



Evolution of Industry from 1.0 Towards 6.0 and Beyond

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Introduction



What is Industrialization?

- ❖ According to wikipedia

Industrialisation is the period of social and economic change that transforms a human group from an **agrarian society** into an **industrial society**, involving the extensive re-organisation of an economy for the purpose of manufacturing.



Why industrialization occurred?

- ❖ **Agricultural Revolution** of the 18th century created a favorable climate for industrialization.
- ❖ **Surplus of food** meant that British families could use the money they saved to purchase manufactured goods.
- ❖ The **population increase**.
- ❖ Availability of **financial institutions**.
- ❖ Easy **access to the market** due to colonization.



What are the impact of industrialization

- ❖ PROs
 - Goods Became More Affordable and More Accessible
 - The Rapid Evolution of Labor-Saving Inventions.
 - The Rapid Evolution of Medicine
 - Enhanced Wealth and Quality of Life of the Average Person

- ❖ CONs
 - Overcrowding of Cities and Industrial Towns
 - Environmental Pollution.
 - Poor Working Conditions.
 - The Rise in Unhealthy Habits.



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- Past
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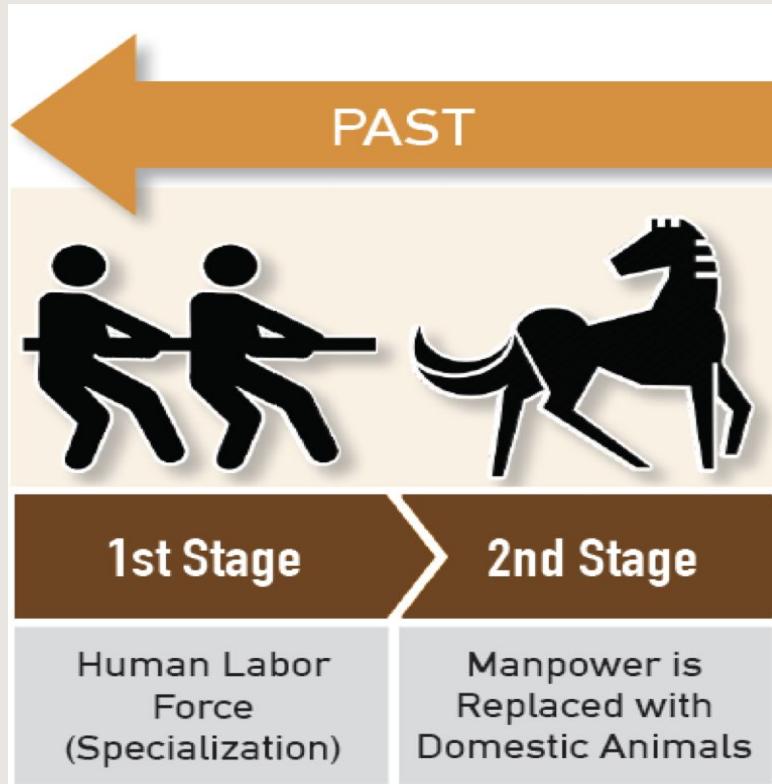
- Industry 1.0 -2.0
- Industry 3.0-6.0
- Industry 7.0-8.0



At The Beginning



First stages of Industrialization(Industry 1.0 -2.0)

