



INDUSTRY 4.0

The Fourth Industrial Revolution: The Role of Artificial Intelligence and Co-Bots in Industry 4.0

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4. INDUSTRY

Map

01

Historical Account

The first three Industrial Revolutions and the 20th century.

02

The 4th Industrial Revolution & Industry 4.0

Pillars of the digital transformation and the computerization of manufacturing.

03

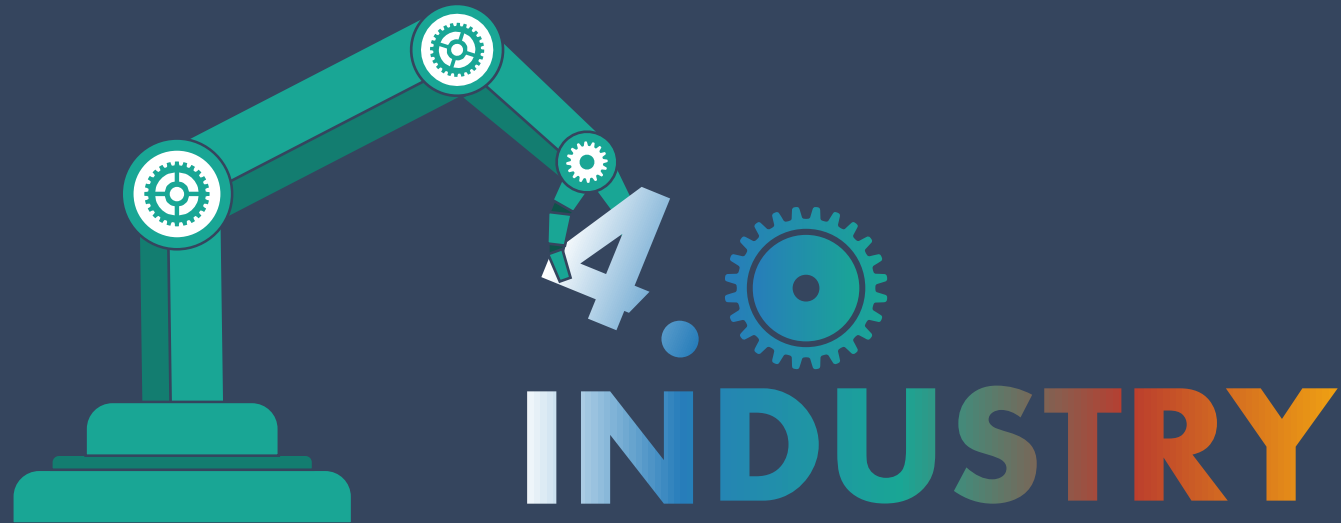
The Role of AI in Industry 4.0

The use of artificial intelligence in Industry 4.0.

04

Collaborative Robots

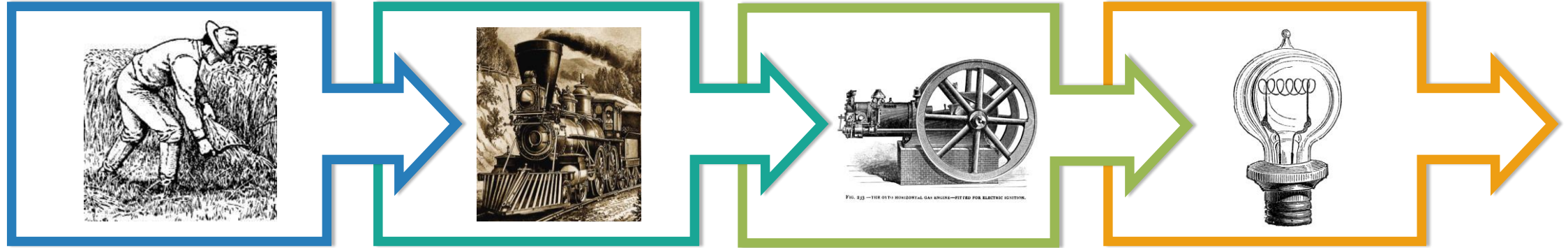
Advantages over conventional robotics and main applications.



Historical Account

The first three Industrial Revolutions

The 1st and 2nd Industrial Revolutions



1st

From an agricultural-based way of living into an Industrial Era.

