증강현실

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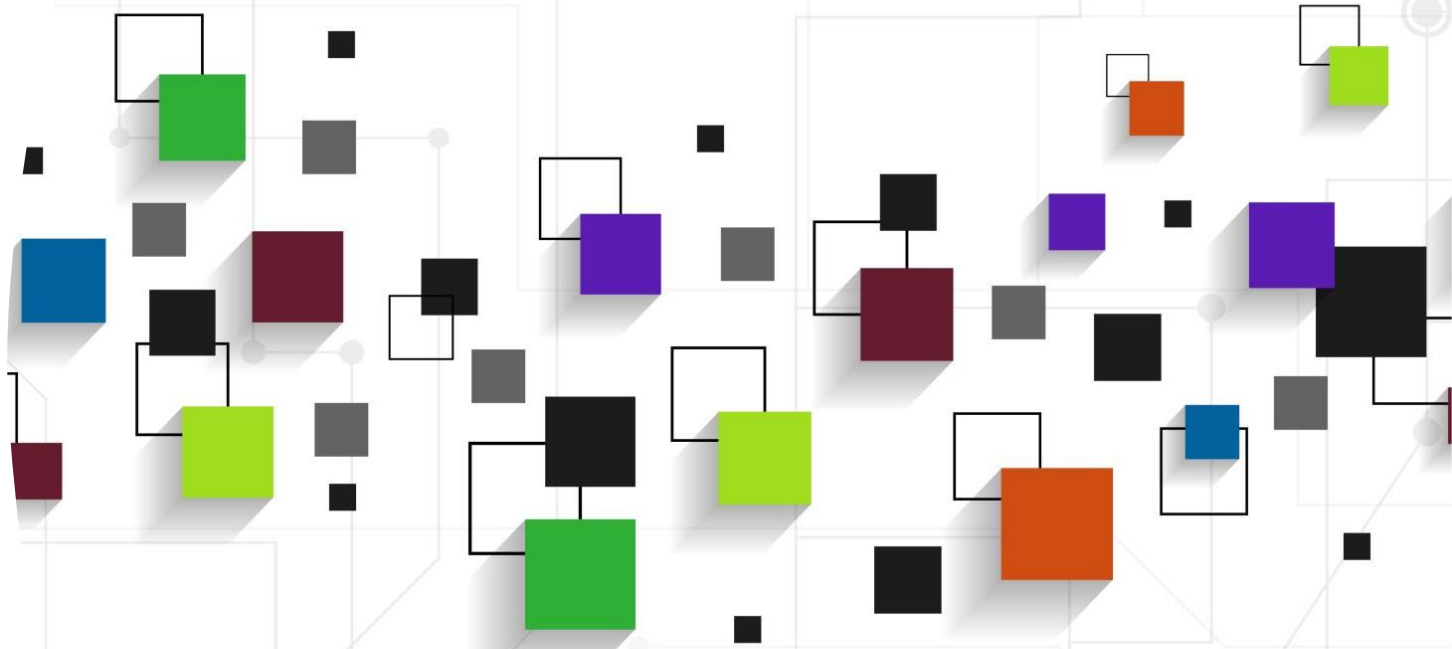