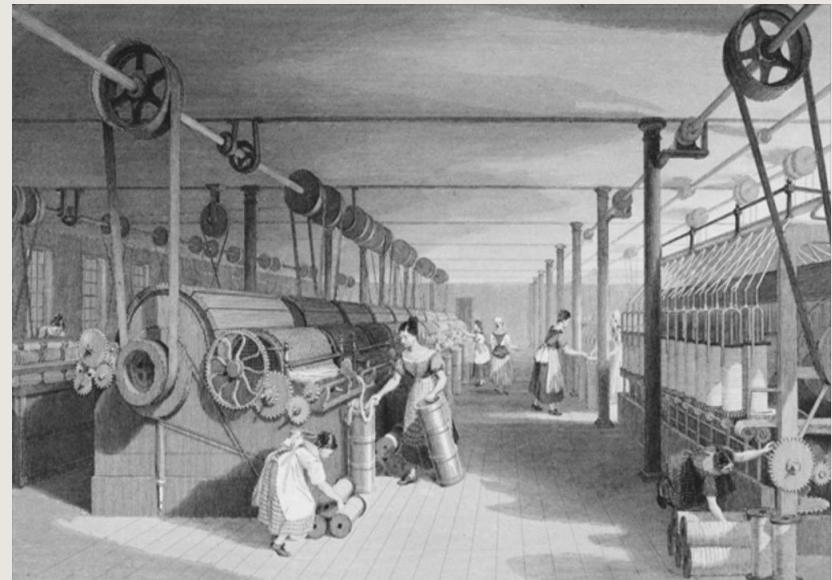


- Human labour began to specialize to increase the efficiency.
- Manual labour got replaced by the domestic animals and mechanical instruments.



The first industrial revolution(Industry 1.0) ~ 1765 AC

- ❖ Also known as the First Industrial Revolution, was the **transition to new manufacturing processes** in Europe and the United States, in the period from about 1760 to sometime between 1820 and 1840.



The first industrial revolution(Industry 1.0) ~ 1765 AC

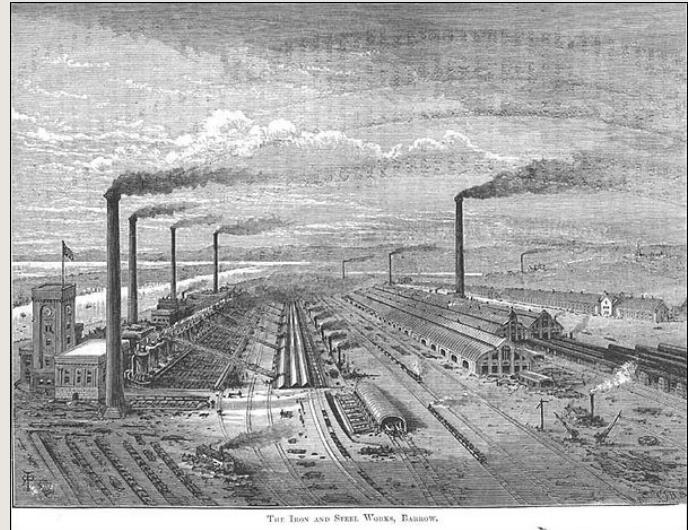
- ❖ It followed the **proto-industrialization** period.
- ❖ Emergence of **mechanization** for the manufacturing industries like Agriculture,Textile,Chemical, Iron and Mining.
- ❖ Use of **energy sources** like coal, wind and Hydro.
- ❖ People migrate to cities for jobs(**Urbanization**)
- ❖ Poor living standards in the city and factories.



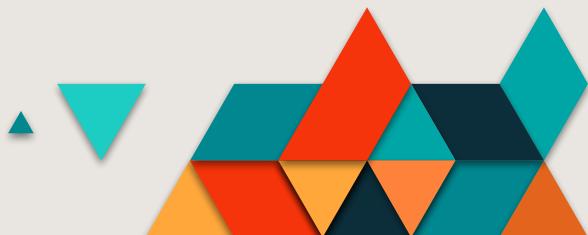
The second industrial revolution(Industry 2.0) ~1870

It was a phase of **rapid standardization** and **industrialization** from the late 19th century into the early 20th century.

It is characterized by the build out of railroads, large-scale iron and steel production and widespread use of machinery in manufacturing, widespread use of the telegraph, use of petroleum and the **beginning of electrification**.

