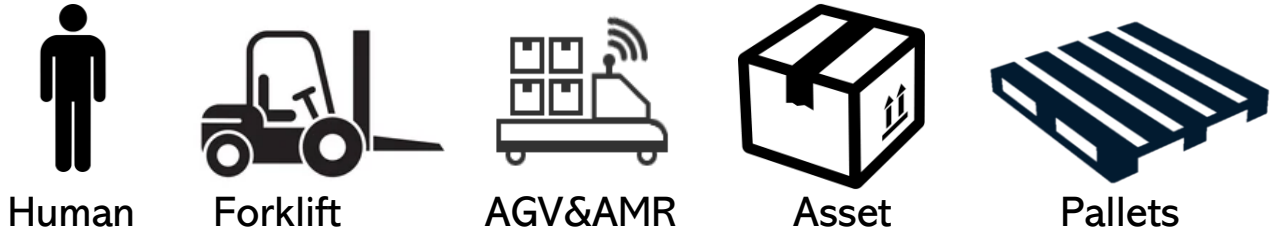
Virtual World: Simulation and Data Monitoring and Analysis

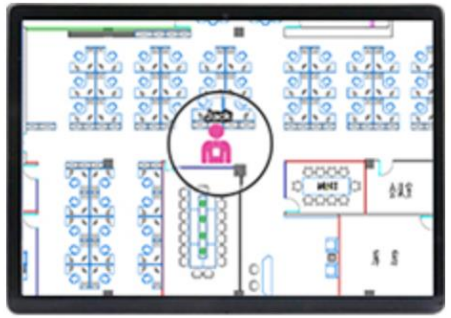




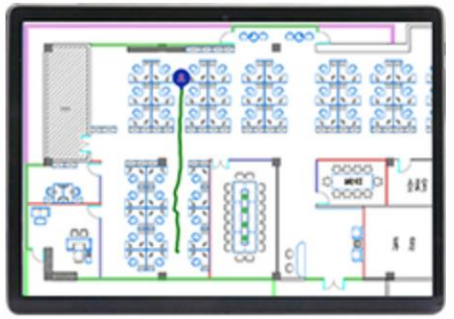

PLC CONNECTION : CONNECTED
EMERGENCY STOP : OK
MODE : NONE

Smart Tracking Systems
Traceability using UWB tech





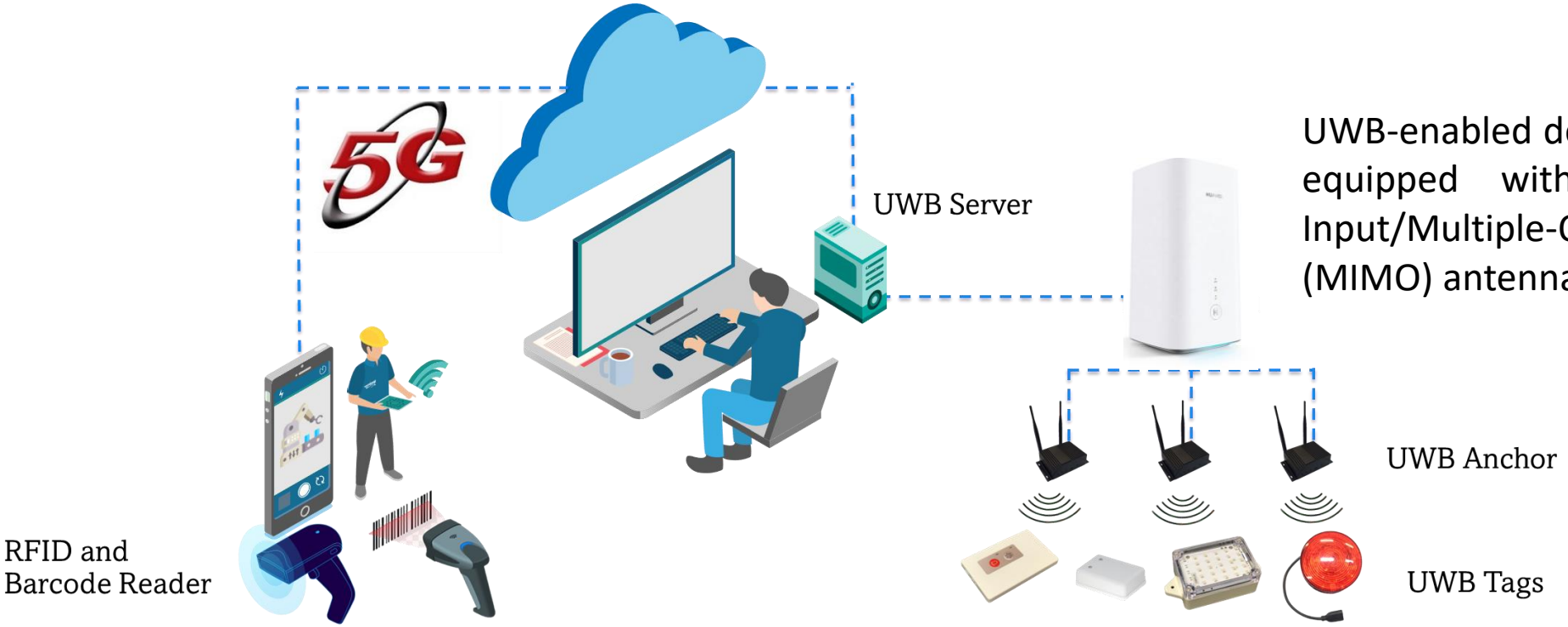
Real-time location



Trajectory query

Electronic Safety fence

Advantage points of 5G + UWB fusion positioning solution



1) It is possible to complete coverage of a large plant area by using 5G network as the transmission medium for UWB positioning technology.
2) The interconnection of 5G and UWB anchors, along with more than 1,000 tags can track the dynamic position of worker, forklift or raw material in real time.
3) Big data and high-performance computing can be applied to improve safety, reduce operating time, improve management precision, and enhance visibility.
4) The integration of 5G + UWB and the digital twin platform enables dynamic monitoring that visually displays the precise location, basic information, and status of personnel in each area of the plant.

ADVANTAGE POINTS OF
Ultra-Wide Band Technology

RFID

Spot detection

Presence detection only

Technique & Accuracy
- Ranging Technique: Sensing
- Accuracy errors: Not applicable

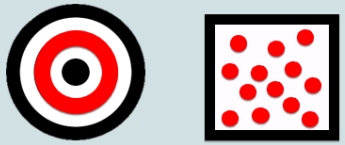
Pros
1) Compact
2) Budget friendly
3) Simple Mechanism

Cons
1) Specific sensing angle
2) Short distance coverage
3) Lacking communication capability

Suitable Areas:
Personal access management

BLE 4.0

< 3m Area detection



Technique & Accuracy
- Ranging Technique: RSSI
- Accuracy errors: 3-5 m

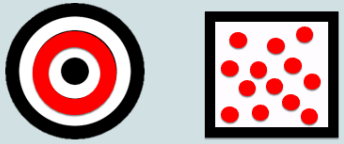
