Università di Pavia

FIRB Project
Software and Communication Platforms for High-Performance Collaborative Grid (application level)

Tunis, March 29th, 2007
Main research directions

• Vision-based perceptive interfaces for explicit and implicit communication
• Graphic learning approaches
• Eye tracking for evaluation of E-learning environments and development of eye-based perceptive interfaces
• (future) Computer-supported 3D virtual environments for collaborative learning
Vision-Based Perceptive Interfaces

Subset of perceptive interfaces

the computer “sees” the user…

Recognition of:

– hand/arm gestures and postures
– head movements and postures
– gaze direction
– face expressions
– whole body movements
Explicit vs. implicit communication

Explicit communication (⇒ control)
users are fully aware that their actions will be interpreted as direct commands

Implicit communication (⇒ awareness)
users’ behaviour is indirectly observed to draw information about their activities and "emotional" states
Does the quality of interaction matter in e-learning?

**yes! (of course):** yet, many e-learning systems are still based on complex procedures and unusable interfaces…

More natural interaction = better interaction for any application, but especially for e-learning

Vision-based interfaces for e-learning can help to improve **user** \(\Rightarrow\) **computer** communication (i.e. **learner** \(\Rightarrow\) **virtual teacher** communication)
Example: Gesture-Enhanced Mouse

Perceptive interface for explicit communication
Hand gestures performed nearby the mouse are interpreted as specific input commands
Graphic learning approaches

Example: 
**GraphQL Builder**  
(a graphic transposition of SQL)
Eye tracking (1)

The Tobii 1750 Eye Tracker is integrated into a 17" TFT monitor. It is useful for all forms of eye tracking studies with stimuli that can be presented on a monitor, such as websites, slideshows, videos and text.
Eye tracking (2)

Usability studies

analysis of eye scan paths, fixations, ...
Eye tracking (3)

Perceptive interfaces

– implicit communication
  • emotional status: is the user "getting nervous"?
  • learning constraints: has the user read an important part of a tutorial?

– explicit communication
  • new eye-based interaction modalities for disabled users
  • new eye-based interaction modalities to be integrated with ordinary input devices (keyboard, mouse, …)
3D Virtual environments

• E.g. "virtual set" - Both virtual and real objects mixed into a 3D computer generated space
• Main problem: occlusions between actors and virtual elements