Compare AR and VR ?

AR : Augmented Reality is an enhanced, interactive version of a real-world environment achieved through digital visual elements, sounds and other sensory stimuli via holography technology

VR : Virtual Reality is a simulated 3D environment that enables users to explore and interact with a virtual surrounding in a way that approximates reality, as it is perceived through the user's senses.

Comparision:

* AR and VR are reality technologies that replaces or enhances a real-life environment with simulated ones.
* The terms AR and VR technologies are experiencing more demand and fast growth.
* However they are not new technologies. VR has in recent years created a lot of buzzing gaming industry.
* AR is quietly breaking new grounds in the enterprising sector.
* Both AR and VR have great potential for industrial applications but are currently seeing the biggest growth in gaming, marketing & ecommerce sectors.
* AR and VR accomplished two very different things in two different ways, despite of similar designs.
* Whereas VR replaces your vision, AR adds to it.
* AR uses Real-world setting, while VR is completely virtual.
* AR users can control their presence in the real world, VR users are controlled by the system.
* VR requires a headset device, but AR can be accessed with just a smartphone.
* AR enhances both the virtual and real world while VR enhances a fictional reality.
* They are both powerful technologies that have yet to make their mark on most peoples lives. They have the potential to completely change how we can use computers in the future, but wheather one or both will succeed is anyone's guess right now.

Examples of AR & VR applications:

Many [redacted] industries are already using AR & VR Education and training, Healthcare, Manufacturing and logistics, Construction, and real-estate, among others.

For example Nike uses AR and VR in their physical stores. Customers can scan items like shoes or clothing to view information or enter a VR world to experience the different steps in Nike's supply chain, so they understood how and where their items were made.

* [redacted] IKEA * LENSkart
* L'OREAL
* Healthcare professionals uses VR for better preparation of themselves for being in the operation theatre.

Future of AR & VR:

There are many different reports speculating what the global AR and VR market will reach within the upcomming years. According to the statistics the global AR & VR market will reach 296.9 Billion us dollers in 2024. And this forecast is expected to continue dominating the market forecast period.

While VR is continuously growing within the gaming industry. AR is mostly leveraged in the industrial and Enterprise sector, for on-site advancements & digitalization. Also many MNC companies tries to fit AR into their process chain of Industry 4.0.

② Application and Types of Sensors:

- Cps integrate physical process with computational and n/w capabilities, enabling them to sense monitor and control various system.
- Sensors play a crucial role in cps by capturing data from the physical world and providing real-time information for decision-making and control.

Types of sensors:

1. Temperature sensors
2. Digital temperature sensors.
3. Humidity and Temperature sensors
4. Pressure sensors
5. Vaccum sensor
6. Motion sensor
7. Torque sensor

1. Temperature Sensor:

* It is a device used to measure the temperature of its surroundings (or) the object it is in contact with. _____ ?
* It converts temp into an electrical signal that can be intrepreted by control system.

diagram

Application

1. HVAC
2. Industrial processes
3. Food and Beverages industry
4. Environmental monitoring
5. Energy management
6. Acrospace and Aviation

2. Digital temperature sensor:

- It is a device that provides temperature reading a digital format.
- It is commonly used in IOT devices, medical devices weather station etc.

diagram

Application

1. Consumer electronics
2. Industry automation
3. Data centers
4. IOT
5. Medical Devices.

3. Humidity and Temp

* It is also known as hygrometer is a device that measures both relative humidity and temperature of sourronding environment.
* It detects the amount of moisture in air and thermal energy present.

Applications:-

diagram

1. weather maintaing
2. HVAC system
3. Agriculture and Green house
4. Food and pharmaceutical industries
5. Data centers.

4. Pressure Sensors:

- The pressure sensor is an instrument that appretends pressure and changes it into an electric signal where the quality depends upon the pressure applied.
- Turned parts for pressure sensor and vacuums ensors are tw of major pressure sensors used in industrial automation.