Pros
1) Single chip architecture
2) Mobile-device friendly
3) Support iBeacon push notification

Cons
1) Short distance coverage
2) Requires more nodes used as an indoor location system
3) Susceptible to interference

Suitable Areas:
Indoor navigation in hospital or shopping mall

ZigBee

< 3m Area detection



Technique & Accuracy
- Ranging Technique: RSSI
- Accuracy errors: 3-5 m

Pros
1) Single chip architecture
2) High stability
3) High penetration ability

Cons
1) Susceptible to interference
2) Not that user-friendly
3) Requires adaptor for mobile devices

Suitable Areas:
Industrial areas such as factory and manufacturing plant

UWB

< 0.3m Area detection

Techniques & Accuracy
- Ranging Technique: TDOA/ToF
- Accuracy errors: Less than 30 cm

Pros
1) Single chip architecture
2) High stability
3) Great coverage

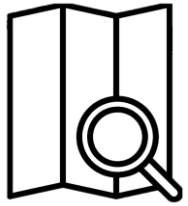
Cons
1) Consumers more power
2) Higher price tag
3) Moderate penetration ability

Suitable Area:
Robots, drones and other application that requires precise distance measurement

KEY FEATURE OF UWB PLATFORM

Ultra-Wide Band Technology

Graphical location display in real-time



Location searching and monitoring

Trajectory record and replay

2D or 3D Mapping development

Human behavior data analytics

Flexible configuration for application

Low battery level warning

Electronic safety fence

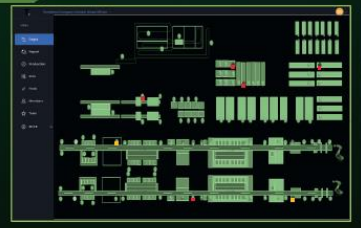
AIS SMART FACTORY SOLUTIONS

AIS Business 5G
Your Trusted Smart Digital Partner

Industry 4.0 : Empowering Digitalization in Manufacturing Industry and Transforming to SMART FACTORY for Enhanced Productivity, Operation Efficiency and Cost Reduction