2nd

The steam engine development.

3rd

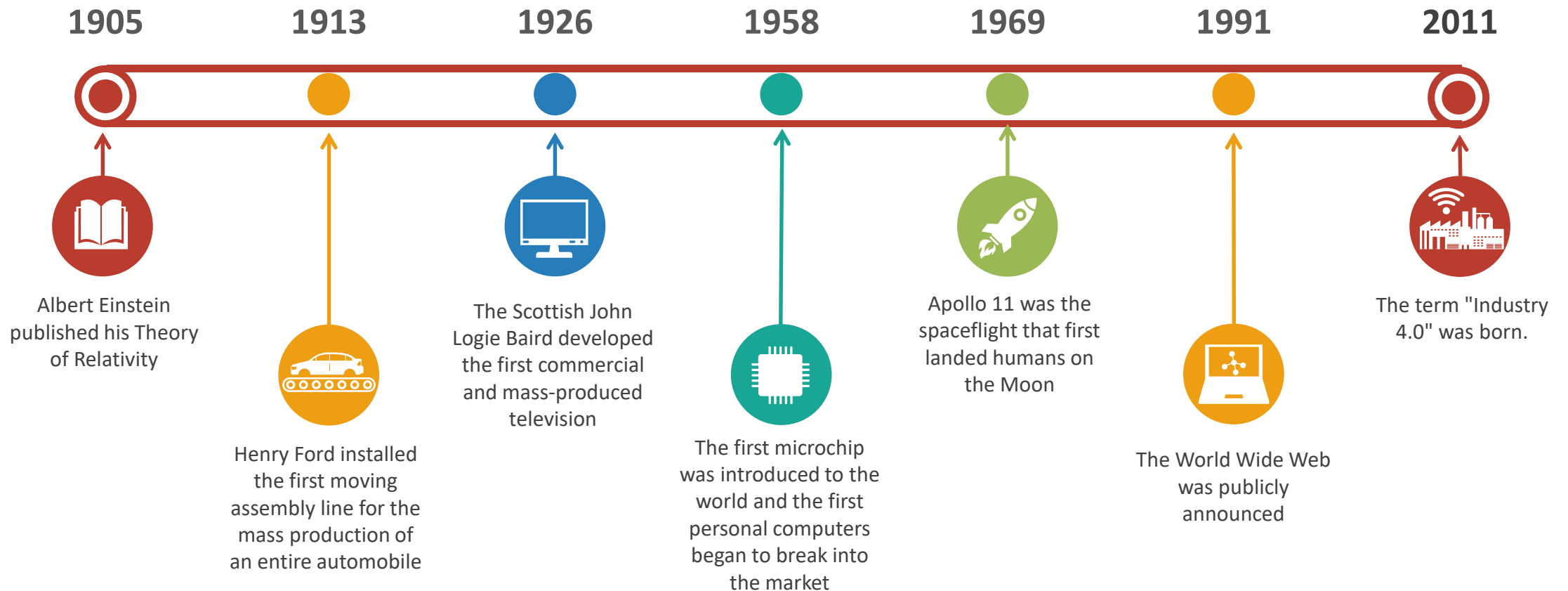
The internal combustion engine appeared.

