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DIGIFABS

Digital Change Agents for Food + Beverage SMEs



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ROBOTICS & AUTOMATION



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OBJECTIVES

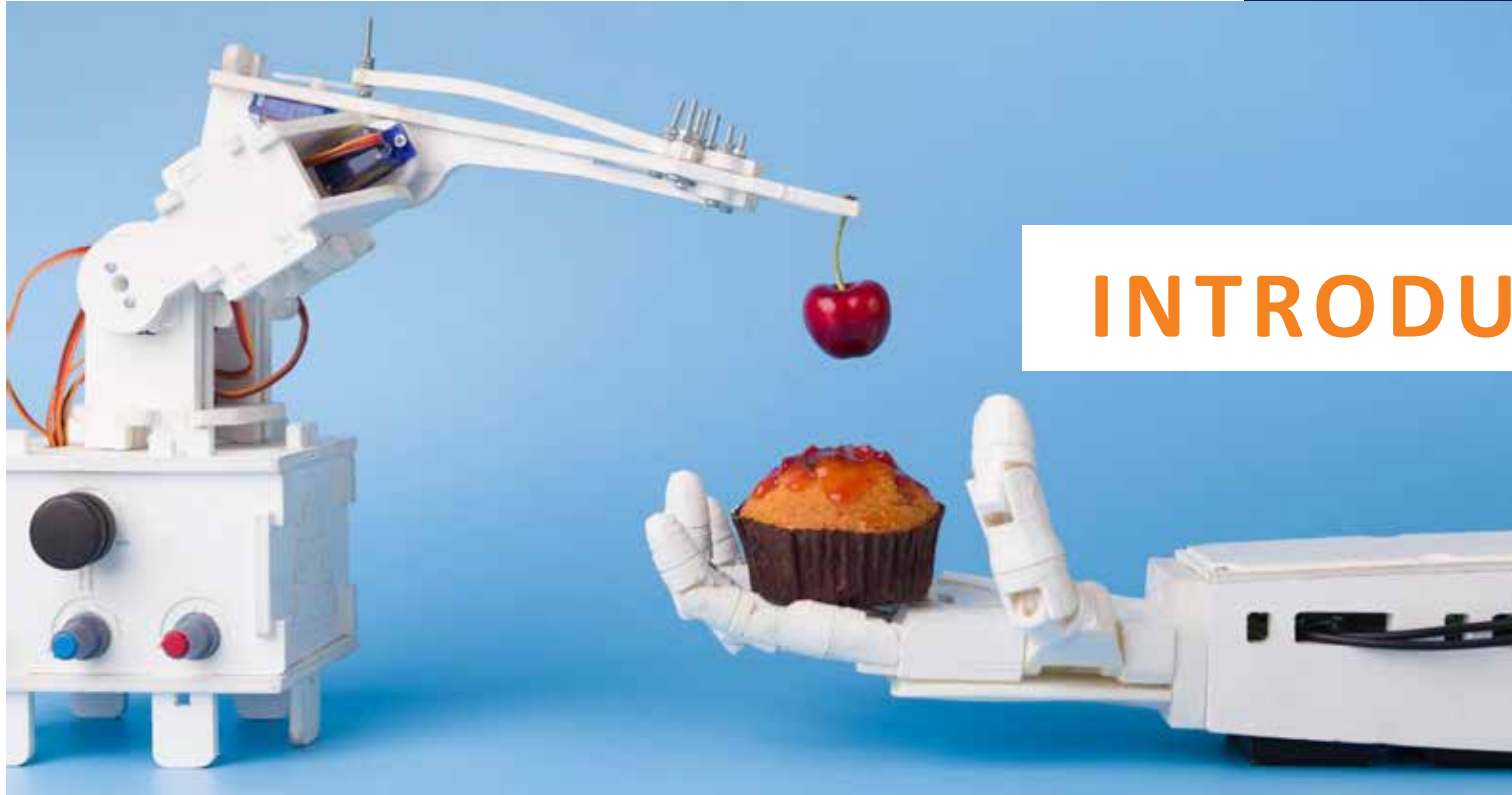
- Understand the role of robotics and automation in the food and beverage industry
- Learn how these technologies improve efficiency, quality, and hygiene
- Discover practical examples in production, packaging, and logistics
- Identify the skills needed to work with robots and automated systems

OUTCOMES

By the end of the module, learners will be able to understand what robotics and automation mean in the context of the food industry, where these technologies are used and why, how they help improve production and food safety, and what basic skills are needed to work with them in daily tasks.

