

Introduction to Emerging Technologies

More notes at Telegram: https://t.me/campus_handout

Chapter 1

1.1 Evolution of Technologies

- Emerging technology is a term generally used to describe a new technology
- It is reserved for technologies that are creating or are expected to create significant social or economic effects
- List of some currently available emerged technologies
 - Artificial Intelligence
 - Blockchain
 - Augmented Reality and Virtual Reality
 - Cloud Computing
 - Angular and React
 - DevOps
 - Internet of Things (IoT)
 - Intelligent Apps (I-Apps)
 - Big Data
 - Robotic Processor Automation (RPA)

1.1.1 [Introduction to the Industrial Revolution \(IR\)](#)

- period of major industrialization and innovation that took place
- late 1700s and early 1800s
- society shifts from using tools to make products to use new sources of energy, such as coal
- manufacturing of goods moved from small shops and homes to large factories.
- The revolution started in England
- Some industrial revolutions changed the world
 - The steam engine
 - The age of science and mass production, and
 - Digital technology
 - Smart and autonomous systems

1.1.2 The Most Important Inventions of the Industrial Revolution

- Transportation: The Steam Engine, The Railroad, The Diesel Engine, The Airplane
- Communication.: The Telegraph. The Transatlantic Cable. The Phonograph. The Telephone
- Industry: The Cotton Gin. The Sewing Machine. Electric Lights

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

- European countries industrialized after England: Belgium, France, and the German states.
- final cause of the Industrial Revolution was the effects created by the Agricultural Revolution : increase in food production

- The four **type of industries**:
 1. **Primary industry**: involves getting **raw materials** e.g. mining, farming, and fishing.
 2. **Secondary industry**: **manufacturing** e.g. making cars and steel.
 3. **Tertiary industries**: provide a **service** e.g. teaching and nursing.
 4. **Quaternary industry**: **research** and development industries e.g. IT.

1.1.3.1 Industrial Revolution (IR 1.0)

- **first coined in the 1760s**
- transition to new manufacturing processes
- From: hand production ➞ machines
- increasing use of steam power

1.1.3.2 Industrial Revolution (IR 2.0)

- **began somewhere in the 1870s**
- **known as the Technological Revolution**
- widespread adoption of pre-existing technological systems such as telegraph and railroad
- new technological systems introduced - electrical power

1.1.3.3 Industrial Revolution (IR 3.0)

- **began from the late 1950s.**
- **known as Digital Revolution**
- transition from mechanical and analog electronic technology ➞ to digital electronics

- Mass production and widespread use of digital logic circuits: **computer**, **hand phones** and **the Internet**.

1.1.3.4 Industrial Revolution (IR 4.0)

- **Present day**
- advancements in various technologies such as **robotics**, Internet of Things, additive manufacturing and autonomous vehicles
- technologies mentioned above are what you call: **cyber physical systems**:
 - mechanism that is controlled or monitored by computer-based algorithms
 - tightly integrated with the Internet and its users.
 - E.g : Computer Numerical Control (CNC) machines.
- Another major breakthrough that is associated with IR 4.0 is the adoption of **Artificial Intelligence (AI)**

1.2 Role of Data for Emerging Technologies

- **Data is**
 - ✓ strategic asset
 - ✓ determines the future of science, technology, the economy, and possibly everything

- ✓ It presents enormous challenges that in turn bring incredible innovation and economic opportunities

1.3 Enabling devices and network (Programmable devices)

- In digital electronic systems, there are **four basic kinds of devices**:
 1. **Memory** - store random information
 2. **Microprocessors** - execute software instructions
 3. **Logic** - provide specific functions e.g: signal processing, timing and control operations
 4. **Networks** - collection of computers, servers & other devices connected to one another to allow the sharing of data e.g: Internet
- Programmable devices
 - ✓ **Chips**

- ✓ Incorporate field programmable logic devices (**FPGAs**), complex programmable logic devices (**CPLD**) and programmable logic devices (**PLD**).
- ✓ **Computer is programmable device**

1.3.1 List of some Programmable devices

- Lattice Semiconductor's ECP3
- Achronix Speedster SPD60 e.t.c

Service Enabling Devices (SEDs)

- Modems
- Conferencing equipment
- Traditional channel service unit (CSU) e.t.c

1.4 Human to Machine Interaction (HMI)

- ✓ communication and interaction between a human and a machine via a **user interface**
- ✓ **HCI** (human-computer interaction)
 - study of how people interact with computers
 - consists of **three parts**:

1. the **user**
 2. the **computer**
 3. **the ways** they work together
- The goal of HCI is to improve the interaction between users and computers

1.4.1 Disciplines Contributing to Human-Computer Interaction (HCI)

- Cognitive psychology
- Computer science
- Linguistics

1.5 Future Trends in Emerging Technologies

1.5.1 Emerging technology trends in 2019

- ✓ 5G Networks
- ✓ Artificial Intelligence (AI)
- ✓ Autonomous Devices
- ✓ Blockchain e.t.c

1.5.2 Some emerging technologies that will shape the future of you and your business

- Chatbots
- Virtual/augmented reality
- Blockchain
- Ephemeral Apps and
- Artificial Intelligence are already shaping your life whether you like it or not