4th

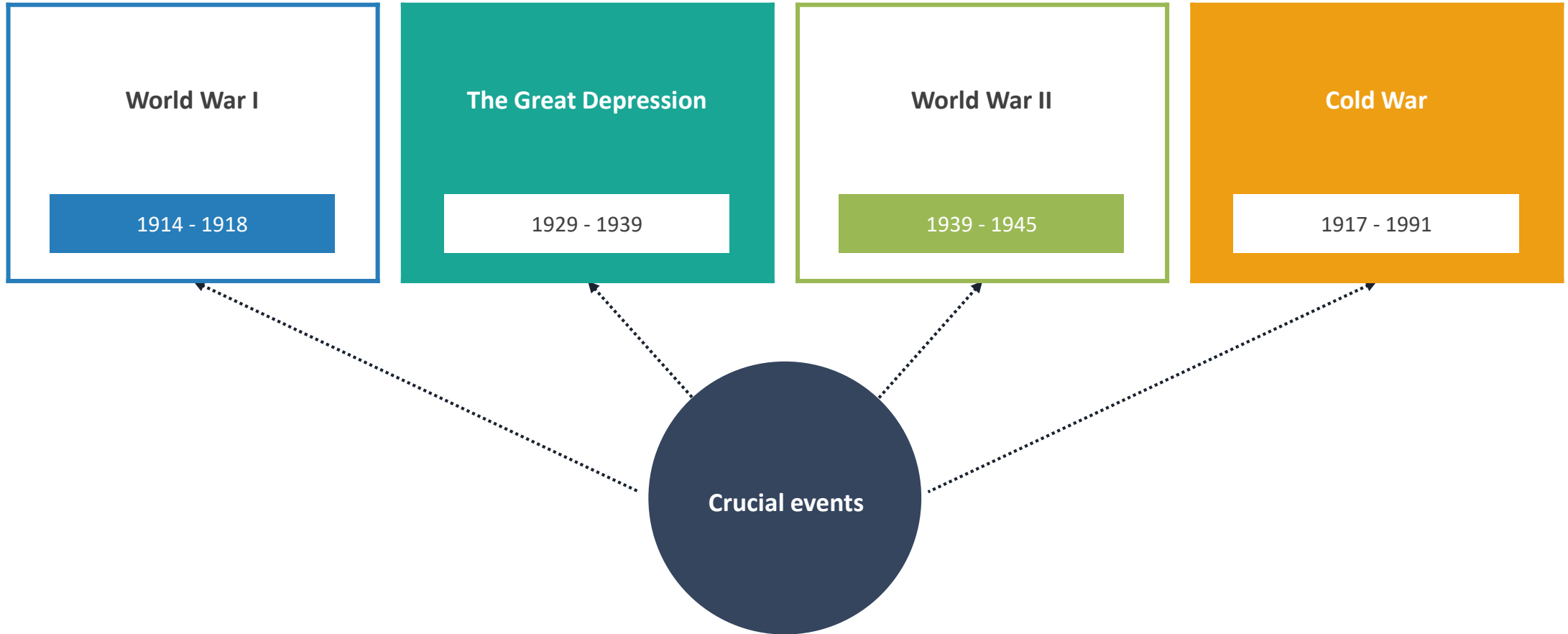
Power plants were developed.
Electromechanics gained great relevance.

The 20th Century and the 3rd Industrial Revolution

Third Industrial Revolution



Dark events in the 20th century



A hinge point into the next Revolution



70s/80s: The price of crude oil increased.



New technology had to be developed:

Resources

New technology should be developed to reduce energy consumption, as well as manpower.

