Assignment 8

Interactive Systems

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1 Audio Output

Auditory Icons and Earcons

Auditory Icons: An example of an auditory icon is the sound of a paper being crumpled when deleting a file. This sound is used to represent the action of deleting a file. It mimics physical paper being thrown away.

Earcons: In interactive systems, our example of an earcon is the shut down sound on Windows when you shut down your PC. Another example is when you boot up your PC and it the starting sound appears. It simbolizes the boot up process.

Auditory Icons vs. Earcons

The difference between auditory icons and earcons in interactive systems:
Auditory icons are sounds that directly resemble or imitate a real-world action or object, providing a direct link between the sound,
while earcons are non-referential sounds that are arbitrarily and serve as simple audio symbols for something.

Mapping Data to Sounds

Name three acoustic dimensions and provide an example for one of them:

Pitch / Frequency:The musical note of some instrumets sound very different. for example the sound of an bass is far deeper than the sound of a violine. In interactive systems, this is important for creating moods.
Amplitude / Volume:Volume of sounds makes it very easy to differenciate sounds. In interactive systems, (important) warnings are usually way louder than normal notifications. An example would be on windows: an error sound is louder than a email message sound.
Tempo / Duration: The tempo of some sounds have different meangings. For example in the super mario game, when the time is almost up, then the music plays twice as fast. This shows the user that he has almost no time left.

2 Physical Output

3D Printing Basics

First step: Create a virtual simulation of the object you want to create. For example in the program CAD.
Eventually you need to build some supporting structures,too to stabilize the object when printing it.

It is important that the virtual object is in a dataform that the 3d printer can read. That means that the object is build up in horizontal layers so that the printer can print the object layer by layer
Finally the printer can start to print the object. When he is done, you have to remove the supporting material and than you have the object.

Creating 3D Objects

- Additive printing: On an empty platform, some molten materials (i.e. plastic) are "printed" layer after layer in order to build a new 3D Object.
- Subtractive printing: Given a 3D-block of a soft material, you can simply use different kinds of tools in order to remove parts of the block so that the block takes the desired 3D-Form.
- Fabrication: Assembling a 3D object, such as a metal cube, from 2D objects (e.g. sheets of metal). a Laser cutting the objects and after that something assembles the parts. Or cutting sheets with connectors.

The first way would be the described 3D-printing process, where certain materials (usually plastic) are molten and printed layer by layer to create a 3D object (additive printing).
Another way would be to take a block of for example metal and remove material from it with CNC mills or similar devices in order to get the desired object (subtractive 'printing').
The third way would be to assemble a 3D object from 2D objects, for example forming a metal cube by putting together 6 sheets of aluminium (or any other metal for that matter)

3 Gaze Interaction

Midas Touch Problem

The fundamentals of the so called "Midas Touch Problem" are based on the tale of king Midas: Everything he touched turned to gold uncontrollably.
In order to transfer this problem to gaze-interaction, we translate the touch with the gaze. Assuming we have a gaze-interface system, then it means that it will always be activated when the gaze falls on it. This means that the system can't distinguish between intentional and unintentional gazes. So it can't decide if the users' gaze is simply casual (nothing to do for it) or an intended command for it to handle.
It's especially relevant for gaze-based interaction as every gaze can lead to unintended commands which may result in errors or simple mistakes when using the whole system.

Mobile vs. Stationary Eye Trackers

- Mobile Eye Trackers:
  Mobile eye trackers are especially useful for people with motor disabilities (i.e. hands or feet). As the eye trackers are integrated in wearable devices ("mobile") (i.e. headsets or glasses) the user can give commands to prostheses or other devices that will help him in order to accurately steer or control them via his gaze while moving in the world.

- Stationary Eye Trackers:
  At the moment, stationary eye trackers are most commonly used in research and testing, as they require the necessary preparations in order to work flawlessly. One big example for this is in the advertisement industry: By the use of (stationary) eye trackers, the effect of their advertisement can be tested and perfected for different kinds of people in the same laboratory room, as long as they use the same external conditions.
  This way, the team can determine which elements of their advertisement attract the most attention and should be prioritized; how long the viewer focuses on which part of it and (if the system is sophisticated enough) which emotional response it provokes.

Adaptive User Interfaces

One very interesting example could be simple video-conferences: By using eye tracking on each participants end, the system can identify who is actively speaking and who he is

talking to right now specially. That way, it can shift their video-feed closer together or generally enlarge it so that it is a more natural conversation for the other participants. For this it must be sophisticated enough not to succumb to the Midas touch problem.