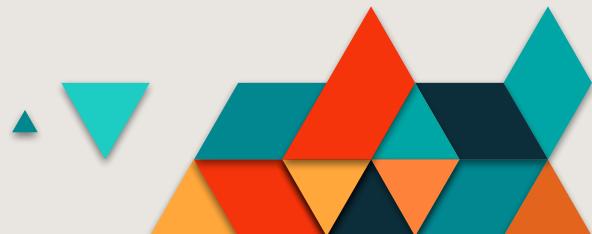
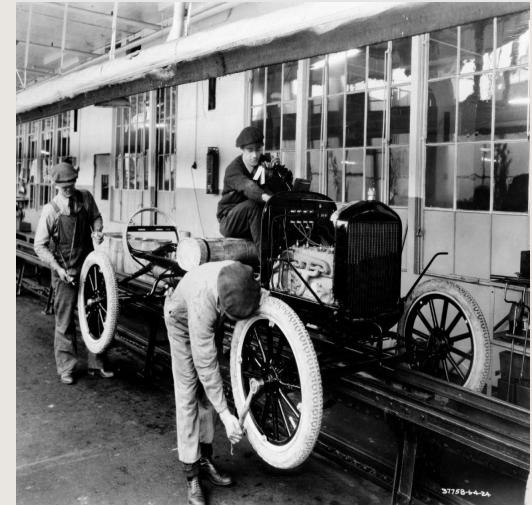


THE IRON AND STEEL WORKS, BARROW.



The second industrial revolution(Industry 2.0) ~1870

- ❖ Technological advancement in field like Iron and Steel manufacturing, Petroleum refining and Automobile industry.
- ❖ Harnessing of Electric power from AC DC technologies.
- ❖ Mass production by the **assembly line** production.
- ❖ Advancements in chemical industry (Synthetic chemicals)
- ❖ Rapid growth of Telecommunication leading to **Globalization**.

