



Industrial Revolution 4.0 - Past, Present & Future



Ang Wan Xin, Henry Meshack Okinyi Odongo, Nur Dinie Sajeeda Binti Azman, students of Computer Science (Graphics and Multimedia Software), University Teknologi Malaysia

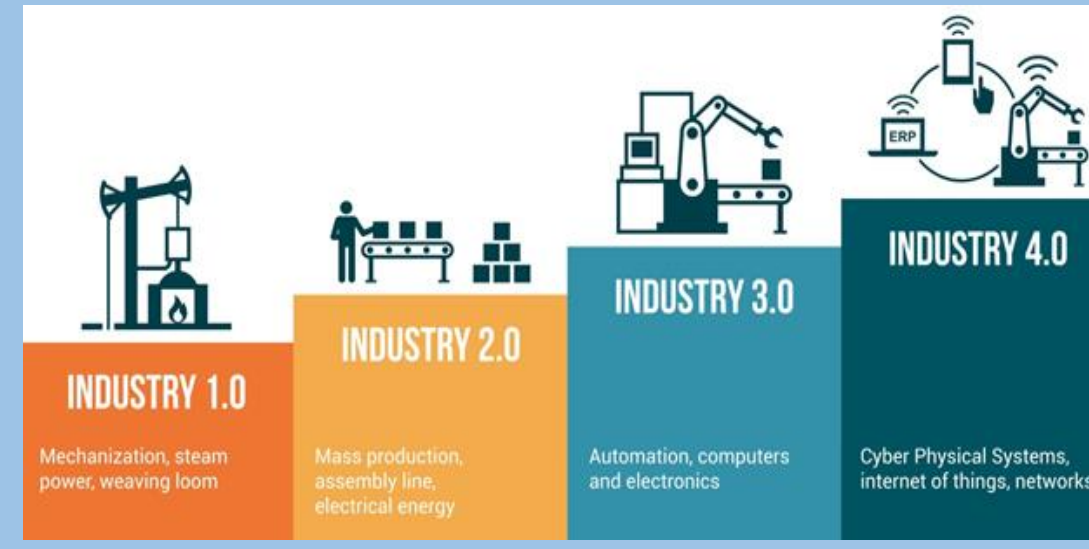
Summary

The talk provide us knowledge about the development of technology from first industrial revolution until now, and the speaker also explained some of the examples of 4IR technology. In the talk, it was mentioned the trend of internet usage by including the information that they collect during the pandemic and before the pandemic. There was a higher usage of the internet and therefore more reliance on the internet for education, jobs, entertainment and ordering items via the internet.

Introduction

INDUSTRIAL REVOLUTION (1IR-4IR)

The changes between each industrial revolution to new manufacturing processes. This changes included going from process of manufacturing by hand to machines. Technological, socioeconomic, and cultural were some of the aspect that involve in industrial revolution. The technology changes involve the usage of new energy sources like steam engine, coal, petroleum and other sources. Usage of new basic materials, invention of machines that reduces manual mankind work, new organization of work known as factory system and more. These technological changes have enabled the enormous use of natural resources and the mass production of manufactured goods.



<https://whyvideo.blog/tag/industrial-revolution/>

Pathway of Industrial Revolution

1st Industrial Revolution - Era of Industry 1.0

- ✓ The First Industrial Revolution began in the 18th century through the use of steam power and water for mechanical power and mechanization of production.
- ✓ The use of mechanism for industrial purposes was the greatest revolution in history for increasing workforce productivity.