Applications

1. used to measure pressure below than the atmospheric pressure at a given location.
2. pressure sensors can be used in systems to measure other variables such as gas flow, water level etc

5. Motion Sensor

- A motion sensor is a deince that detects movements in its surroundings.
- It is used in security system, lighting control.

Applications:

* used to detect motion
* used to measure static acceleration of an object dynamic acceleration, in an air craft, cell phones etc.
* lighting control
* Home automation.

6. Vaccum sensor:

* Vaccum pressure sensor is a device that measures and detects the level of vaccum (or) -ve pressure in an enclosed space.
* It is commonly used in various industrial & scientific

Applications

1. Vaccum system.
2. HVAC system.
3. Automative Industry
4. Analytical instruments
5. Vaccum leak detection.

7. Torque sensor

- A Torque sensor also known as a Torque transducer. It is a device that measures and detects the twisting force applied to an object.
- It is commonly used in engineering, industrial and automative applications.

Applications

- used to measure the highest speed of rotation, oscialating torque
- used to measure the speed of rotation and maintainece neccessities.

5. Types of actuators and its applications

- An actuator on the other hand, causes movement.
- It takes an electrical signal & combines it with an energy sources to create physical motion.
- An actuator may be prematic, hydraulic, electric, thermal or magnetic.

Types of Actuators:

1. Manual Actuators
2. Pneumatic Actuator.
3. Hydraulic Actuator
4. Electric Actuator
5. Spring Actuator.

1. Manual Actuator:

- These actuators require an employee to control gears, levers or wheels.
- Although they are inexpensive and simple to use, they have limited applicability

Applications:

1. Hand wheel
2. lever
3. push-Button.
4. knob
5. Crank.

2. Pneumatic Actuator:

- These Actuators use gas pressure to power valves.
- The pressure pushes a piston to effect the valve system.

Application

1. Valve Control
2. Robotics
3. Conveyor System
4. medical equipment
5. Automative industry.

3. Hydraulic Actuator:

These actuators use fluid to generate pressure instead of using gas pressure, hydraulic actuators use fluid Pressure to operate values:

Application:

1. Industrial machinery
2. Construction Equipment
3. Aerospace and Aviation
4. Oil & Gas industry

4- Electric Actuators:

Electric actuators employ an electric motor to operate a value. Although these actuators are quiet and efficient, they require batteries (or) electricity which may not always be available in particular locations.

Applications

1. Industrial Automation.
2. HVAC system.
3. Automative industry
4. Aerospace and Defense
5. Home Automation.

5- Spring actuatory:

These actuatory hold spring back until a trigger occurs. Once a particular threshold is reached, the spring relased and operated the value.

These are typically used in one time Emergency applications

Applications:

1. value control
2. Switches and Circuit Breakers.
3. Safety and Emergency systems
4. Hand Tools.