Definition and Basic Concepts

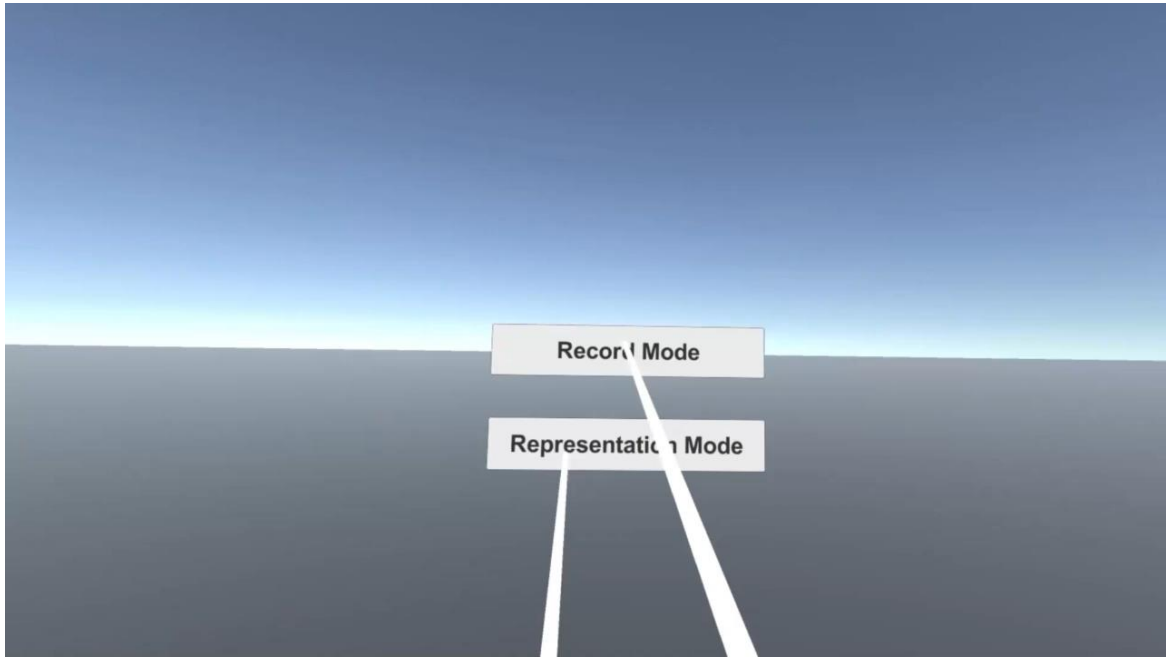
Objective

✓A clear understanding of what AR is and its basic concepts

Definition

- ✓Augmented Reality (AR) is a technology that superimposes computer-generated virtual elements onto the real world in real-time
  - Images, videos, or 3D models
- ✓AR enhances the real world by adding virtual content to it
  - Unlike Virtual Reality (VR), which creates a fully immersive digital environment

AR vs. VR



VR

AR

AR Definition [Azuma 97]

✓Combine Real and Virtual images

- Both can be seen at the same time

✓Interactive in real-time

- The virtual content can be interacted with

✓Registered in 3D

- Virtual objects appear fixed in space

* Azuma, R. T. (1997). A survey of augmented reality. Presence, 6(4), 355-385

Basic Concepts

✓Real World

- The physical environment we live in
- Consisting of objects, spaces, and people

✓Virtual Content

- Computer-generated elements
- 3D models, animations, images, videos …

✓Real-time

- AR operates in real-time
- Allow virtual content to interact with and respond to a user instantly

Types of AR

✓Marker-based AR

- AR experiences that require markers
- Images with specific patterns

✓Markerless AR

- AR experiences that do not rely on markers
- Use computer vision and object recognition to detect and track real-world objects or surfaces

Key Components

- ✓ Sensors
  - Devices used in AR systems
  - Cameras, gyroscopes, accelerometers, depth sensors, …
  - Provide information about the user's position, movements, and the surrounding environment
- ✓ Processing unit
  - Powerful processors to analyze sensor data, track real-world objects, and render virtual content in real-time
- ✓ Display
  - The medium through which users see the augmented view
  - Smartphone screen, HMD display, or projectors

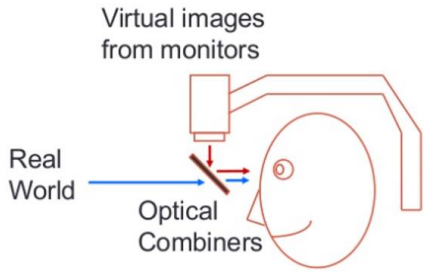
AR Display Technologies

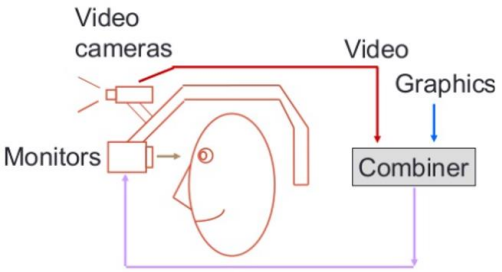
✓Smartphones and tables

- Views through the screens of smartphones and tablets
- Overlays virtual content onto the camera feed

✓Head-Mounted Displays (HMDs)

- HMDs (smart glasses or headsets) provide a hands-free AR experience
- Optical see-through and video see-through





Possible Applications

✓Gaming and Entertainment

- AR games, interactive experiences, and immersive storytelling

✓Education and Training

- Simulations, interactive learning materials, and virtual laboratory experiments

