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CERTIFICATION COURSES

Industry 4.0: Augmented Reality and Virtual Reality

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Augmented Reality and Virtual Reality in IIoT

- From the technological perspective, Augmented Reality (AR) and Virtual Reality (VR) are used in several contexts and sectors in Industry 4.0.
 - AR and VR plays important role in the primary stages where optimization and productivity are important in manufacturing industry.
 - The efficiency of warehouses are improved using various AR applications.
 - AR and VR also plays an important role in safety training, thereby the potential safety hazards can be easily located.

“Manufacturing”, Reality technologies

Augmented Reality and Virtual Reality in IIoT (contd.)

- Use cases:
 - Machining and production
 - Education and collaboration
 - Assembly
 - Safety and security
 - Digital prototyping
 - Factory planning
 - Maintenance and inspection

“Virtual-reality-vr-augmented-reality-ar-trends”, I-scoop

Augmented Reality (AR)

➤ Augmented Reality is

- an enhanced version of reality
- direct/indirect views of physical world environments are “augmented” with computer-generated superimposed images
- adds digital elements into their actual environment
- amplifies the present perception of reality.

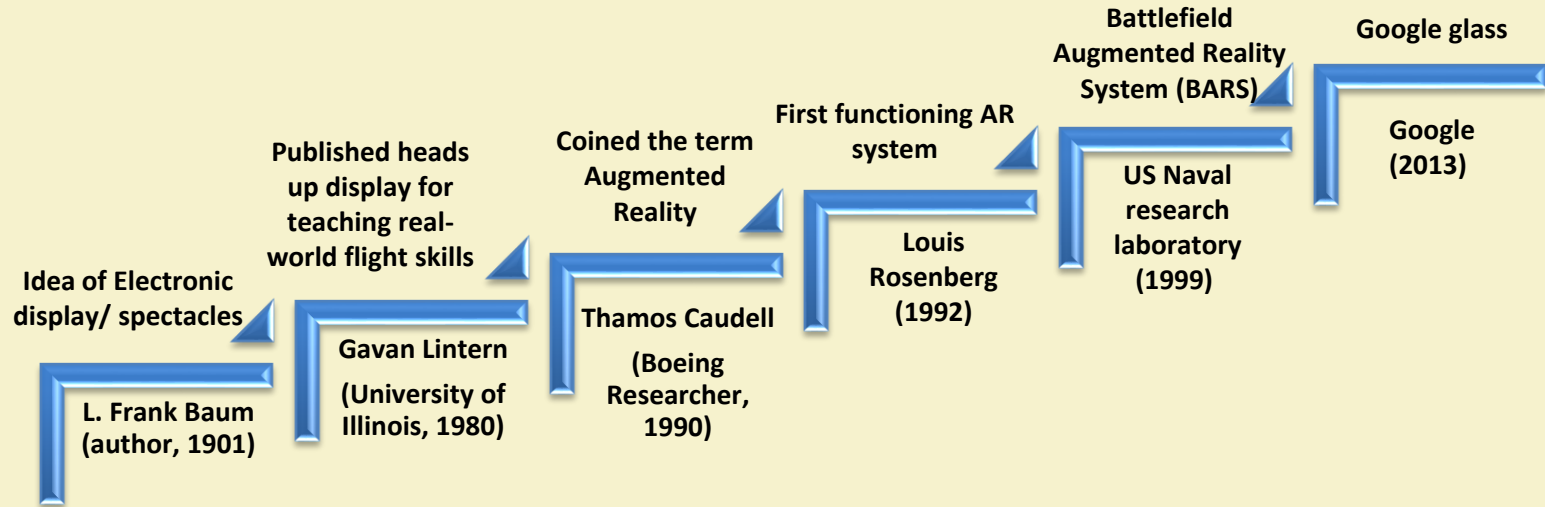
“Augmented Reality”, Reality technologies
“ Augmented Reality”, Techtargit

Key Features of AR

- The key features of AR are:
 - It lies in the middle of the mixed reality spectrum.
 - It provides multiple sensor modalities – visual, auditory, and haptic.
 - It utilizes the existing environment and overlays new information on top of it.

“Augmented Reality”, Reality technologies
“Augmented Reality”, Techtarget

Chronological order of Augmented Reality



“Augmented Reality”, Wikipedia

Applications of Augmented Reality



“Augmented Reality”, Wikipedia

Applications of Augmented Reality (contd.)

AR Eyeglasses



Head-up display



Medical Applications



Key components of devices:

- Sensors and Cameras
- Projection Screen
- Processing unit
- Reflection

"Ar glasses", Uploadvr

"Medical Research", Pehub

Types of Augmented Reality

Marker-Based Augmented Reality

Markerless Augmented Reality

Projection Based Augmented Reality

Superimposition Based Augmented Reality

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Types of Augmented Reality (contd.)