SMART PRODUCTION LINE

Increase Performance Efficiency with REAL-TIME OEE, Predictive Maintenance, Downtime, and Performance Report



WEB APPLICATION & ADVANCE WIDGET
- Production plan / ERP integration
- Monitoring on mobile / tablet
- Overall performance data available for management view

REAL-TIME DASHBOARD
- Live dashboard provide instant access to critical data
- Predictive maintenance
- Real-time alert via Line message

REPORT & ANALYTICS
- View your historical data at anytime
- Automated generate report
- Export to excel /.csv format
- Multiple analytic tools support

SMART OPERATION MONITORING

Transform Existing Camera/CCTV in the Factory to Smart AI Camera by Connecting to AI Software

Key Features

REAL-TIME digitize physical environment

REAL-TIME activity monitoring & analytical dashboard

REAL-TIME notification & alerts

KEY CHALLENGES
- Worker KPI monitoring
- Working inefficiency
- Unbalanced stations workloads
- Lack of real-time information

AI SMART MONITORING
- Understanding operator practicing
- Increase process efficiency
- Reducing operating costs
- Digitize your production line in real-time

SMART INDOOR TRACKING

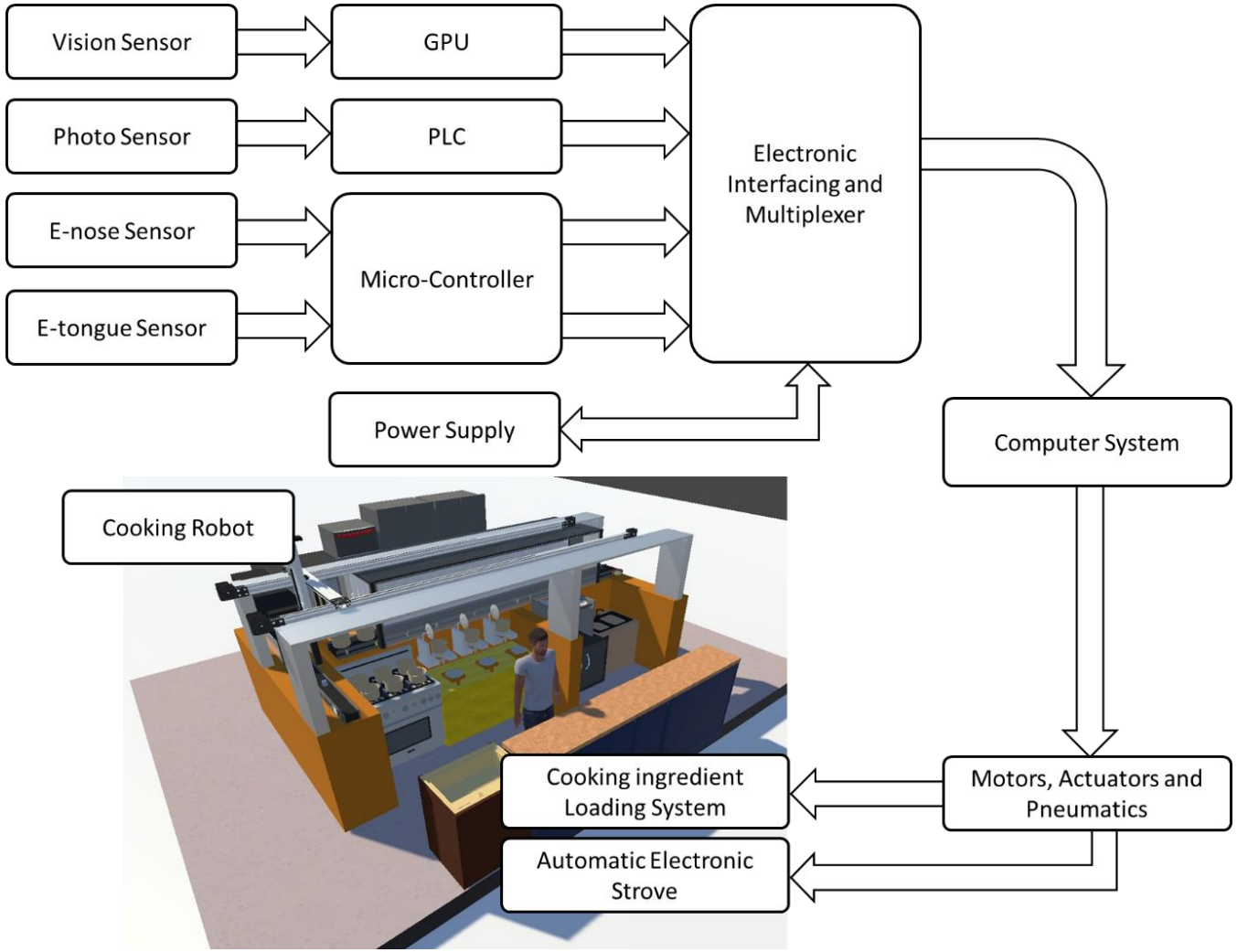
Digitized and Connected Manufacturing Facility with Real-Time Asset Tracking Based on Ultra-Wideband (UWB) Technology