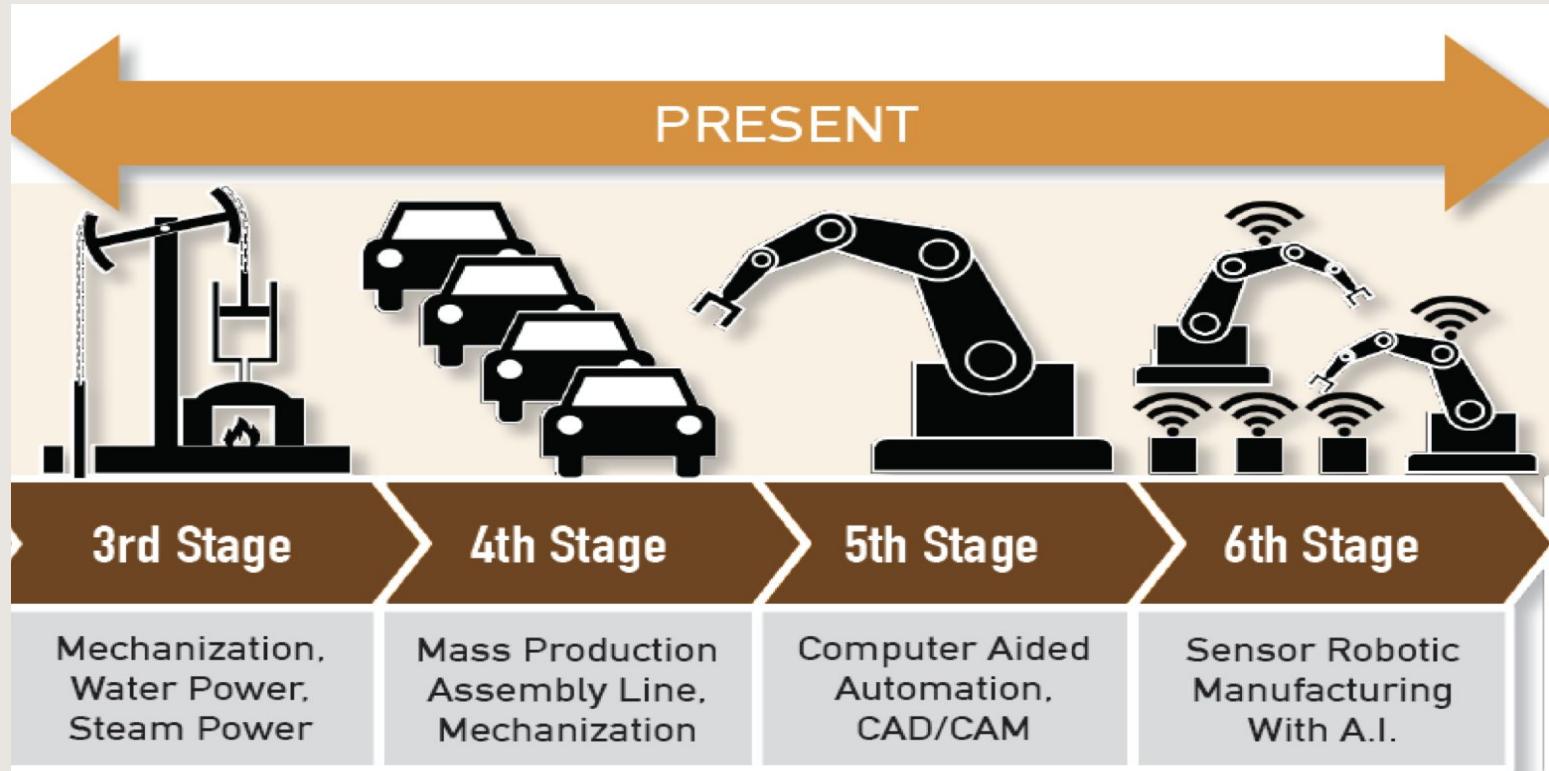




At The Present



Present stages of Industrialization(Industry 3.0 -6.0)



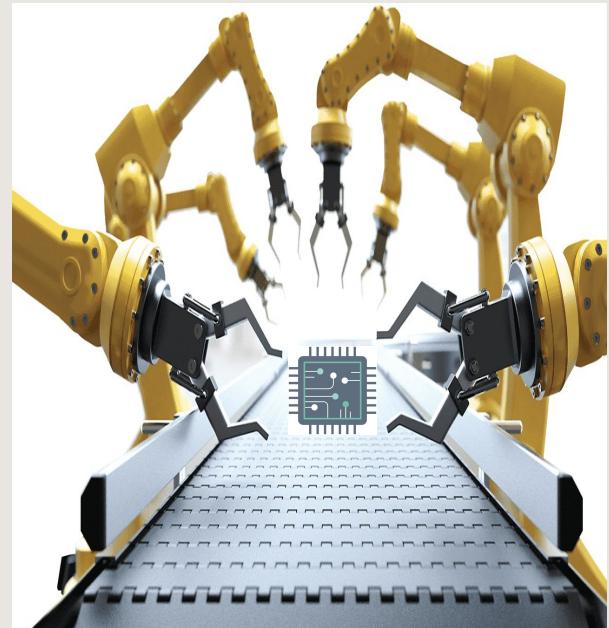
The third industrial revolution(Industry 3.0) ~1969

- ❖ The third revolution brought forth the rise of **electronics, telecommunications** and of course **computers**.
- ❖ Through the new technologies, the third industrial revolution opened the doors to space expeditions, research, and **biotechnology**.
- ❖ Third industrial revolution appeared with the emergence of a new type of energy whose potential surpassed its predecessors(**nuclear energy**)



The third industrial revolution(Industry 3.0) ~1969

- ❖ Two major inventions,
 - Programmable Logic Controllers (PLCs)
 - Robotshelped give rise to an era of **high-level automation**
- ❖ Rise of electronics with the emergence of **Transistor**.
- ❖ Rise of telecommunications and computers with the emergence of **microprocessor**.
- ❖ Advancements in the space research and biotechnology.