- Marker-based augmented reality gives an outcome when the reader is sensed by the camera and visual marker.
 - camera: differentiates between a marker and a real object.
 - marker: recognizes simple, distinct patterns and can be easily processed.
- Markerless augmented reality is commonly utilized for mapping directions. The location is provided based on the GPS, digital compass, or accelerometer, which is attached to the device.

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Types of Augmented Reality (contd.)

- Projection-based augmented reality gives an outcome by projecting light onto real world surfaces.
 - It allows human interaction by sending light.
 - It differentiates between the expected projection and altered projection.

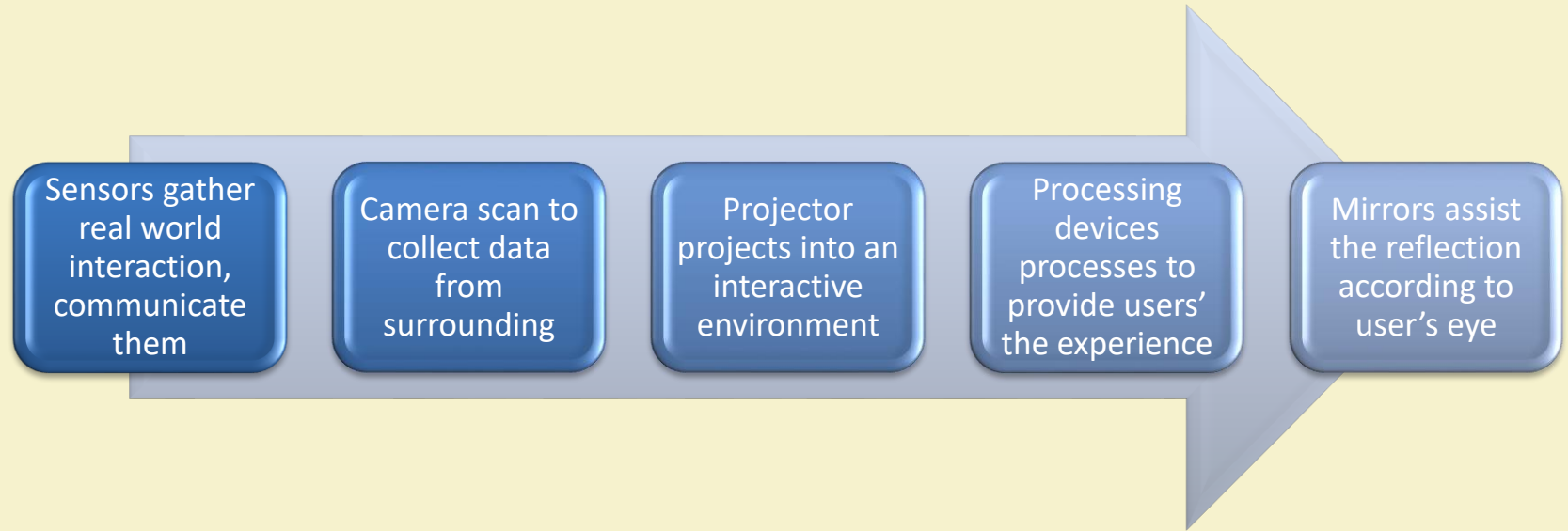
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Types of Augmented Reality (contd.)

- Superimposition-based augmented reality partially or fully substitutes the original view of the object with the augmented view.
 - Object recognition plays an important role
 - Application cannot replace the original view with the augmented one.

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How do Augmented Reality works ?



“Augmented Reality”, Reality technologies

Virtual Reality (VR)

- Virtual Reality is
 - a mixture of interactive hardware and software based artificial environment
 - a realistic three-dimensional image is created
 - presented to the user, in such a way so that they interacts with the real or physical world.