2nd Industrial Revolution – era of industry 2.0

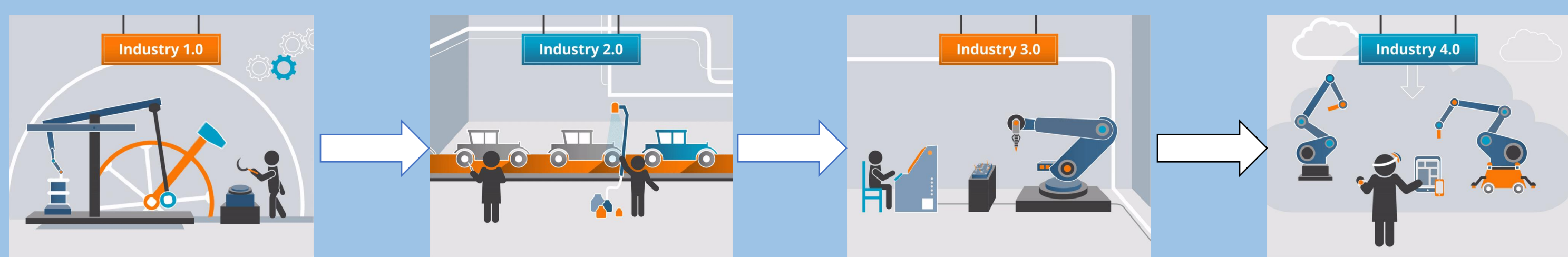
- ✓ The Second Industrial Revolution, which started in the middle of 19th century between 1850 until 1970. It was the time when pre-existing industry growing and expand of new ones.
- ✓ New innovations in steel production, petroleum and electricity that brings to development of technologies which is plane and public transport that give impact to the world.
- ✓ In this second industrial revolution, the current manufacturing and production method also improved.
- ✓ For example, this era brings the innovation of electricity by Thomas Edison, and invention of telephone by Alexander Graham Bell and there were more inventions that impact the world.
- ✓ The second IR also changed the way that goods are produced and gave birth to mass production, by the division of labor and the increasing prevalence of machines in factories. Humanization were improved as a result of mass production and the existence of factory

3rd Industrial Revolution - Era of Computing

- ✓ The Third Industrial Revolution began in the 20th century using memory-programmable controls and computers, but people must be alert and ready to take over the system anytime.
- ✓ This third revolution brought the rise of electronics, telecommunications and computers for example digital Revolution like Apple machine/computer, iPhones and Macintosh by Steve jobs. This technology invention give so much helped for space expedition, research and biotechnology.
- ✓ This revolution also brings two major invention which is PLC microcontroller and robots that allow us to bring the era of high leveled automation where this invention give advantages for improves the economic state.

4th Industrial Revolution - Era of Industry 4.0

- ✓ This is the era or birth of artificial intelligence mechanism from expanding the 3rd industrial revolution by the invention of network connection and contain digital twin on the internet.
- ✓ In 4th industrial revolution, new technologies such as artificial intelligence cloud computing, robotics, 3D printing, the Internet of Things, and advanced wireless technologies start take place in civilization and this technology will probably make the industry work fully autonomous.
- ✓ Era of industry 4.0 is the application of information and technology system in industry where production systems, components and people communicate via a network and production is nearly autonomous. This also called smart factory where the networking of all systems leads to cyber-physical production systems.



<http://heliconia.io/industry-4-0/>

Components of Industrial 4.0

1. Autonomous Robots

Intelligent machines that perform tasks in the world by themselves without explicit human control. They reduce errors, improve cycle times, increase customer loyalty, drive sales growth, sense their environment via technologies such as laser scanners, cameras, microphones, spectrometers. Used in space flight, household maintenance, delivery of goods and other services.

2. Simulation

Is used in training people how to use certain computer software especially how to act in a real-life scenario by putting them in a computer-generated training environment that replicates a live system or a real-life situation. Simulation is utilized for safety engineering, performance tuning and optimization, testing, training, education and video games.

3. System Integration

Is the process of combining different sub-systems (components) into one larger system. It is typically defined as the process of linking together various IT systems, services, technological devices as well as software to enable all of them to work functionally together.

4. Industrial Internet of Things (IIoT)

Deals with everything connected to the internet and that communicate with each other via the internet. It combines the power of the internet, data processing and analytics and brings them to the real world of physical objects allowing even home appliances like the refrigerator to be fully operated using the internet. Examples include Google homes, Siri, smart devices, electrical appliances, smart watch, smart speakers, etc.