01

INTRODUCTION



Do you know what is a robot? – Mentimeter Survey

Is a car considered a robot?



What is a robot?



"Actuated mechanism programmable in two or more axes with a degree of autonomy, moving within its environment, to perform intended tasks. "

(ISO 8373)

Difference between robotics and automation

Robotics: refers to the design, creation, and use of machines that can **perform tasks**. Often those that are repetitive, dangerous, or require high precision.



Automation: Automation is the use of technology to **control** and **operate processes** or systems with **minimal human intervention**.



02

Types of robots

Types of robots

Robots can be categorized based on their **function** and **area of use**:

- **Industrial robots** are commonly found in manufacturing, handling tasks such as assembly, welding, painting, and packaging.
- **Service robots** assist humans in both personal and professional environments. These include domestic (e.g robotic vacuum cleaners), social, delivery, medical, military, search and rescue, and space robots.
- **Educational robots** play a vital role in teaching programming, engineering, and STEM subjects, especially in classrooms and training environments.

Types of robots

Industrial robots



Articulated robots



Mobile robots



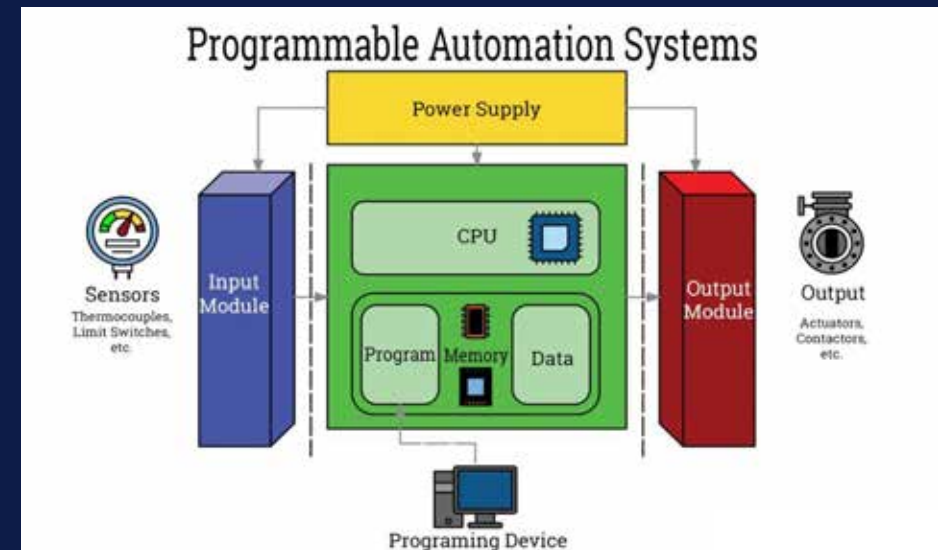
Articulated and mobile robots

Types of automation

There are several types of automation in food production:

1. **Fixed automation**: used for high-volume tasks like bottling or labeling.
2. **Programmable automation**: used for batch production where settings can be changed between tasks.
3. **Flexible automation**: allows easy reprogramming to adapt to different products or processes.

These systems can operate independently or be part of larger **IoT** or **AI systems** for smart automation.





03

Automation in food production

Advantages of robotics in the F&B industry



Robotics and automation, are revolutionizing how food is:

- Produced
- Packaged
- Delivered

These technologies help companies, work **faster, safer,** and with **greater precision.**

Robots take on repetitive tasks, reduce errors, and enhance hygiene. Automation systems ensure **smooth operations** with **minimal human effort**, increasing productivity and strengthening food safety from production to delivery.

