



Introduction to Emerging Technologies



Chapter 1: Introduction to Emerging Technologies

- some of the points to be addressed under these chapters are:
 - Evolution of Technologies
 - Role of Data for Emerging Technologies
 - Enabling devices and network (Programmable devices)
 - Human to Machine Interaction
 - Future Trends in Emerging Technologies

Brainstorming

I. Define emerging technologies in your own?

Emerging technology:- is a term generally used to describe a new technology.

- ✓ It may also refer to the continuing development of existing technology however it can be have slightly different meanings when used in different areas, such as media, business, science, or education.
- ✓ Commonly it refers to technologies that are currently developing, or that are expected to be available within the next five to ten years.

- What is the root word of technology and evolution?
- **Technology:** 1610s, "discourse or treatise on an art or the arts," from Greek tekhnologia "systematic treatment of an art, craft, or technique," originally referring to grammar, from tekhno- (see techno-) + -logy.
- The meaning "science of the mechanical and industrial arts" is first recorded in 1859.
- **Evolution:** evolution means the process of developing by gradual changes. from Latin evolutio, "an unrolling or opening," combined from the prefix e-, "out," plus volvere, "to roll."

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- ✓ Artificial Intelligence
- ✓ Blockchain
- ✓ Augmented Reality and Virtual Reality
- ✓ Cloud Computing
- ✓ Angular and React
- ✓ DevOps
- ✓ Internet of Things (IoT)
- ✓ Intelligent Apps (I-Apps)
- ✓ 3D printing
- ✓ Nanotechnology
- ✓ Drones
- ✓ 5G.
- ✓ Biometrics
- ✓ Big Data
- ✓ Robotic Processor Automation (RPA)

Industrial Revolution (IR)

- It was a period of major industrialization and innovation that took place during the late 1700s and early 1800s.
- **Industrial** – Having to do with industry, business or manufacturing
- **Revolution** – a huge change or a change in the way things are done
- **Industrial Revolution** – a change from making things by hand to making them in factories. or fundamental change in the way goods were produced, from human labor to machines.

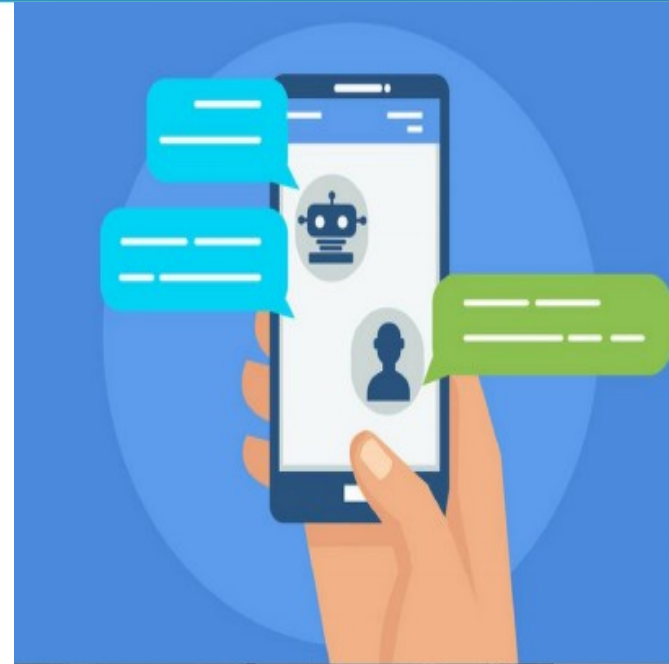
Industrial Revolution (IR)

- **IR** was a fundamental change in the way goods were produced, from human labor to machines.
- Machines were invented which replaced human labor.
- New energy sources were developed to power the new machinery – water, steam, electricity, oil (gas, kerosene).
- Increased use of metals and minerals. such as, [Aluminum](#), [coal](#), [copper](#), [iron](#), etc.
- Transportation improved
 - ✓ Ships
 - ✓ Wooden ships → Iron ships → Steel ships ,
 - ✓ Wind-powered sails → Steam-powered boilers
 - ✓ Trains
 - ✓ Automobiles

cont. ..

- Communication improved
 - ✓ Telegraph
 - ✓ Telephone
 - ✓ Radio
- An Industrial Revolution at its core occurs when a society shifts from using tools to make products to use new sources of energy, such as coal, to power machines in factories.
- The revolution started in England (Birthplace of the Industrial Revolution), with a series of innovations to make labor more efficient and productive.

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- Generally, the following industrial revolutions fundamentally changed and transfer the world around us into modern society.
- ✓ The steam engine,
- ✓ The age of science and mass production, and
- ✓ The rise of digital technology
- ✓ Smart and autonomous systems fueled by data and machine learning.

Historical Background (IR 1.0, IR 2.0, IR 3.0)

- ✓ Industrial revolution began in Great Britain (England) in the late 1770s then it expands to Belgium, France, and the German states.
- ✓ The final cause of the Industrial Revolution was the effects created by the Agricultural Revolution due to an increase in food production, which was the key outcome of the Agricultural Revolution.