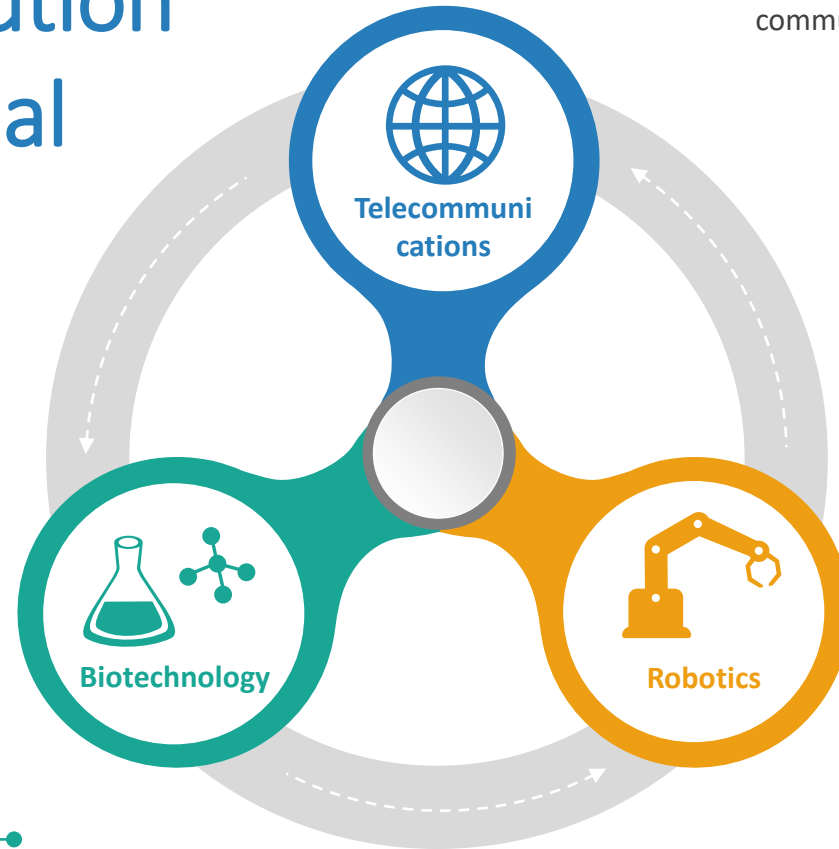
Broad Impact

It should be a technology with a very broad impact on all aspects of individual and collective lives.

Productivity

It should be a technology that uses the least possible amount of raw material, maintaining high productivity.

Transition between the 3rd Industrial Revolution into the 4th Industrial Revolution



Telecommunications

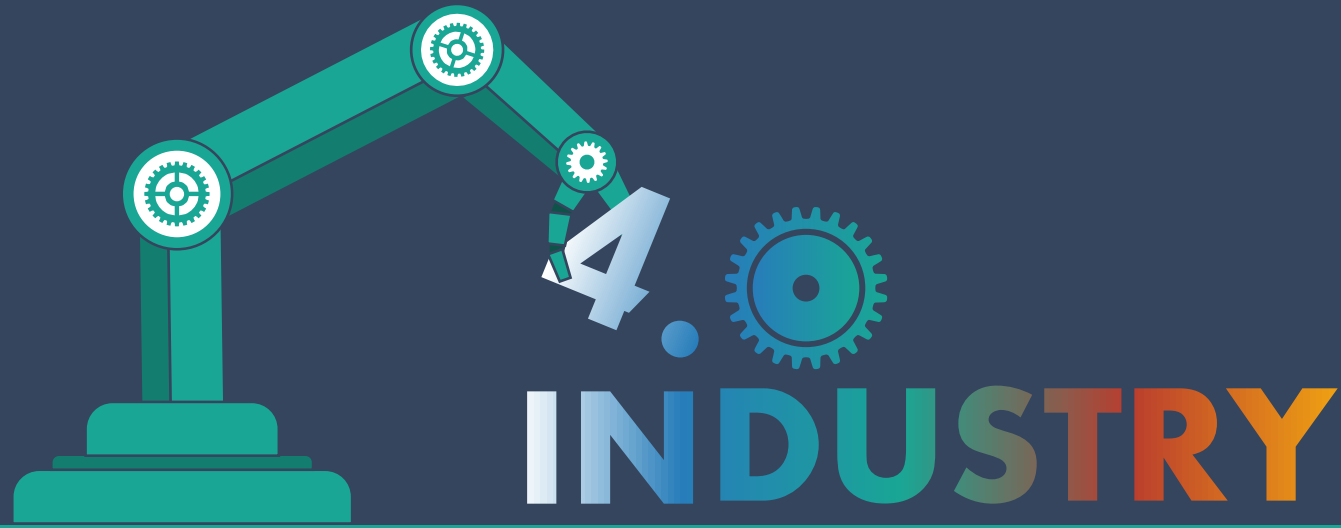
The appearance of the Internet as new way of communication and sales deeply impacted society.