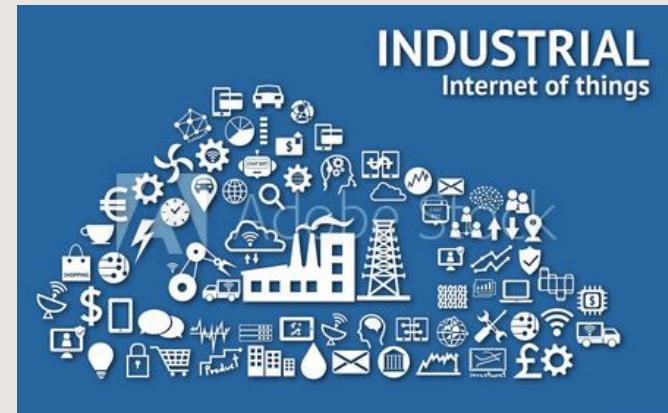
The fourth industrial revolution(Industry 4.0) ~2000

- ❖ This is the era of **smart machines**, storage systems and production facilities.
- ❖ These can **autonomously** exchange information, trigger actions and control each other without human intervention.
- ❖ It started in the dawn of the third millennium with the one thing that everyone uses every single day. The **Internet**.
- ❖ Emergence of **Embedded systems** .



The fourth industrial revolution(Industry 4.0) ~2000

- ❖ **Cyber-physical systems** — A mechanical device that is run by computer-based algorithms.
- ❖ **Internet of things (IoT)** — interconnected networks of machine devices and vehicles embedded with computerized sensing, scanning and monitoring capabilities.
- ❖ **Cloud computing** — Offsite network hosting and data backup.
- ❖ **Cognitive computing** — technological platforms that employ artificial intelligence and signal processing..



The fifth industrial revolution(Industry 5.0)

- ❖ Man and machine reconcile and find ways to work together to **improve the efficiency** of production.
- ❖ Giving the freedom of design responsibility back to the human.
- ❖ It started with the unprecedented advances in **artificial intelligence (AI)** and **machine learning (ML)**.
- ❖ **Service personalization.**



The fifth industrial revolution(Industry 5.0)

- ❖ Emergence of autonomous vehicles and self-driving cars.
- ❖ Mainstream **3D printing** technology
- ❖ Use of Virtual and Augmented reality technologies.
- ❖ Advancements in Nanotechnology and Biotechnology.
- ❖ **Quantum computing** blurring the traditional boundaries.



The sixth industrial revolution(Industry 6.0)

- ❖ AI becoming sophisticated at many general tasks.
- ❖ Use of AI for better robotic manufacturing processes .
- ❖ **Sustainable Energy** and **manufacturing** processes.
- ❖ Machines that are able to do creative tasks.
- ❖ Computer aided manufacturing able to produce quality that is beyond what human can achieve.



The sixth industrial revolution(Industry 6.0)

- ❖ Fully autonomous vehicles.
- ❖ Privatization of Space sector.(spacex)
- ❖ Global internet through satellite constellations.(starlink)
- ❖ Interplanetary colonization.

