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

E-learning and machine perception

Does the quality of interaction matter in e-elearning?

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 ⇨ computer** communication
(i.e. *learner ⇨ 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:
GraphSQL 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

Testing with stimuli presented on a computer screen

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