5. Cybersecurity

Is concerned with the protection of systems connected to the internet such as hardware, software and data from cyber-threats. It is utilized by individuals and businesses to protect against unauthorized access to data centers and other computerized systems. The different layers of cybersecurity include: Application layer = cloud/server, Network layer = routers, gateways, Perception layer = sensors, actuators.

6. Cloud Computing

It delivers computer services that are on-demand computing services -- from applications to storage and processing power -- typically over the internet and on a pay-as-you-go basis. It offers better stability, flexibility and computing power. Examples include mobile, applications, database, hybrid cloud, Public cloud, private cloud, server, storage. Examples: Huawei Cloud, Google Drive, Google Cloud, Dropbox, iCloud.

7. Additive Manufacturing

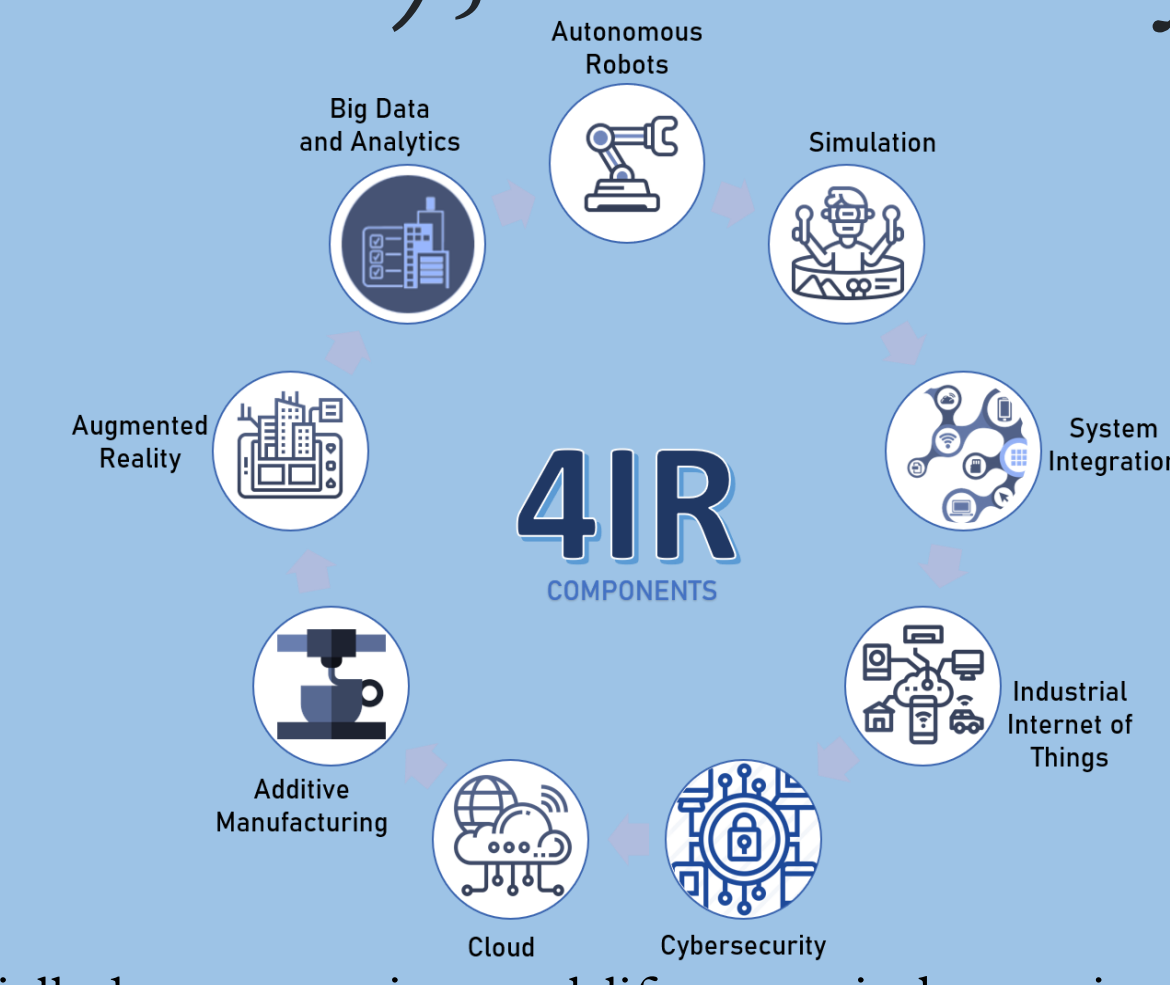
Is the industrial production of 3D printing, which is a computer-controlled process that creates three dimensional objects by adding materials in layers. It is also known as additive layer manufacturing (ALM). It operates with 3D object scanners alongside computer-aided-design (CAD) software to direct hardware to place material, layer upon layer, in precise geometric shapes.