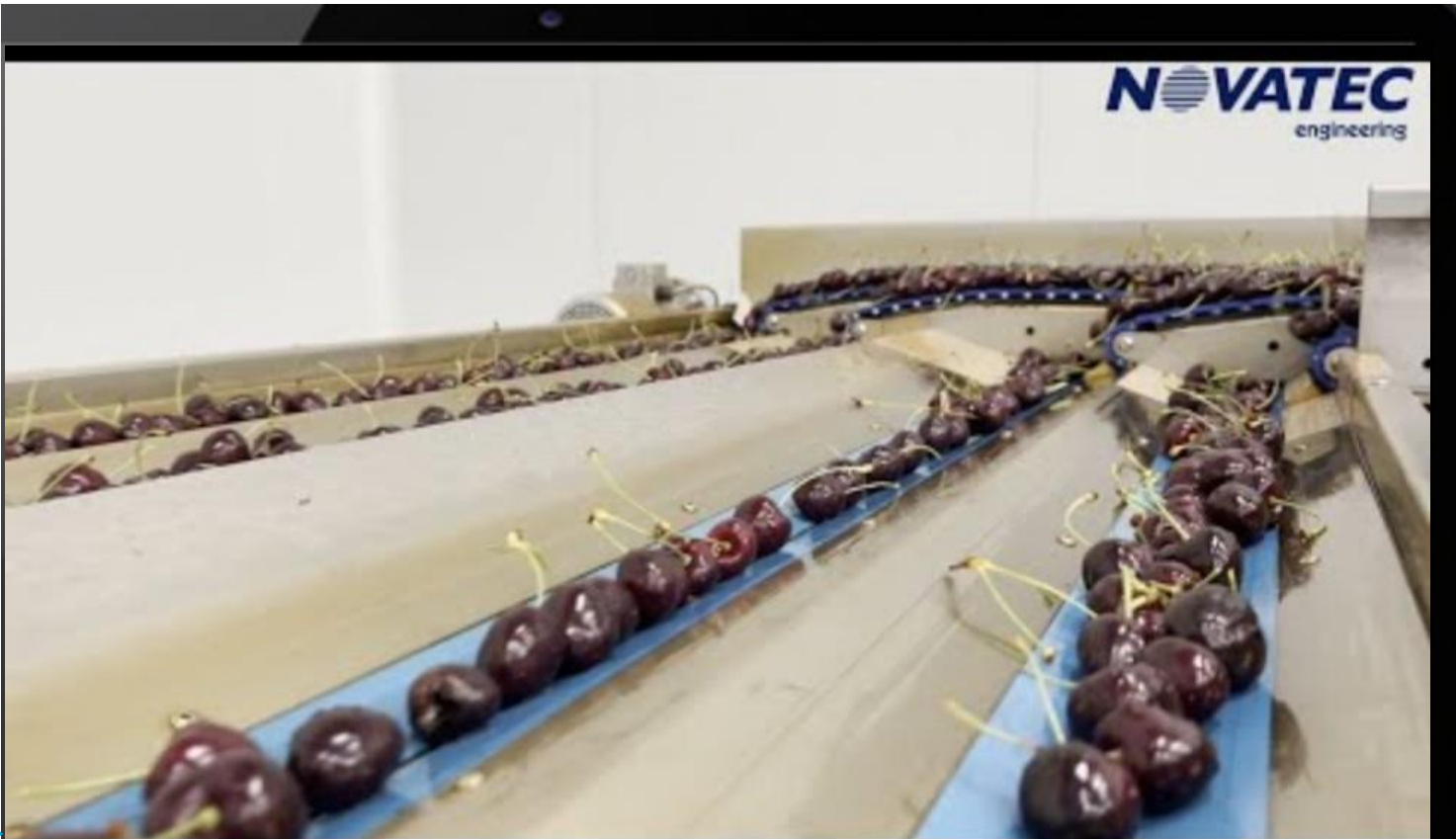
Common Automation Applications



Packaging and Palletizing:
Robotic arms place bottles, cans or food items in containers and stack them on pallets.

<https://www.youtube.com/watch?v=2RwQsi2aPZM>

Common Automation Applications



Sorting and Grading:
Machines with cameras or sensors sort fruits, vegetables, or meat by size, weight, or quality.

https://www.youtube.com/watch?v=W7kv3HRRK_E

Common Automation Applications



Cooking and Mixing:
Automated systems adjust heat and timing to ensure consistent results in baking, boiling, or blending.

https://www.youtube.com/watch?v=_nmVPscwPc

Common Automation Applications



Cleaning and Disinfection:
Robots and programmed machines clean equipment, floors, and working areas to maintain hygiene

<https://www.youtube.com/watch?v=XKOM6xMfFY0>

Common Automation Applications



Quality Control: Vision systems check product appearance, label accuracy, and detect contamination or errors.

<https://www.youtube.com/watch?v=Xyvvnv7kn8A&t=3s>



04

Augmented and Virtual Reality

Virtual reality (VR)

What is VR? The devices and apps that turn the real world virtual.

Definition: the use of computer modeling and simulation that enables a person to interact with an artificial **three dimensional** (3-D) visual or other sensory environment.

Computer-generated environments simulate reality using interactive devices, which send and receive information and are worn as goggles, **headsets**, **gloves**, or **body suits**.