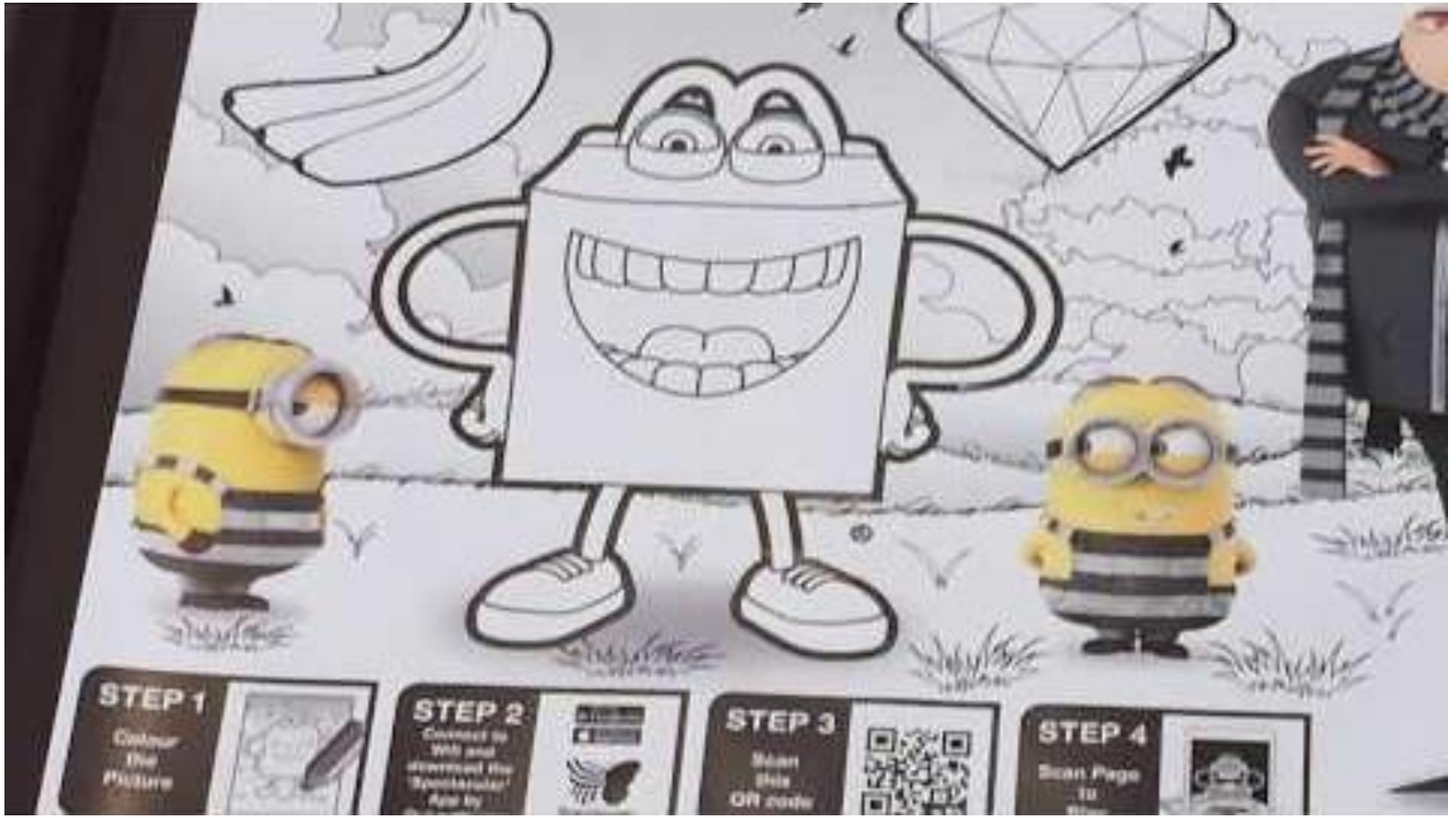
AR Basketball Game

https://youtu.be/hJVP1uHpe2Q?si=HdW1eUXcJ3jNwXDF

CNN Election Demo

CNN Hologram TV: https://youtu.be/v7fQ_EsMJMs

QuiverVision and McDonald



QuiverVision and McDonald's NZ – Colourable 3D Tray Mats 2017 (2017. 6. 21.): https://youtu.be/aUPMDwypBkA

Possible Applications

✓Retail and E-commerce

- Virtual try-on of products, AR shopping experiences, and visualization of furniture or home decor

✓Industrial and Manufacturing

- Maintenance and assembly instructions, remote assistance, and augmented training

✓Healthcare

- Surgical visualization, rehabilitation, and medical education

Manufacturing: Boeing

Recap of Key Points

- ✓AR overlays virtual content onto the real world in real-time
- ✓Marker-based and markerless AR are two types of AR experiences
- ✓AR can be viewed through smartphones, tablets, or head-mounted displays
- ✓AR relies on sensors, processing units, and displays
- ✓AR finds applications in gaming, education, retail, industry, and healthcare
- ✓AR unlocks endless possibilities for enhancing our interaction with the real world around us

Q/A

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