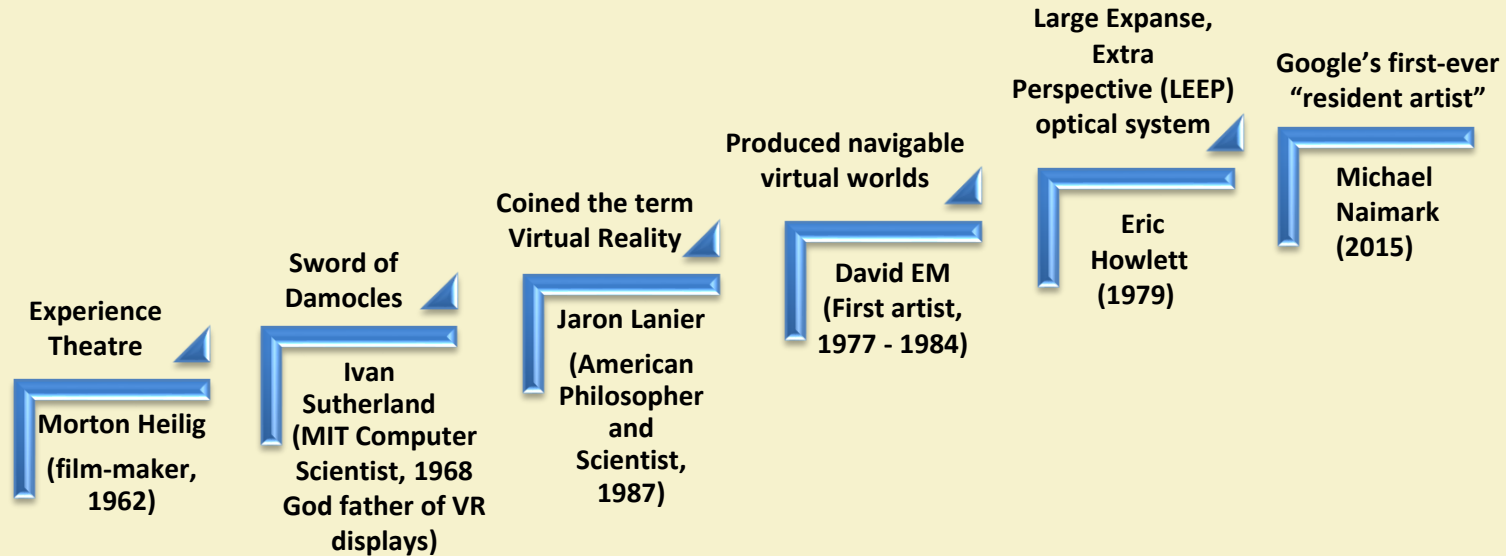
“Augmented Reality”, Reality technologies

Key Features of VR

- The key features of VR are:
 - It creates and enhances an imaginary reality.
 - It gives the perception of being physically present in a non-physical world.
 - It incorporates auditory and visual sensory feedback.
 - It allows users to get naturally absorbed into the virtual environment.

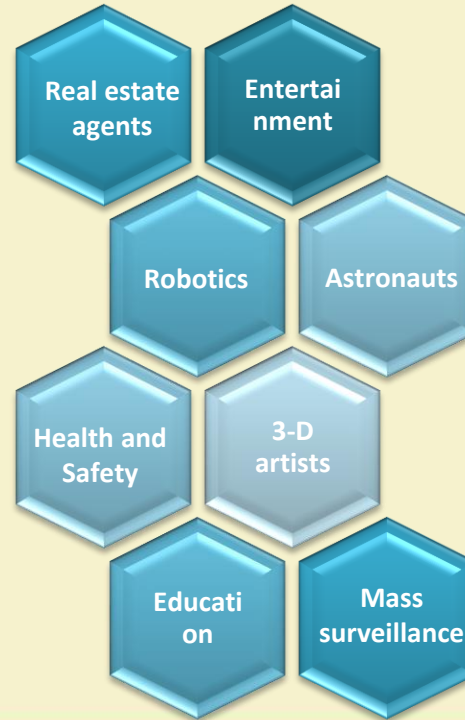
“Augmented Reality”, Reality technologies

Chronological order of Virtual Reality



"Virtual Reality", Wikipedia

Applications of Virtual Reality



“Virtual Reality”, Wikipedia

Applications of Virtual Reality (contd.)

VR Headset



Military Applications



Key components of headsets:

- Sensors –
Magnetometer, Accelerometer, and Gyroscope
- Lenses
- Display screens
- Processing unit

"Glasses", Uploadvr
"Sony-hmz", Polygon

Types of Virtual Reality

Non-immersive Simulations

Semi-immersive Simulations

Fully-immersive Simulations

“Virtual Reality”, Reality Technologies

Types of Virtual Reality (contd.)

- Non-immersive simulations utilizes only a subset of the user's senses.
 - User enters into the virtual environment through a portal or window
 - Users allows a peripheral awareness of the reality outside the virtual reality simulations.

“Augmented Reality”, Reality Technologies

Types of Virtual Reality (contd.)

- Semi-immersive simulations provides a partial or fully immersive experience of the user's senses. The simulations are :
 - powered by high performance graphical computing system, and
 - coupled with a large screen projector.