- ❖ The **four** types of industries are:
- ✓ The **primary industry** involves getting raw materials e.g. mining, farming, and fishing.
- ✓ The **secondary industry** involves manufacturing e.g. making cars and steel.
- ✓ The **Tertiary industries** provide a service e.g. teaching and nursing.
- ✓ The **quaternary industry** involves research and development industries e.g. IT.

Industrial Revolution (IR 1.0)

- IR is described as a transition to new manufacturing processes.
- The first IR included going from hand production methods to machines, the increasing use of steam power.



Industrial Revolution (IR 2.0)

- ✓ Known as the Technological Revolution, began somewhere in the 1870s.
- ✓ New technological systems were introduced, such as electrical power and telephones.



Industrial Revolution (IR 3.0)

- ✓ The transition from mechanical and analog electronic technology to digital electronics which began from the late 1950s.
- ✓ Due to the shift towards [digitalization](#), IR 3.0 was given the nickname, “[Digital Revolution](#)”. The mass production and widespread use of [digital logic circuits](#) and its derived



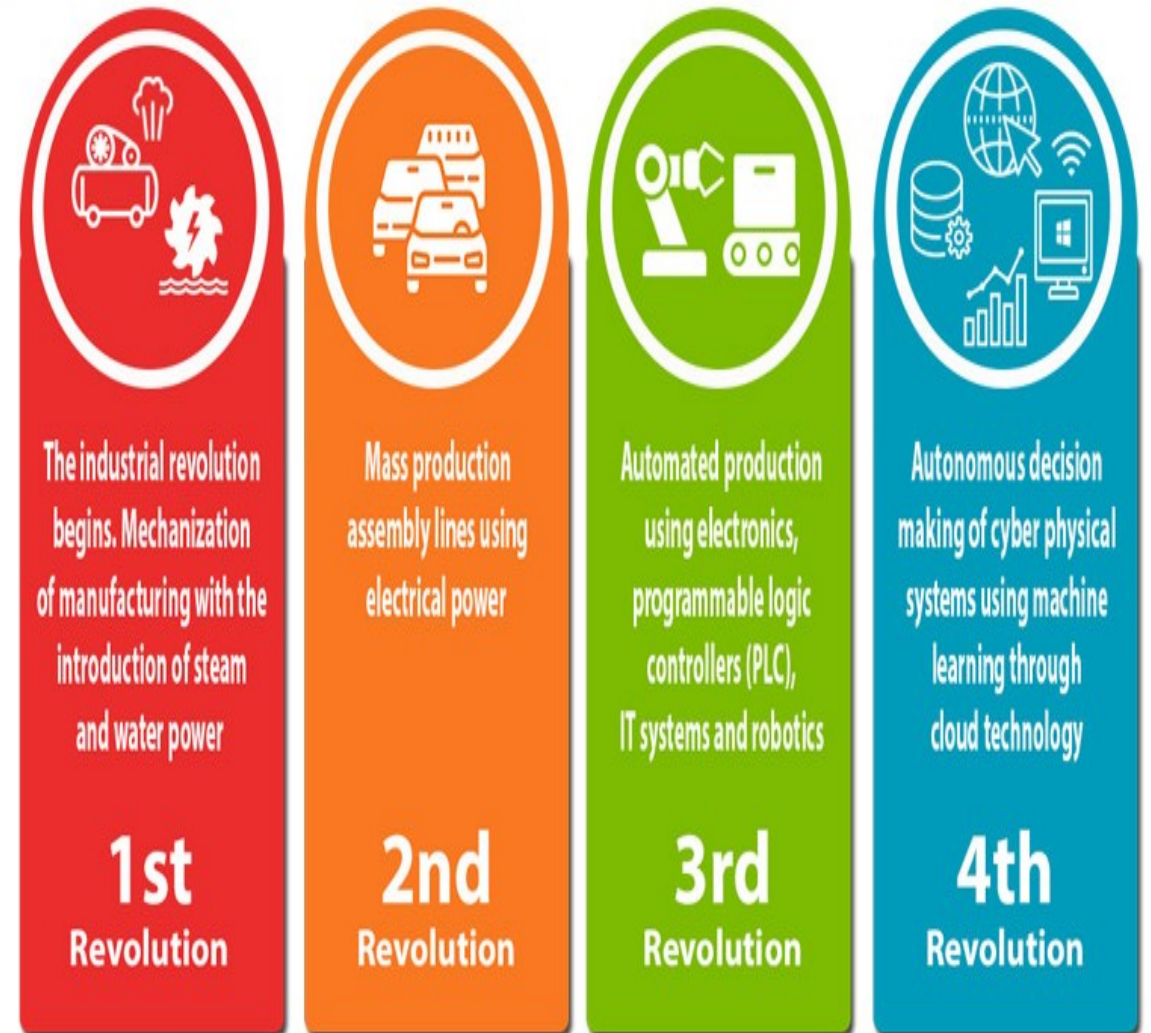
Fourth Industrial Revolution (IR 4.0)

- ✓ Advancements in various technologies such as robotics, Internet of Things (IoT), additive manufacturing and autonomous vehicles.
- ✓ Coined by **Klaus Schwab**, the founder and executive chairman of World Economic Forum, in the year 2016.
- ✓ A cyber-physical system is a mechanism that is controlled or monitored by computer-based algorithms, tightly integrated with the Internet and its users.
- ✓ Example, usage of Computer Numerical Control (CNC) machines which is operated by giving it instructions using a computer and the adoption of Artificial Intelligence (AI).