Biology: Bioengineering and Biotechnology

Traditional petroleum-based chemistry replaced with genetic-based biology,

Robotics

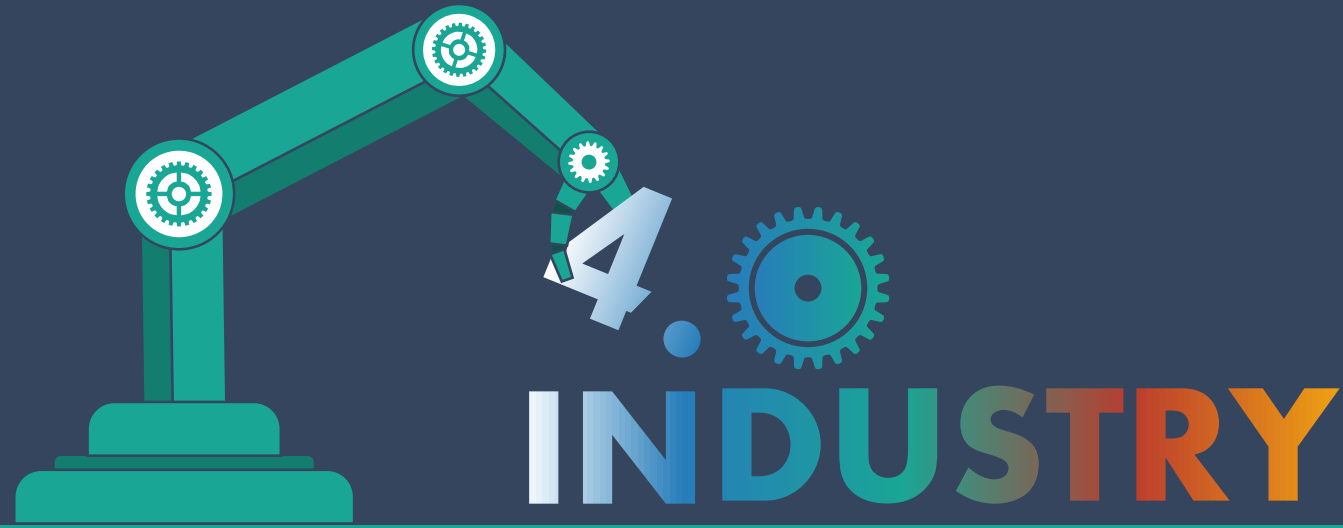
Robots and other machines that started replacing human labor in assembly lines