12/9

1.1 Industrial 4.0 - refers to the fourth industrial revolution

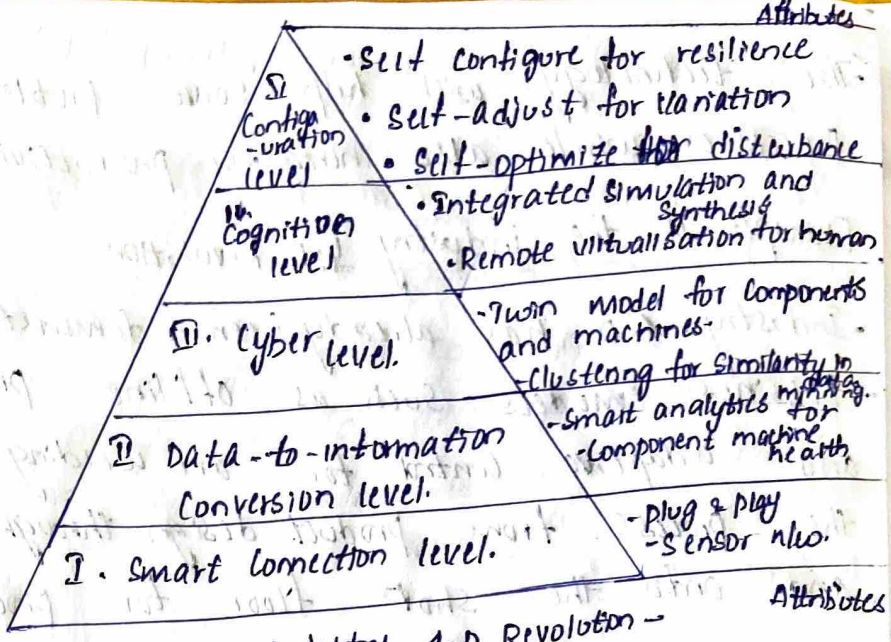
Fourth industrial revolution

- The first industrial revolution came with advent of mechanisation of steam power and water power.
- The second industrial revolution revolved around mass production and electricity
- The Third industrial revolution came with electronics I.T systems and automation.
- The fourth Industrial revolution is associated with cyber physical systems.

Industry 4.0 Technologies

- Industry 4.0 describes the growing trend towards data automation & data exchange in technology and processes within the manufacturing industry including
  - The Internet of Things (IOT)
  - The industrial internet of Things (IIOT)
  - Cyber-physical systems (cps)
  - Smart manufacture
  - Smart factories
  - Cloud Computing
  - AI
  - Cognitive Computing

Pg-3



Ex- pgNO-3

-Industry 4.0 Revolution-

This automatic creates a manufacturing system where by machines in factories are arugumented with wireless connectivity and sensors to monitor and visualise an entire production process and make autonomous decision.

-wireless connectivity and the augementation of machines will be greatly advanced with the full roll out of 5G. This will provide faster response times; allowing for near real time communication between system.

- The fourth industrial revolution also relates to digital twin technologies. These digital technologies can create virtual versions of real-world installations, processes and application. These can then be robustly tested to make cost effictive decentralised decisions.

- This automation includes interconnectivity between processes information transparency and technical assistence for decentralised decisions.

- In short this should allow for digital transformation. This will allow for automated and autonomous manufacturing with joined-up system that can cooperate with eachother.

- The technology will help solve problems & track processes while also increasing productivity

Example of the Industry 4.0 Revolution

- Industry 4.0 has already been demonstrated through bussiness models such as offline programming and adaptive control for are welding, taking the process from product design through simulation and onto the shop floor for production.
- There are also example of bussiness implementing industry 4.0 in automative manufacture and a variety of smart factories across the world.