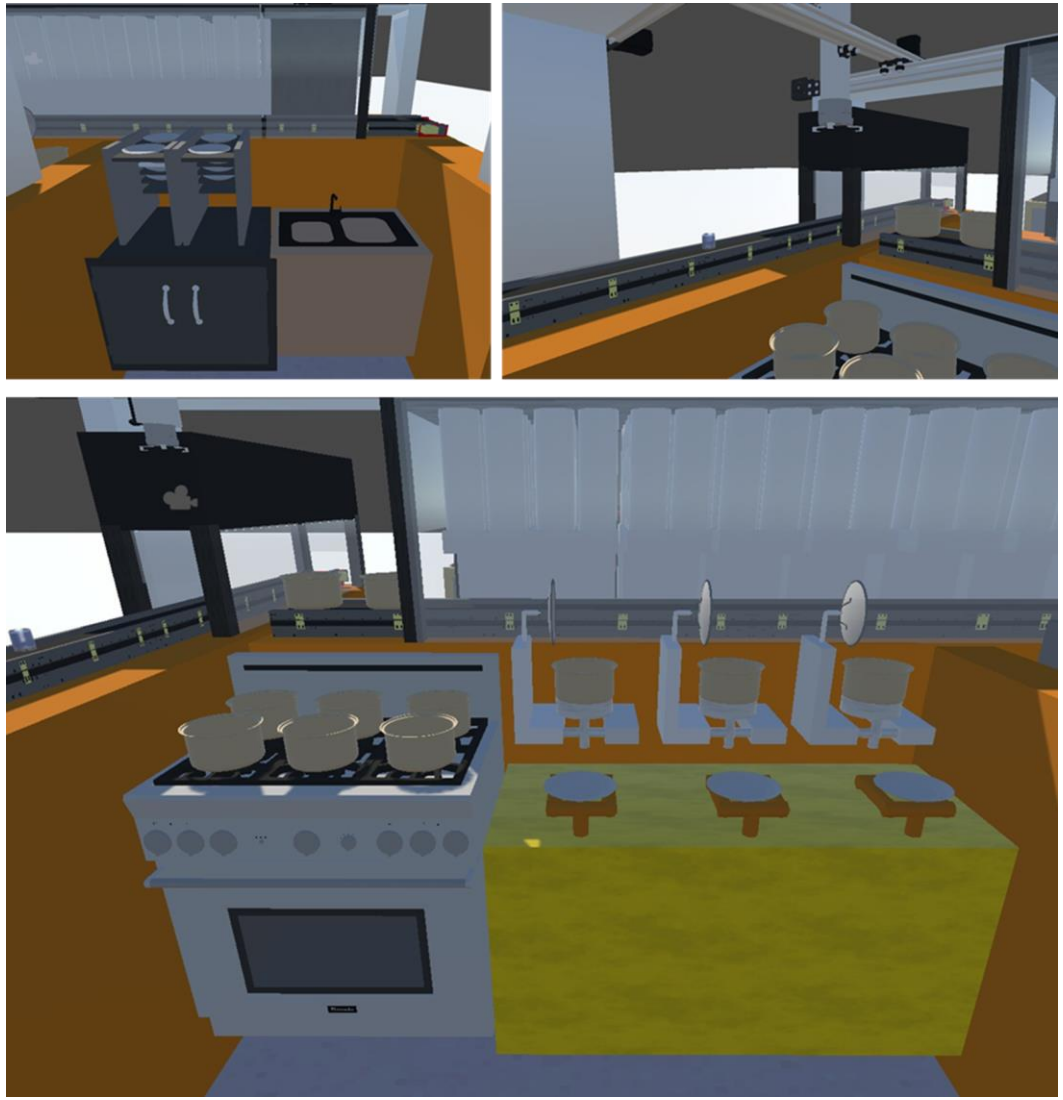
Key Features

- Graphical location display in real-time
- Location searching and monitoring
- Trajectory record and replay
- 2D or 3D Mapping development
- Human behavior data analytics
- Flexible configuration for application
- Low battery level warning
- Electronic safety fence

Industrial 5G. The Wireless Network of the Future.