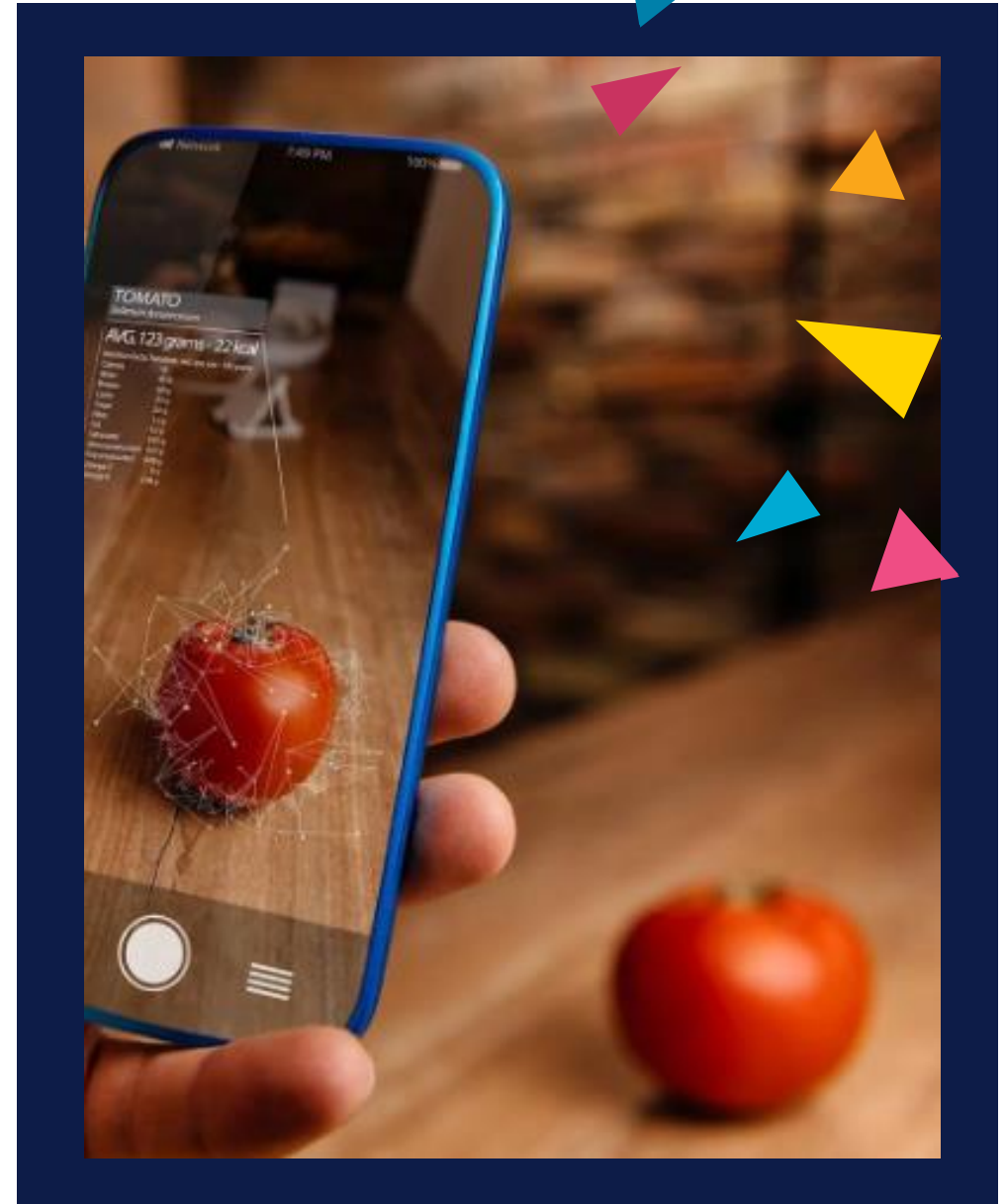
Augmented reality (AR)

Augmented reality is an interactive experience that **combines** the real world and computer-generated content.

The content can span **multiple sensory modalities**, including visual, auditory, haptic, somatosensory and olfactory (sense of smell).

Three basic **features**:

- a combination of real and virtual worlds,
- real-time interaction,
- accurate 3D registration of virtual and real objects.