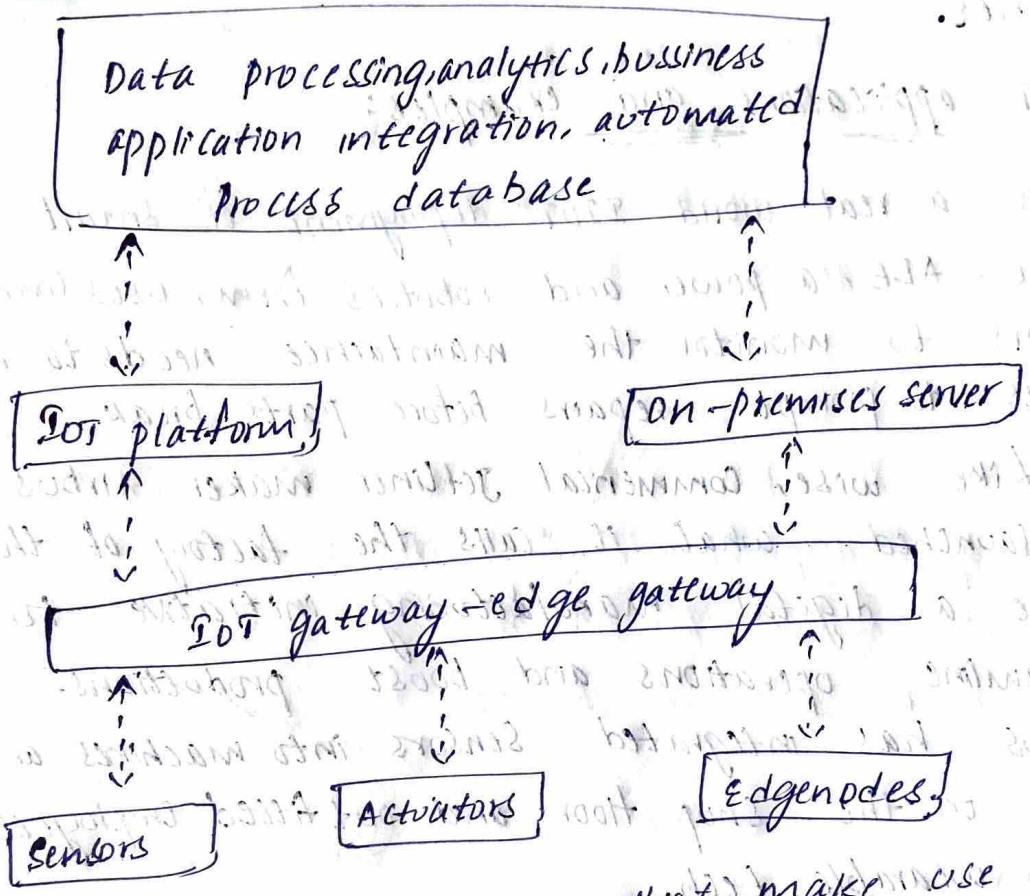
A challenge in the development of Embended and cyber-physical system is the large difference in the design practice b/w the various engineering disciplines involved, such as software and mechanical ~~engineering~~ engineering

(3) Industrial Internet of Things (IIOT)

It connects everyday object to internet allowing them to communicate and operate for anywhere in the world.

Includes robatics medical devices and software that is defined for production process.

IIOT infrastructure:



- There are countries industries that make use of IIOT. one example is the automative industry which uses IIOT devices in the manufacturing process. The automative extensively uses industrial robots and IIOT can help proactively maintain these system and spot potential problems before they can disrupt production.

The agriculture industry makes extensive use of IIOT devices, too industries sensors collect data about soil nutrients moisture and more, enabling farmers to produce an optimal crop.

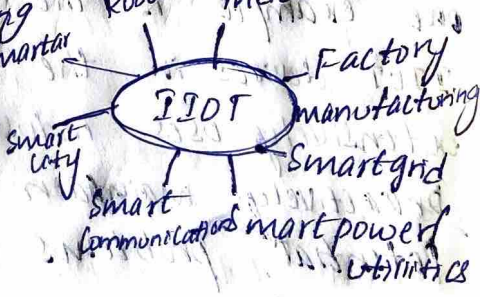
The oil and gas industry also uses industrial IOT devices. some oil companies maintain affect of autonomous aircraft that can use visual and thermal imaging to detect potential problems in pipelines.

IIOT applications and examples:

In a real world IIOT deployment of smart robotics, ABB, a power and robotics firm, uses connected sensors to monitor the maintarnce needs to its robots to prompt repairs before parts break.

Like wise, commercial Jetliner maker Airbus has launched what it calls the factory of the future, a digital manufacturing initiative to streamline operations and boost productions. Airbus has integrated sensors into machines and tools on the shop floor and outfitted employees with wearable tech.

eg. industrial smart glasses - airnedat cutting down on errors and enhancing workplace safety.



- IIOT is used in many industries and sectors, including robotics, manufacturing and smart cities.

Advantages IIoT

1. Automated data collection.
2. Improved productivity
3. Real-Time production visibility
4. Reduce quality defects
5. Decrease costs.

disadvantages

1. more weakness in network security
2. more required band width.
3. increased monitoring time
4. Security issues.