Future work



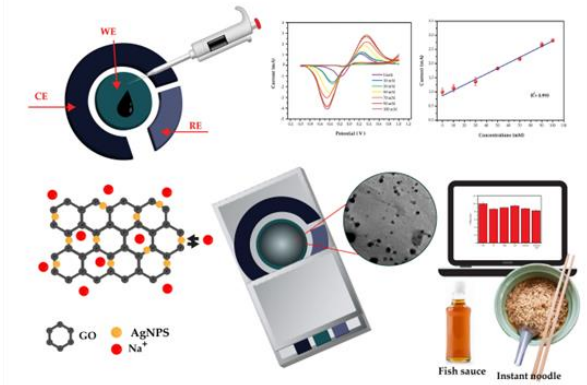


https://drive.google.com/drive/u/0/folders/18MCBcF4gqHbZ8aJYy5RUl4cwNore5_yk

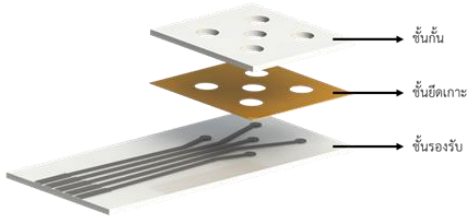
Future work

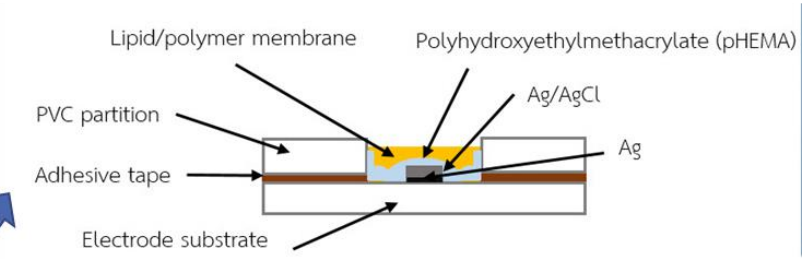
E-tongue Sensors

Sodium ion sensor



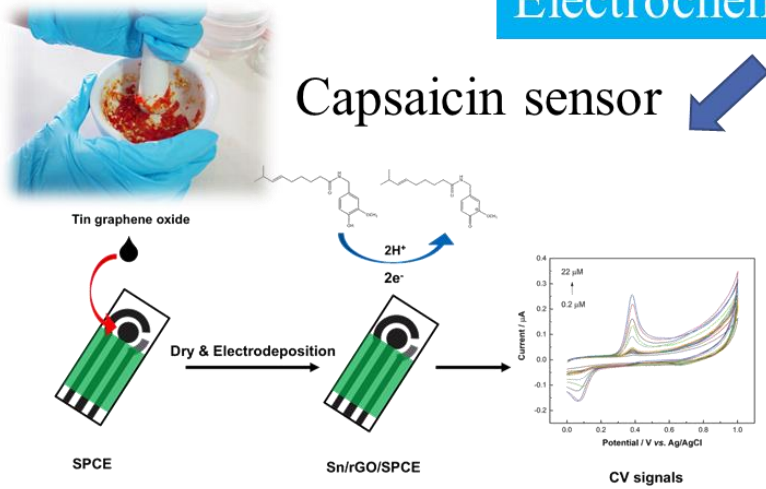
Sweetness sensor



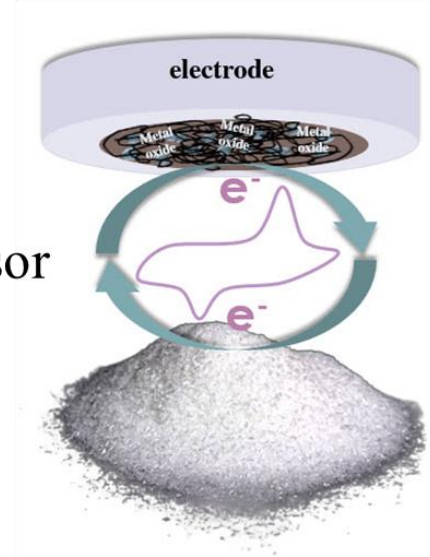


Electrochemical Sensors

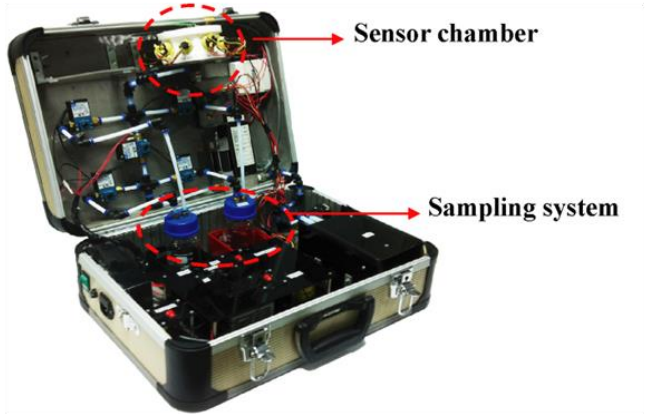
Capsaicin sensor

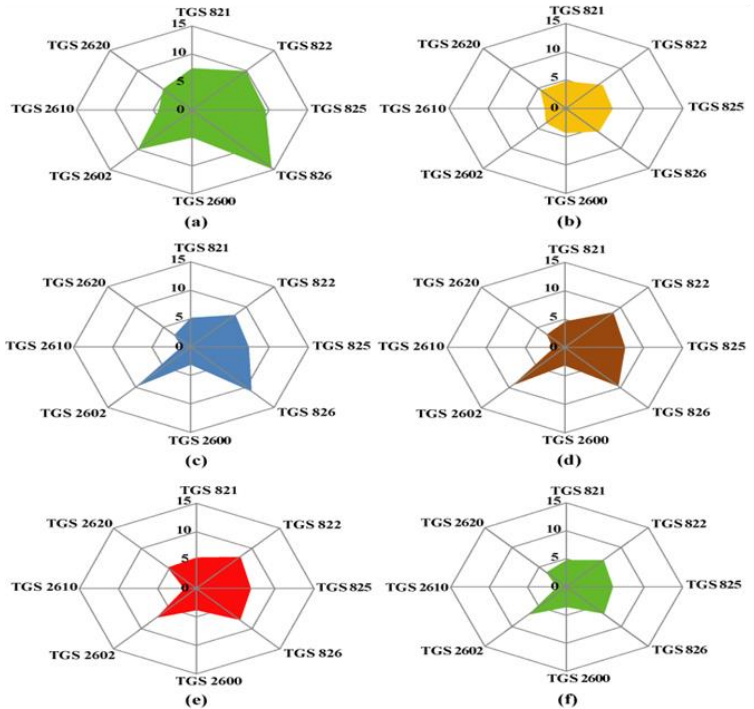


Glutamate sensor

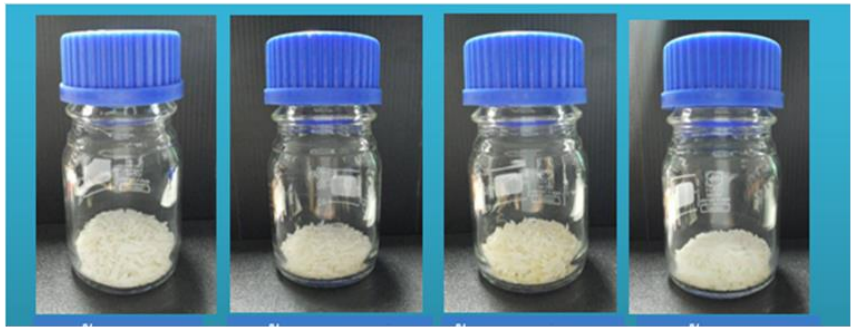


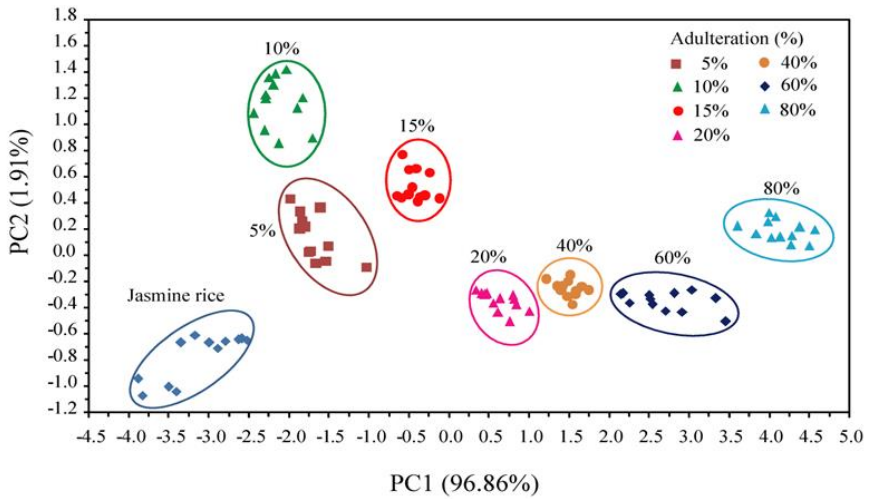