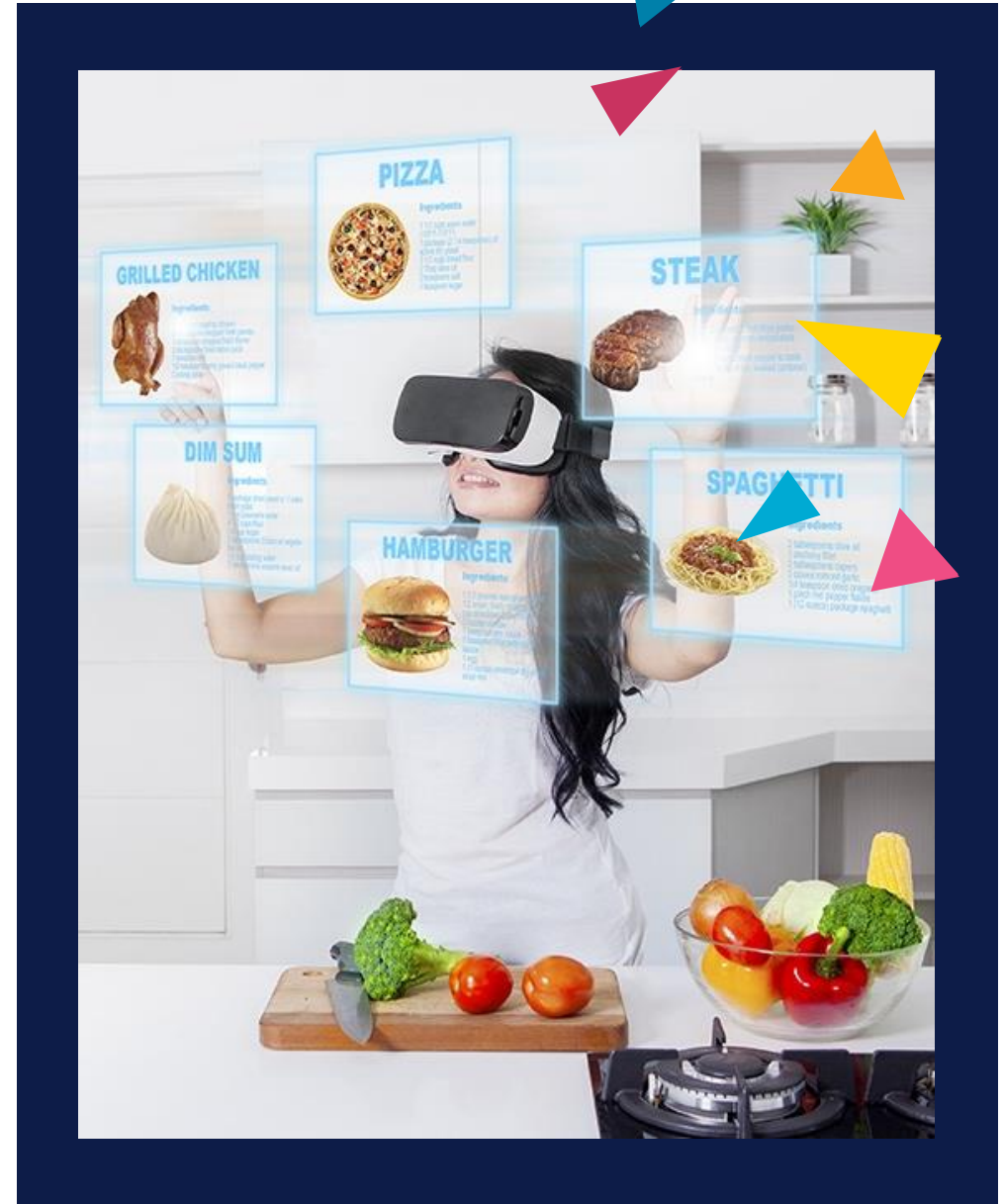
Mixed reality (MR)

Mixed Reality blends the physical and digital worlds, allowing **real and virtual elements to interact in real time**.

Unlike VR, users can see and interact with both their surroundings and digital content at the same time.

AR adds digital content to the real world, while MR merges the real and virtual worlds, allowing them to respond to and affect each other.

