HMI course
Human-Machine Interaction
Introduction to HMI –part 2

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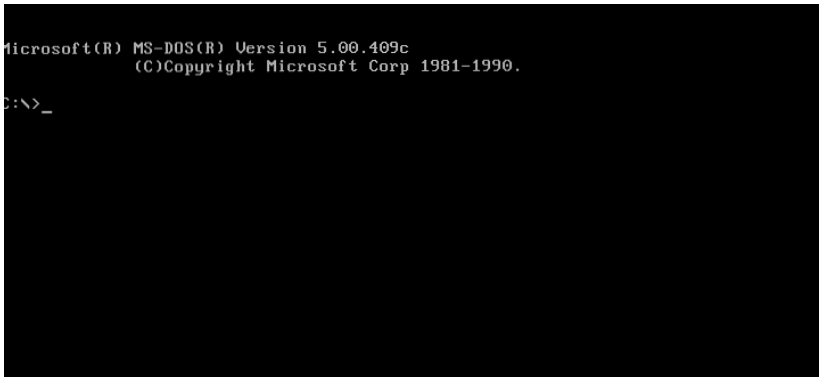
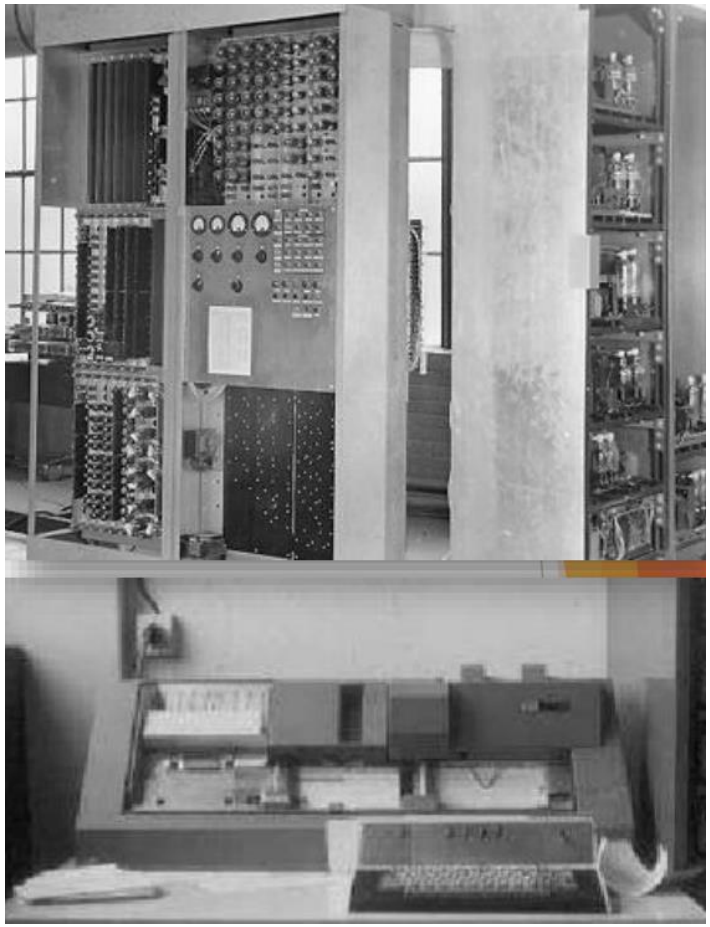
HMI – History

1945-1970: the premises

- Limited input-output devices
- perforators/card readers
- dashboards (indicator lights)
- Printers
- Commands languages

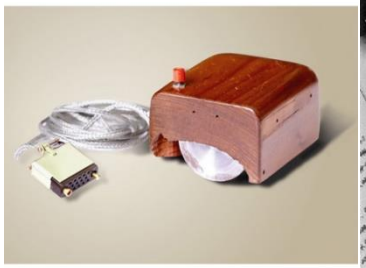


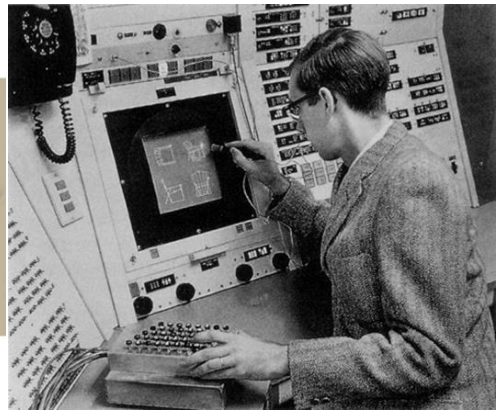


HMI – History

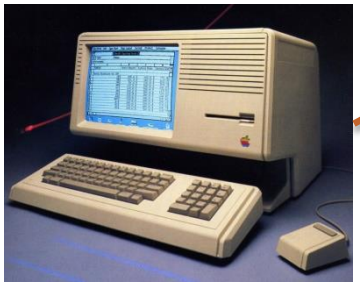
1970s: "modern" computers

- "New" input-output devices
  - 1963: graphic display and optical pen
  - 1963: first mouse
  - 1980s: consumer applications
    - direct manipulation