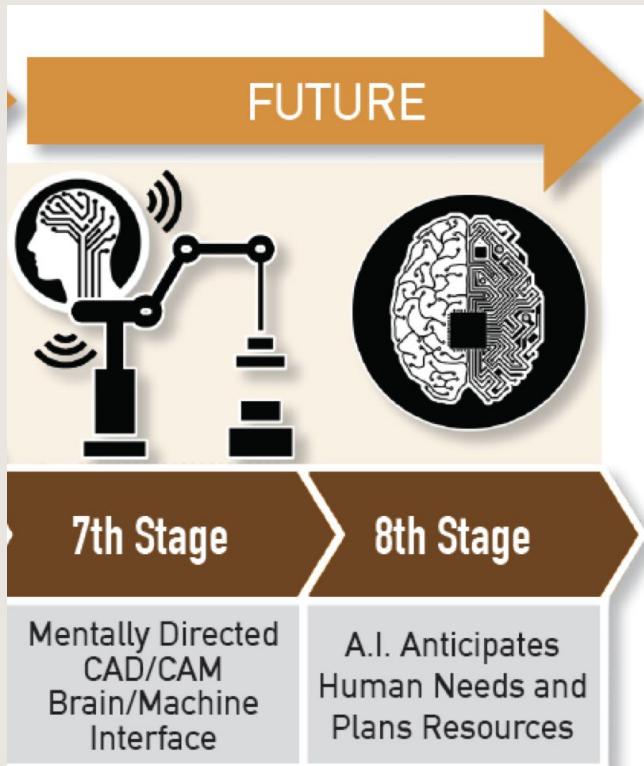




Future of Industry

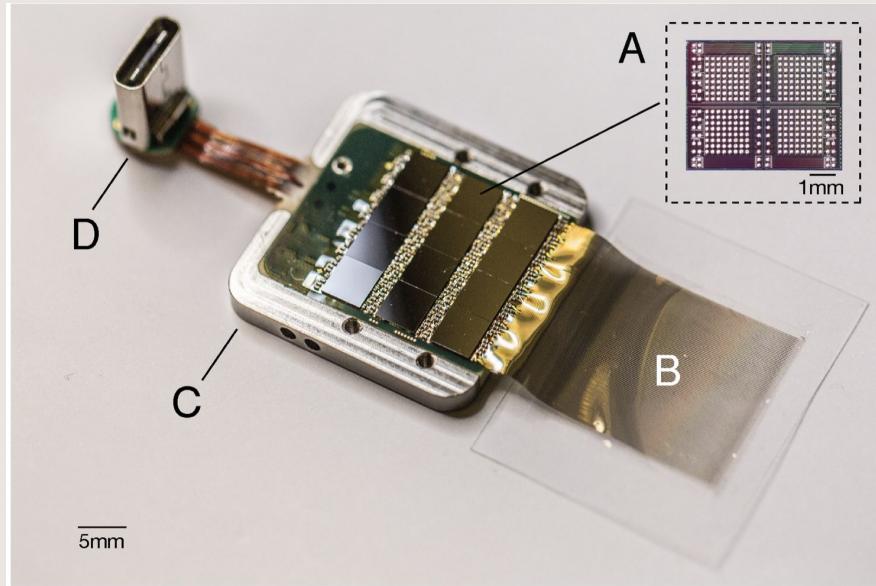


Future stages of Industrialization



- ❖ Brain and Machine can interface with each other using neural interfaces.
- ❖ Management and resource planning tasks are handled by the superior AI systems.

Human machine interfacing(neural link in action)



References

Google Suprimacy

[<https://ai.googleblog.com/2019/10/quantum-supremacy-using-programmable.html>]

Autonomous cars

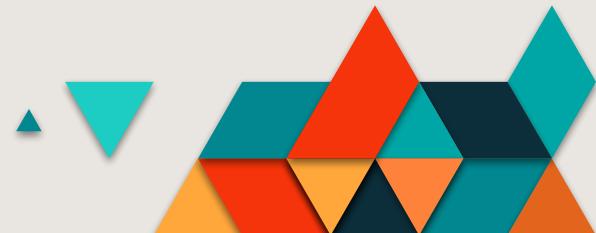
[<https://interestingengineering.com/how-do-self-driving-cars-work>]

Global internet(starlink launch by spacex)

[<https://www.youtube.com/watch?v=HwyXo6T7jC4>]

Neural link white paper on human machine interfacing

[<https://www.biorxiv.org/content/10.1101/703801v2>]



THANKS!

