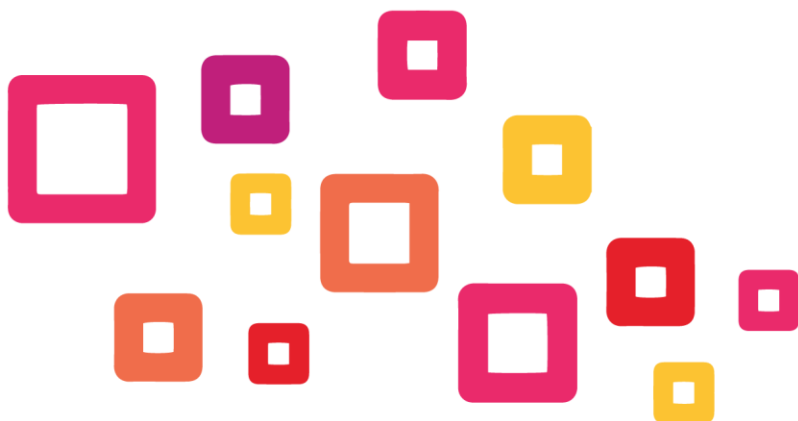


Cre@

102

Virtual Collaborative environment (tools 2.0)

Subunit 2: Hardware and software



Content

Introduction	3
1. INPUT DEVICES	4
2. OUTPUT DEVICES.....	4
3. STRONG PERSONAL COMPUTER.....	5
4. SOFTWARE FOR VIRTUAL REALITY.....	6

Introduction

VR devices are the hardware products used for VR technology to happen. The inputs are received from the user and his surroundings and appropriate view of the world are rendered to displays for VR experiences. Computers are used to process inputs and outputs sequentially. To power the content creation and production significant computing power is required, thereby making PC/consoles/smartphones important part of VR systems. The VR content is what users view inside and perceive so it is equally important as other hardwares.

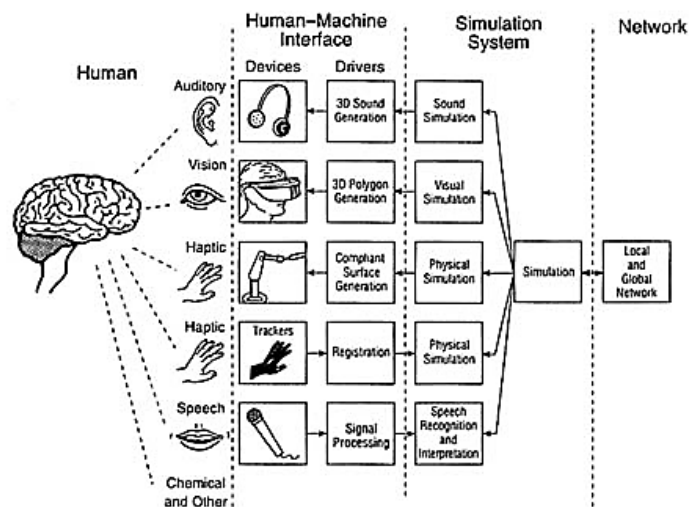


Figure 1: Organization of the computer technology for virtual reality.

In Figure 1, three distinct classes of blocks are shown:

- rendering hardware and software for driving modality specific display devices;
- hardware and software for modality-specific aspects of models and the generation of corresponding display representations;
- the core hardware and software in which modality-independent aspects of models as well as consistency and registration among multimodal models are taken into consideration.

1. INPUT DEVICES

Input devices provides users the sense of immersion and determines the way a user communicates with the computer. It helps users to navigate and interact within a VR environment to make it intuitive and natural as possible. Most commonly used input devices are joysticks, force Balls/Tracking balls, controller wands, data gloves, trackpads, on-device control buttons, motion trackers, bodysuits, treadmills and motion platforms (virtual omni).



Figure 2: Input device HTC Vive and Oculus Rift - hand controls examples

2. OUTPUT DEVICES

Devices that each stimulate a sense organ. Output devices are used for presenting the VR content or environment to the users and it is utmost devices to generate an immersive feeling. These include visual, auditory or haptic displays.

Like input devices, the output devices are also underdeveloped currently because the current state-of-art VR system does not allow to stimulate human senses perfect ideal manners. Most systems support visual feedback, and only some of them are enhanced it by audio or haptic information.



Figure 3: VR output device Oculus Rift HMD example

Oculus Rift is a lineup of virtual reality headsets developed and manufactured by Oculus VR, a division of Facebook Inc., released on March 28, 2016. Oculus maintains a market place for applications for the headsets. The listings are curated to only allow applications that run smoothly on the recommended hardware. Most listings are also rated on their comfort level based on their likelihood of causing motion sickness or number of jump scares. The Oculus Rift runtime officially supports Microsoft Windows, macOS, and GNU/Linux. The installation package includes components such as the headset driver (which includes Oculus Display driver and controller drivers), Positional Tracking Sensor driver, Oculus Service, and Oculus Home Application.

The HTC Vive is a virtual reality headset developed by HTC and Valve. The headset uses "room scale" tracking technology, allowing the user to move in 3D space and use motion-tracked handheld controllers to interact with the environment. HTC VR system consists: Vive headset, two controllers, two base stations and Vive tracker. There are several VR headsets currently on the market: **Vive Pro, Vive Pro Eye, Vive Focus, Vive Cosmos**. SteamVR is widely used open source software with native support for Unity.

3. STRONG PERSONAL COMPUTER

TO effectively drive a virtual reality content, we need strong computer with powerful graphic card.

Minimum requirements for VR READY PC:

- processor i5 or greater
- at least 16 gb RAM
- Graphic card GeForce 1050 or similar (with two external display outputs)



Figure 4 Graphical card and strong computer for VR

4. SOFTWARE FOR VIRTUAL REALITY

Currently there are two leading commercial platforms on the market: **OCULUS** and **HTC VIVE** (STEAM VR). Both platforms offers apps, games and other virtual reality experiences (free and for purchase). Platforms are daily updated with new content (software) and hardware (firmware) updates and bug fixes. Virtual reality apps usually requires large amount of disk space (aprox. 20-30 gb) . We also know other non-commercial VR platforms that are developed for individual customers.



Figure 4: Software STEAM VR

Sources

Web pages

<http://web.tecnico.ulisboa.pt/ist188480/cmuf/devices.html>

Books

National Research Council 1995. Virtual Reality: Scientific and Technological Challenges. Washington, DC: The National Academies Press.

Video gradivo

<https://www.youtube.com/watch?v=OnQEecNfmuY>