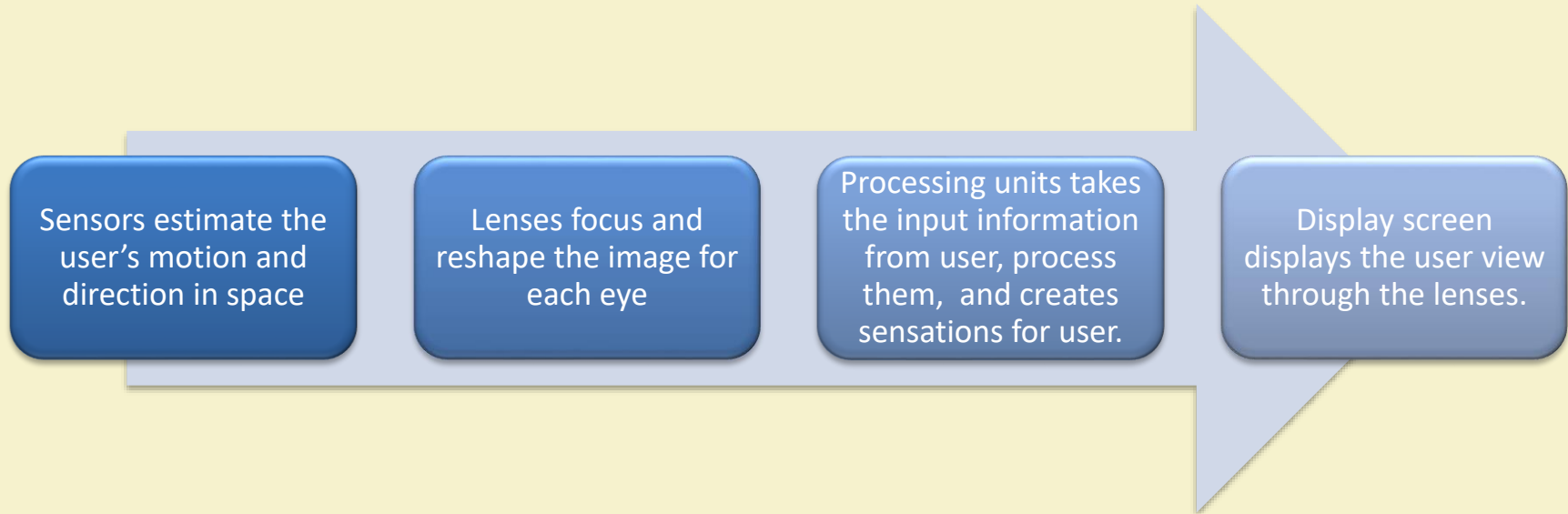
"Virtual Reality", Wikipedia

Types of Virtual Reality (contd.)

- Fully-immersive simulations provides realistic experience to the users. The simulations
 - delivers a wide field of view, and
 - uses head-mounted displays and motion detecting devices to simulate user's experiences.

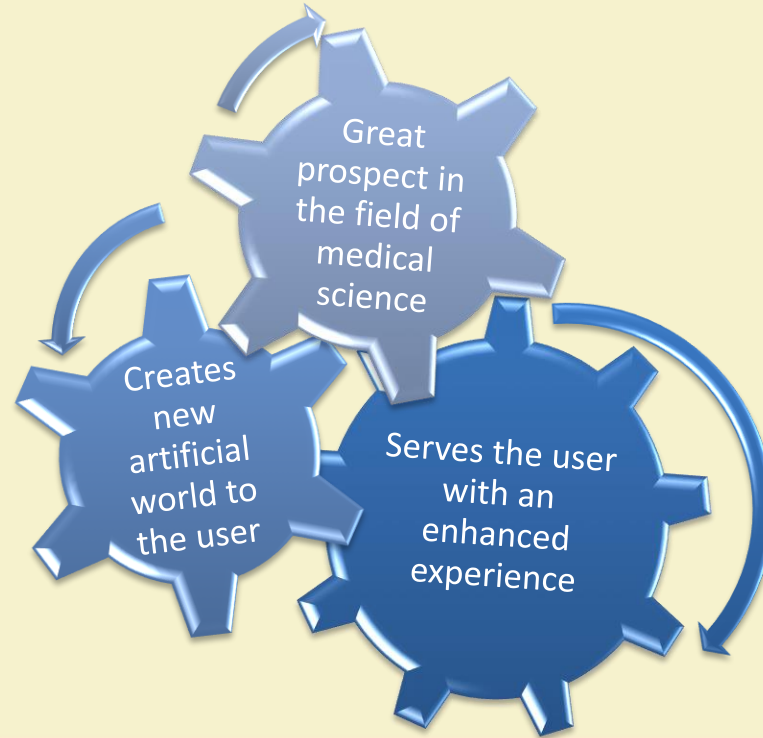
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How do Virtual Reality works ?



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Similarities of AR and VR



“Virtual Reality”, Reality Technologies

Comparison of AR and VR

Augmented Reality

- It adds digital elements to the actual environment.
- It delivers virtual elements as an encrust of the real world.

Virtual Reality

- Immersive application, which affects the experience of user.
- It offers a digital recreation of a real life setting.

“Virtual Reality”, Reality Technologies

References

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Thank You!!