Xerox 8010 Star - 1981



Appel Lisa - 1982

Macintosh -1984

Windows 3.0 - 1990

HMI - History Evolution of interfaces

- More user-friendly systems, easy to understand and operate
- Graphical interfaces
  - direct manipulation
  - direct action on objects displayed on screen
- WYSIWYG: What You See Is What You Get
- ACAI: Affichage Conforme A l'Impression (print-compliant display)

HMI - History Evolution of interfaces

- ***HMI Today :*** goes beyond simple GUI interaction
  - ⇒**new needs and new technologies for the HMI!**
  - ⇒New I/O devices for interaction

TouchPad

TrackBall (new shapes for mouse)

Game Controller

Digital glove (with position and direction sensors to interact with the virtual world in real time)

Kinect for the Xbox (based on the detection of object movements in front of a camera)

3D headset: immerse yourself in a virtual 3D world

HMI - History Evolution of interfaces

Other dispositifs

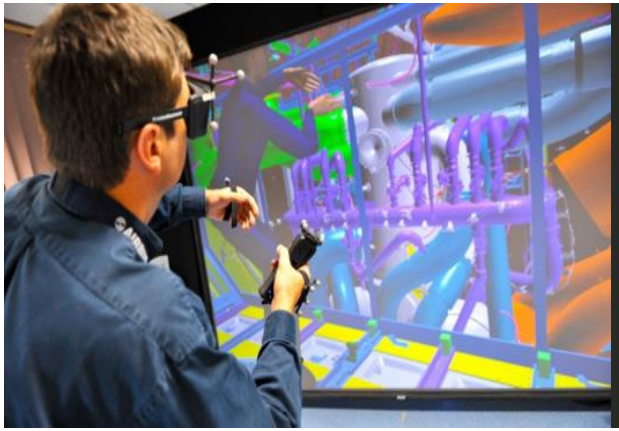
- Temperature, humidity, air composition, light…

- Orientation, proximity, movement, altitude, direction, acceleration, rotation, magnetic field…

- heart rate, noise level, atmospheric pressure, odors…

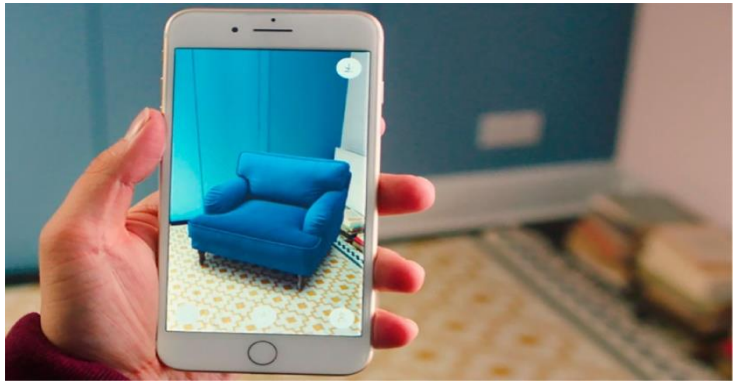
Virtual Riality

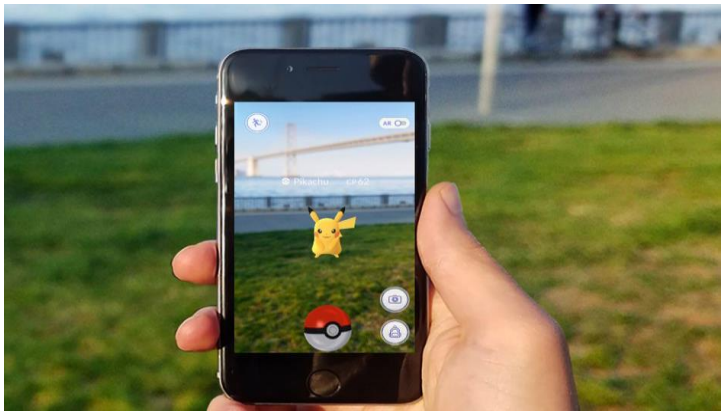
- **Definition**: Computer simulation of an environment in which the user has the impression of evolving
  - immersion in a 3D world
  - user represented by an avatar



Augmented Reality

- Superimposing a (virtual) image on the real thing (or its image)
- The virtual is projected onto the real, in real time on the screen.





HMI- Utility/ Usability

These two concepts are strongly related to ergonomics, which characterizes the adaptation of a system to the work and well-being of human beings.

- **Utility**: is the ability of an object to facilitate the performance of a human activity.

- **Usability**: is the ability of an object to be easily used by a given person to perform the task for which it was designed.

HMI – Fitting/Adaptation features

- **User features**
  - physical differences (age, disability)
  - knowledge and experience (novice, expert, professional)
    - in the field of the task
    - in computing, software
- **Psychological features**
  - visual/auditory, logical/intuitive, analytical/synthetic…
- **Socio-cultural features**
  - date format 05.10.2000, decimal numbers 17.42 / 17.42
  - writing direction
  - meaning of icons, colors

HMI – Fitting/Adaptation features

- **Context**
  - general public (make the product easy to use)
  - leisure (make the product attractive)
  - industry (increase productivity)
  - critical systems (to ensure zero risk)
- **Task features**
  - occasional, regular, daily use, repetitive task
  - sensitive to changes in the environment, risky, time-sensitive…
- **Technical constraints**
  - Platform, memory, band width,
  - screen, sensors, effectors, reuse of existing code

Questions?