Future work





E-Nose

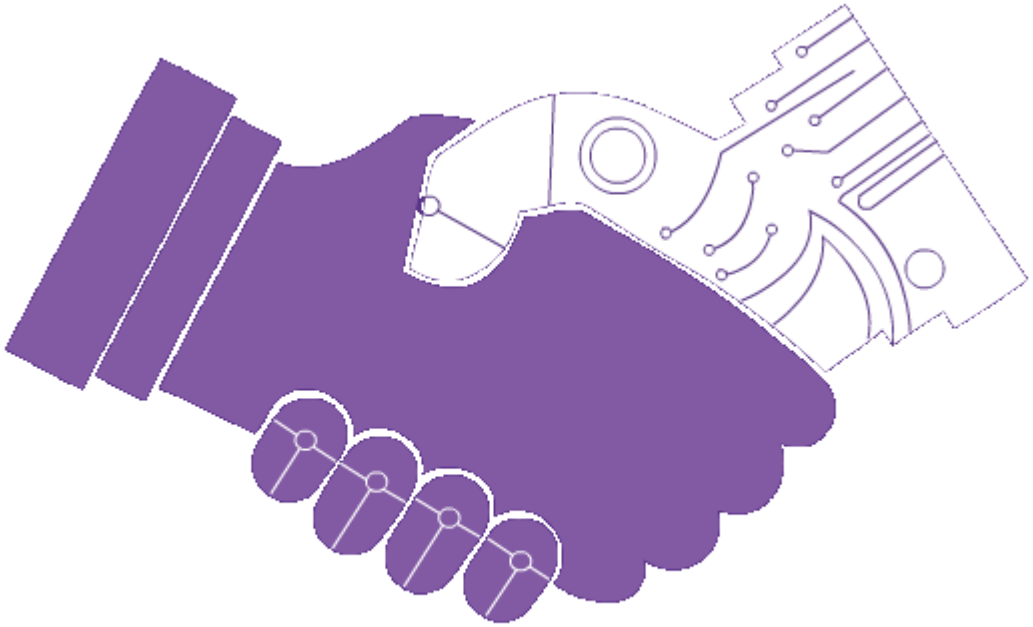




Conclusion

Conclusion

- The integration of robotics and AI in customer service represents a significant advancement in the way businesses interact with their customers. This innovative combination of technologies has the potential to revolutionize the customer service industry in several ways.
  - **Enhanced Efficiency and Scalability**
  - **Improved Customer Experience**
  - **Data-Driven Insights**
  - **Human-AI Collaboration**
  - **Continuous Learning and Improvement**



Conclusion

- In conclusion, the integration of robotics and AI in customer service holds great promise for businesses looking to provide efficient, personalized, and cost-effective support to their customers.
- However, it's essential for businesses to carefully implement and manage these technologies, keeping ethical and customer-centric considerations at the forefront of their strategy.
- When done right, this integration can lead to a more satisfying customer experience and increased competitiveness in today's digital landscape.

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