→ **Extended reality (XR)** covers the entire range of immersive technologies (VR,AR,MR)



EXTENDED REALITY (XR)



Real Life

Physical
Environment
Around Us



AR

Real-world
environment with
superimposed digital
objects



MR

Real-world
environment with
superimposed
interactive digital
objects



VR

Completely
digital
environment

Applications

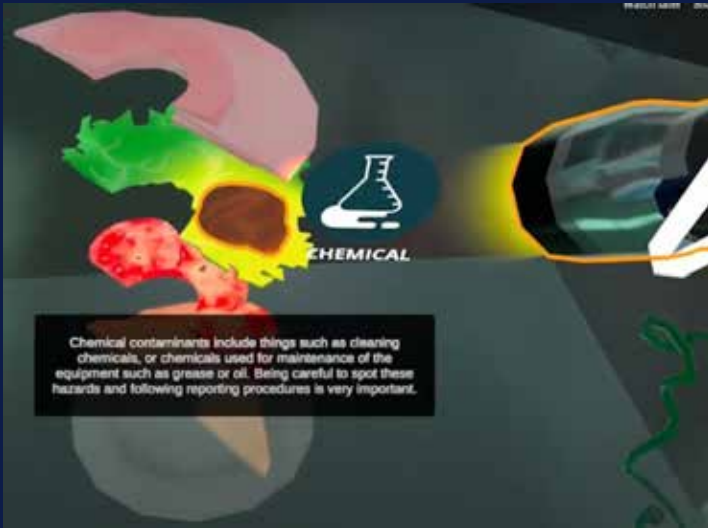
Impact of XR in the industry



<https://www.youtube.com/watch?v=BeGHVbPU-Go>

Applications

Examples of XR in the industry



VR training ¹



XR Food safety ²



Restaurant experience ³

¹<https://www.youtube.com/watch?v=bWqLIKBDalw>, ²<https://www.youtube.com/watch?v=yJVn-fsZvGA> ³<https://www.youtube.com/watch?v=K41bXbzZScI>

05

Challenges and Limitations



Technical and operational challenges

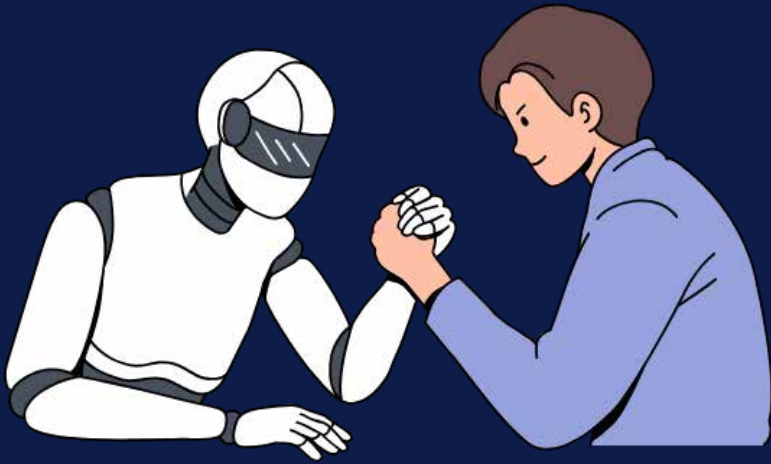
Robotics and automation in the food and beverage industry require strong technical foundations. However, companies often face the following issues:

- High **initial investment costs** for equipment and system integration
- Need for **stable and advanced infrastructure** (electricity, connectivity, space)
- **Complexity** in maintenance and calibration of machines
- **Downtime risks** due to technical failures

These challenges can slow down adoption and require long-term planning and support.



Human barriers



Successful automation depends not only on **technology**, but also on **people**. Human-related challenges include:

- **Resistance** to change
- **Fear** of job loss
- **Lack** of digital and technical skills
- **Lack** of soft skills
- Need to **adapt** team roles

These challenges can limit the impact of new systems.

06

New Jobs and Skills



Technical and operational skills



To operate in environments with robotics and automation, food industry workers need technical and operational skills.

- **Technical skills:** understanding how machines and robots work, using Human-Machine Interfaces (HMI), basic programming, and working with control systems like PLCs.
- **Operational skills:** maintaining hygiene and safety standards, reading sensor data, monitoring systems, and troubleshooting minor errors.

Soft Skills and Continuous Training

Workers must also develop **soft skills**:

- Teamwork
- Adaptability
- Communication
- Time-management



These are equally important for collaborating with others and responding to alerts from automated systems.

Companies should offer ongoing **training and support** the staff, so they can adapt and keep up with the technology:

- Online course
- Practical workshops
- On-the-job learning to help

07

Conclusions



Successful transformation

Robotics and automation are **transforming the food and beverage industry** by improving efficiency, reducing errors, and increasing safety and quality.

These technologies are used in **many sectors** of the production chain, from packaging to quality control.

However, their success depends on the ability of companies and **workers to adapt**. Digital skills, training, and a positive attitude towards innovation are essential.



08 Bibliography

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www.DIGIFABS.eu