8. Augmented Reality (AR)

Augmented reality connects digital data with information from the physical world (usually relying on camera, GPS and internet connection). This makes it seems as if you're present with the digital information in your own space (bedroom, kitchen, garage, etc.). Example of the use of AR: 'Pokémon Go' (an AR-based gaming application that allows you to navigate the real world in order to find the fictional creatures).

9. Big Data and Analytics {Big data->Analytics->Decisions}

A large number of unstructured data put together in big data analytic engines in order to make something that can have an insight report which is then beneficial for the process. Example: smart traffic light gathers information of vehicle from sensors (record type, plates, etc.). In terms of decision, a report comes out such as the number of vehicles passing thru, type of car, fines, etc.



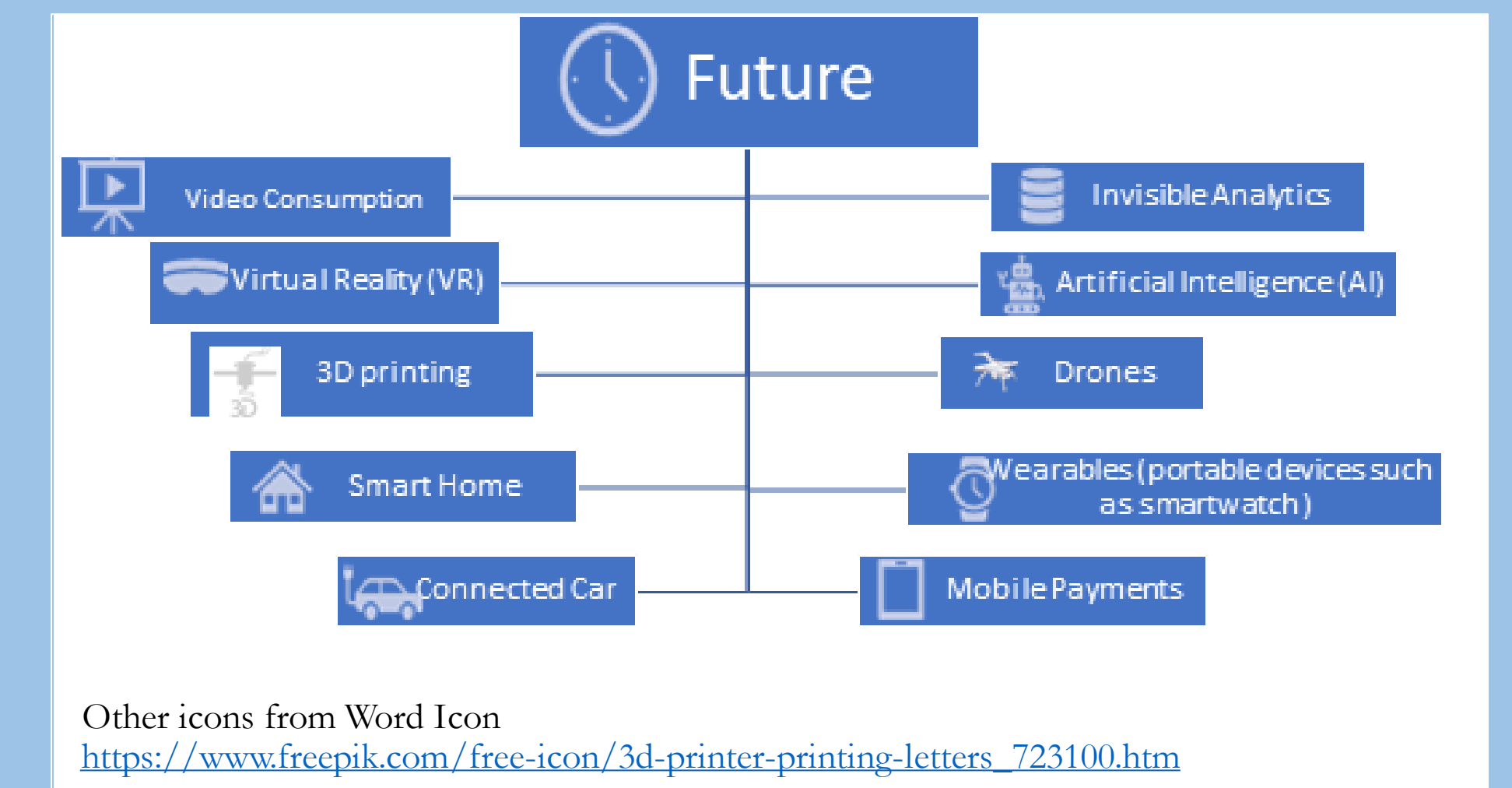
Education 4.0

- Nowadays, we are still struggling and adopting into IR 3.0 and just starting using IT and computers to teach. But some of the countries have started using IR 4.0 in education.
- Education 4.0 uses technology-based tools and resources like learning management software that brings education in non-traditional ways to keep pace with the world. It ensures that the new generations can follow the steps of the world in order to adapt themselves.
- Education 4.0 also ensures that the teaching skills is more towards working environment using technologies. Thus, it is more realistic and practical approach the learning that leads better students' learning outcomes.
- Personalized learning through Education 4.0 in the researches shows that students can have faster understanding, more interests and they can have more specialization and better recall.
- As we can see that education 4.0 leads to better learning outcomes for students in terms of their real academic or professional interests.

Future of works: Jobs of tomorrow

Past	Present	Future
Computer operator	Blogger	3D printing technicians
Film projectionist	Cloud service specialist	Computer vision engineer
Ice cutter	Mobile app designer	Ethical hacker
Lamp lighter	Zumba teacher	Urban agriculturist
Typist	Biomass plant technician	Electronic textile designer

- ❖ Over the years, there are many technology companies focus and develop on 4IR technology.
