What is Augmented Reality?

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WHAT IS AUGMENTED REALITY – OVERVIEW

- Definition and examples

- What senses can be addressed?

- How does Augmented Reality work?

- Popular applications

- Companies developing AR

Augmented Reality (AR) Navigator

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AUGMENTED REALITY – DEFINITION AND EXAMPLES

Augmented Reality (AR) is the technology that adds a layer of virtual information to the real world.

- AR combines real and virtual information

- AR is interactive in real-time

- AR operates and is used in a 3D-environment

Examples:

- First down line in football on TV

- Information to help tourists to find the nearest subway stop

- Information for mechanics repairing a car

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AUGMENTED REALITY – WHAT SENSES CAN BE ADDRESSED?

- **Sight** – Virtual information added to the real world is often visual (see examples in previous slide)

- **Hearing** – for example, Intelligent Headset which gives tourists information about the point of interest they are looking at

- **Touch** – for example, smart shoes that vibrate to give users information on when and where to turn to reach their destination

- **Smell and taste** – the least explored area in AR, but interesting for the future:

  - Advertisers including the taste of a product to an add

  - Video game designers offering players taste-based reward and penalties in response to gamer's performance

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AUGMENTED REALITY – HOW DOES IT WORK?

Necessary components

Hardware

- A computer or mobile device
- A monitor or display screen
- A camera
- Tracking and sensing systems (GPS, compass, accelerometers)
- A network infrastructure
- A marker

Software

- An app or program running locally
- Web services
- A content server

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AUGMENTED REALITY – HOW DOES IT WORK?

Positioning the virtual images

Marker-based

- Software recognizes a particular pattern (barcode, symbol) when the camera points to it and overlays digital images at that point

- AR markers are more powerful than QR codes

- Any 3D image can be a marker

Location-based

Uses the ability of a device to record the position in the world, the way it is pointing and on which axis it is operating and offers data that is relevant to that location

Markerless AR – AR based on natural features

AUGMENTED REALITY – HOW DOES IT WORK?

Display types

Screen-based AR

- On a smartphone or tablet

- Relatively cheap but display is small

AR glasses - Virtual images appear in the air around you

- <u>Video see-through</u> – real world is captured by a camera, virtual images are mixed with the video images

- <u>Optical see-through</u> – the real world is directly perceived with your eyes, the AR glasses display the virtual images on top of your own view

- <u>Projection-based</u> – Augments on a real-world object or physical dummy. Ideal for hardware prototypes.

AUGMENTED REALITY – POPULAR APPLICATIONS

- **Gaming** – for example, Pokémon Go

- **Manufacturing and repair**

- **Medicine** – for example, add information during surgery

- **Education** – Add information to textbooks or during hands-on exercises

- **Forensic research** – for example, police officers can follow arrows to the crime scene

COMPANIES DEVELOPING AUGMENTED REALITY

- **AR platform companies** – provide tools for AR developers

- **Self-service AR companies** - provide content management tools and a limited menu of basic AR effects

- **Custom branded app development companies** – build custom AR solutions

- **AR product and game companies** – develop their own exclusive AR products (books, games)

MAJOR TECHNOLOGY COMPANIES DEVELOPING AR

- **Google** – Google Glass (production stopped in 2015)

- **Microsoft** – Hololens

- **Osterhout Design Group** – two versions of AR glasses

- **Apple** – no product yet but probably working on AR glasses