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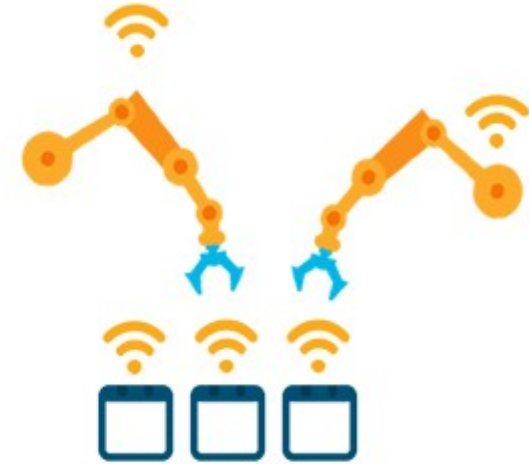
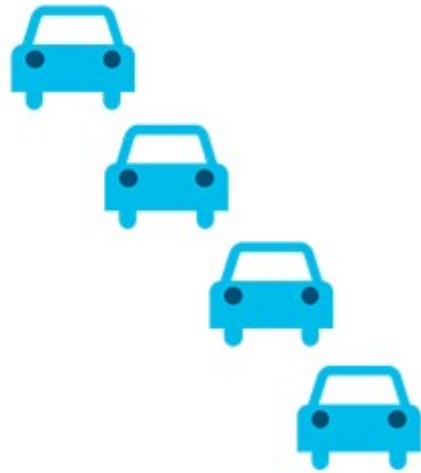


IR 4



comparisons

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1



2



3



4

Mechanization,
water power,
steam power

Mass production,
assembly line,
electricity

Computer and
automation

Cyber-physical
systems

Role of Data for Emerging Technologies

- Data is regarded as the new oil and strategic asset since we are living in the age of big data, and drives or even determines the future of science, technology, the economy, and possibly everything in our world today and tomorrow.

Assignment

1. Briefly discuss Data, Information and Big Data?
2. List out some programmable devices and explain their property?

Enabling devices and network (Programmable devices)

- ✓ The network is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data.
- ✓ An example of a network is the Internet, which connects millions of people all over the world Programmable devices usually refer to chips that incorporate field programmable logic devices (FPGAs), complex programmable logic devices (CPLD) and programmable logic devices (PLD).
- ✓ There are also devices that are the analog equivalent of these called field programmable analog arrays.

- Why is a computer referred to as a programmable device?
- ✓ Because what makes a computer a computer is that it follows a set of instructions.

List of some Programmable devices

- Achronix Speedster SPD60
- Actel's
- Altera Stratix IV GT and Arria II GX
- Atmel's AT91CAP7L

- Cypress Semiconductor's programmable system-on-chip (PSoC) family
- Lattice Semiconductor's ECP3
- Lime Microsystems' LMS6002
- Silicon Blue Technologies
- Xilinx Virtex 6 and Spartan 6
- Xmos Semiconductor L series

- A full range of network-related equipment referred to as Service Enabling Devices (SEDs), which can include:
 - ✓ Traditional channel service unit (CSU) and data service unit (DSU)
 - ✓ Modems
 - ✓ Routers
 - ✓ Switches
 - ✓ Conferencing equipment
 - ✓ Network appliances (NIDs and SIDs)
 - ✓ Hosting equipment and servers

Human to Machine Interaction

- It refers to the communication and interaction between a human and a machine via a user interface.
- It is also the study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings.
- The goal of HCI is to improve the interaction between users and computers by making computers more user-friendly and receptive to the user's needs.

Disciplines Contributing to Human-Computer Interaction (HCI)

- ✓ **Cognitive psychology**:- Limitations, information processing, performance prediction, cooperative working and capabilities
- ✓ **Computer science**:- Including graphics, technology, prototyping tools, user interface management systems.
- ✓ **Linguistics**:- Including natural language interfaces
- ✓ **Engineering and design**:- Engineering principles and Graphic design
- ✓ **Artificial intelligence**:- Intelligent software
- ✓ **Human factors**:- Display readability and Hardware design

Future Trends in Emerging Technologies

- Emerging technology trends in 2019
- ✓ 5G Networks
- ✓ Artificial Intelligence (AI)
- ✓ Autonomous Devices
- ✓ Blockchain
- ✓ Augmented Analytics
- ✓ Digital Twins
- ✓ Enhanced Edge Computing and
- ✓ Immersive Experiences in Smart

Assignment 1.

1. Barfly discussed these emerging technologies how it could be shaping the future of you and your business
 - Chatbots
 - Virtual, Augmented & Mixed Reality
 - Blockchain. The blockchain frenzy is real
 - Ephemeral Apps and
 - Artificial Intelligence.