The 4th Industrial Revolution & Industry 4.0

Pillars of the 4th Industrial Revolution





The Role of AI in Industry 4.0

AI Role in Industry 4.0

OEE optimization



Generative Design



Collaborative Robotics



Quality 4.0

AI applied to robotics

Monitoring



Artificial Vision



Adaptation



Learning

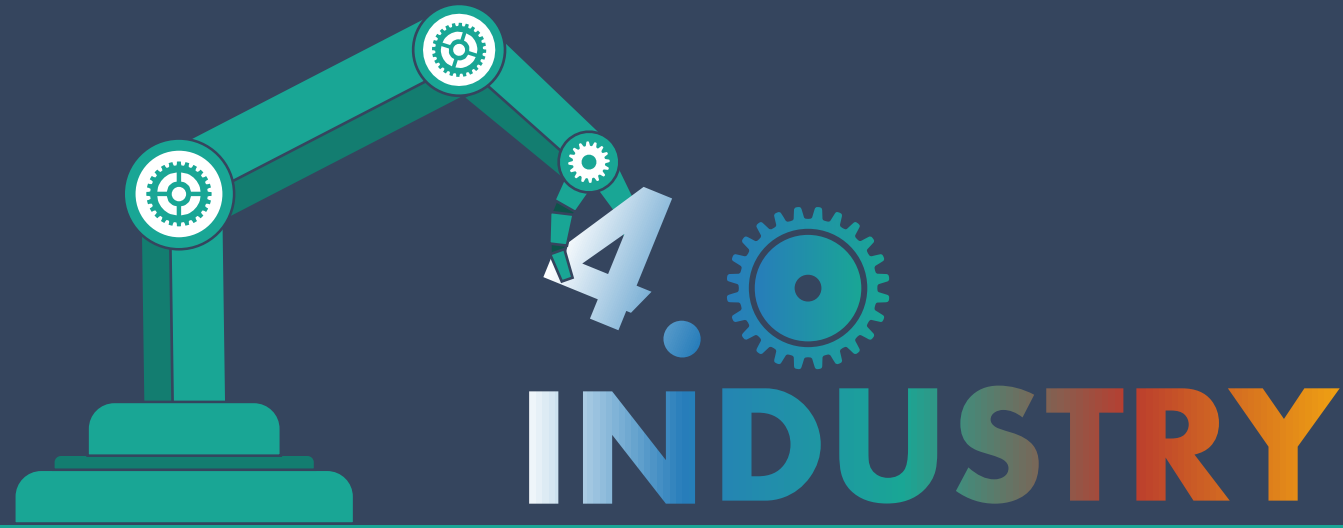


Implementation



Machinery Supervision





Collaborative Robots

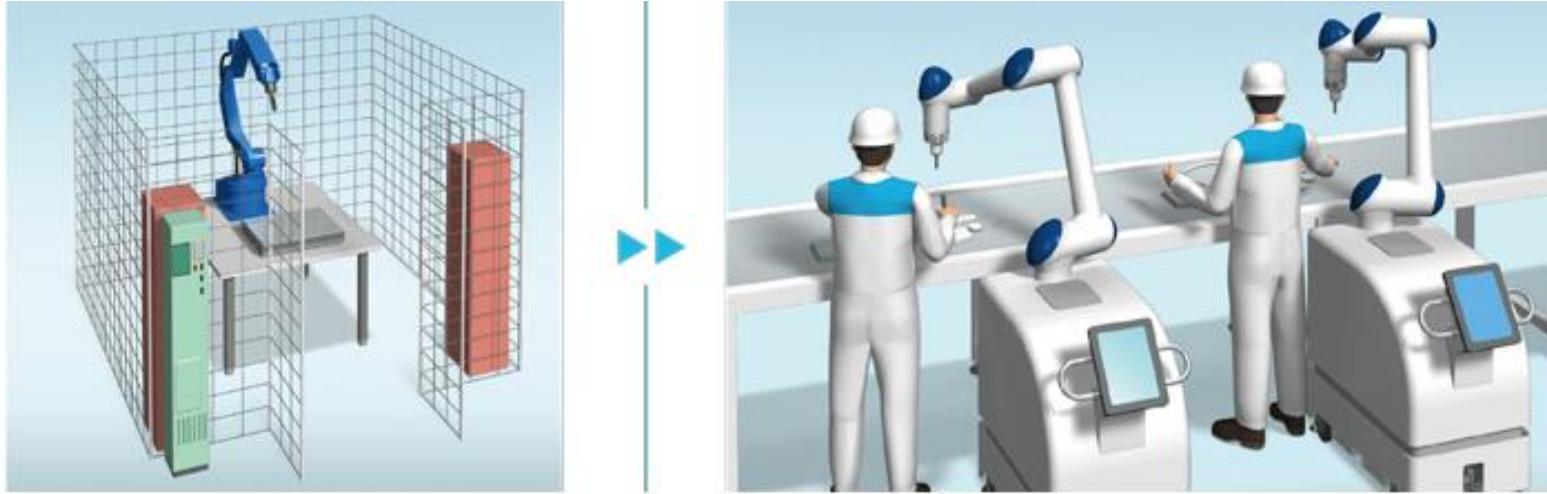
Conventional Industrial Robots



Collaborative Robots



Co-bots vs Industrial Robots



Conventional Robots

Space

Take up a lot of space and often remain in a fixed position.

Versatility

A traditional robot is designed and developed from the beginning considering a single purpose, which can be solved with optimal efficiency.

Costs

Expensive to build, acquire, program, and maintain.

Programming

Previous training is required.

Safety

Since the absence of force sensors (which gives the robot the ability to know its surroundings and allows it to stop automatically in the event of an intrusion into its space), added to its high weight, makes industrial robots potentially dangerous tools.



Collaborative Robots

Space

Co-bots are compact and take up little space. Also, they can be relocated anywhere.

Versatility

A collaborative robotic arm can be built for multiple applications according to production needs. Their easy programming allows the machine to be quickly reprogrammed for a new series of tasks.

Costs

Co-bots are more affordable than conventional robots.

Programming

Their programming and handling are simpler and can be done without the need of going through a previous training period.

Safety

They are lightweight and are equipped with sensors that allow them to stop in case of obstruction or need, ensuring the worker safety and preventing possible injuries.



Consumers are in pursuit of Personalized Products

The return of people to production centers as an indispensable force



Products like individually configured cars, hand-made clothes or even craft beer, require the presence of people to elaborate the product.. In this scenario, collaborative robots perform a crucial role: assist man workforce instead of replacing it.

Customers trends are focused on the acquisition of handmade or artisan products



Advantages of Co-bots in SMEs

Unlike conventional robots, co-bots' role is to assist human workers.



Co-bots are suitable for manufacturers in developing countries or places where labor is scarce

Collaborative robotic arms are accessible to any company, since they are affordable, versatile, and easy to integrate without the need of major renovations





Conclusion

and future work

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Thank You

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