- ❖ This gives chance on opening new job opportunity in this course area.



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Reflection

The talk made us realize the importance of the internet in our daily lives today. Almost all our tasks rely on the internet. In the talk it was mentioned that during the pandemic there was a higher usage of the internet and therefore more reliance on the internet for education, jobs, entertainment and ordering items via the internet. Innovations of technology really help us in our daily life. The motivation that we gain from this industrial talk is we should be more hardworking as we are the new generation in the future to guide the world.

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Commerce 4.0

- ❖ In the past, people went to the physical store to buy things.
- ❖ But nowadays, new generations more preferred to e-commerce.
- ❖ We buy things via online store like Lazada, Shopee, Amazon and etc. which gives full of convenience to us as the thing's straight delivery to our house.
- ❖ Applications have also been developed in order to catch up with times such as Google, Amazon, Foodpanda, Uber, Grab and others. For example, Foodpanda, we can order our food without going to the restaurant and just at home wait them delivery to our house. It brings much advantages to us as it is easier for us when we are busy.
- ❖ For transportation, electric car is also one of the developments in commerce 4.0. The car is connected to the cloud and it use electrical energy that stored in rechargeable batteries which can last more than 300 miles. We can enjoy our time in the car as the car is fully autonomous by setting the destination. Compare to internal combustion engine car, electric car is more environment friendly as it has lower combustion.
- ❖ Smart homes also have been fully developed in these few years. It can be controlled remotely or inside as it is connected to the internet. We can just control the electrical appliances with just one touch and monitor kids when connected to internet. For certain scenarios, like break in, light and alarm can be triggered automatically and we can protect our belongings.
- ❖ As we can see that revolution in commerce brings much benefits and transformations to our life.



<https://www.x-cart.com/e-commerce-101.html>