CHAPTER ONE
INTRODUCTION TO EMERGING TECHNOLOGIES

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Evolution of Technologies

- A term generally used to describe a new technology
- Also refer to the continuing development of existing technology
- The term is reserved for technologies that are creating or are expected to create significant social or economic effect
- Technological evolution is a theory of radical transformation of society through technological development

What is the root word of Technology and Evolution?

- **Technology:-**comes from two Greek words, transliterated *techne* and *logos*
  - *Techne* means art, skill, craft, or the way, manner, or means by which a thing is gained
  - *Logos* means word, the utterance by which inward thought is expressed, a saying, or an expression
  - So, literally, technology means words or discourse about the way things are gained.
- **Evolution:** evolution means the process of developing by gradual changes.
  - This noun is from Latin evolutio, "an unrolling or opening," combined from the prefix e-, "out," plus volvere, "to roll."

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)

Introduction to the Industrial Revolution (IR)

- A period of major industrialization and innovation
- Took place during the late 1700s and early 1800s
- Occurs when a society shifts from using tools to make products to use new sources of energy
- Started in England, with a series of innovations to make labour more efficient and productive

Industrial revolutions that 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 feuled by data and machine learning

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.

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

- Industrial revolution began in Great Britain in the late 1770s
- The first European countries to be industrialized after England were Belgium, France, and the German states
- The final cause of the Industrial Revolution was the effects created by the Agricultural Revolution

The four types of industries

- The primary industry involves getting raw materials e.g. mining, farming, and fishingUsing Awesome Backgrounds
- The secondary industry involves manufacturing e.g. making cars and steel
- 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)

- described as a transition to new manufacturing processes
- first coined in the 1760s
- The transitions in the first IR includes going from hand production methods to machines
- the increasing use of steam power
- the development of machine tools and the rise of the factory system.

Industrial Revolution (IR 2.0)

- Also known as the Technological Revolution
- Began somewhere in the 1870s
- The development of methods for manufacturing interchangeable parts
- Widespread adoption of pre-existing technological systems such as telegraph and railroad networks
- New technological systems were introduced, such as electrical power

Industrial Revolution (IR 3.0)

- Digital Revolution
- the transition from mechanical and analog electronic technology to digital electronics
- began from the late 1950s
- the mass production and widespread use of digital logic circuits and its derived technologies such as the computer, handphones and the Internet

Fourth Industrial Revolution (IR 4.0)

- was coined by Klaus Schwab
- advancements in various technologies

such as robotics, Internet of Things (IoT) additive manufacturing and autonomous vehicles,

- The technologies mentioned above are what we call cyberphysical systems.
- A cyber-physical system is a mechanism that is controlled or monitored by computer-based algorithms, tightly integrated with the Internet and its users

Role of Data for Emerging Technologies

- Data is regarded as the new oil and strategic asset
- Drives or even determines the future of science, technology, the economy and possibly everything
- presents enormous challenges that in turn bring incredible innovation and economic opportunities

Enabling devices and network (Programmable devices)

- In the world of digital electronic systems, there are four basic kinds of devices:

- **Memory** store random information such as the contents of a spreadsheet or database
- **Microprocessors** execute software instructions to perform a wide variety of tasks such as running a word processing program or video game
- **Logic** provide specific functions, including device-to-device interfacing, data communication, signal processing, data display, timing and control operations
- **Networks** is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data

Programmable devices

- Is an electronic component used to build reconfigurable digital circuits
- Consist of logic gates and have a fixed function
- Has an undefined function at the time of manufacture
- Before the PLD can be used in a circuit it must be programmed

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

Service Enabling Devices (SED)

- 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

- HMI Refers to the communication and interaction between a human and a machine via a user interface
- HCI (human-computer interaction) is the study of how people interact with computers and to what extent computers are or are not developed for successful interaction with human beings
- HCI consists of three parts: the user, the computer itself, and the ways they work together

The Goal of HCI

- to improve the interaction between users and computers by making computers more user-friendly and receptive to the user's needs
- Simplicity
- ease of deployment & operations
- cost savings for smaller set-ups.
- reduce solution design time and integration complexity

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
- Engineering and design
- Artificial intelligence
- Human factors.

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 Spaces


THANK YOU