GAZE COMMUNICATION DEVICE FOR SEVERELY HANDICAPPED SUBJECTS

FINAL REVIEW  APRIL 2001
GAZE COMMUNICATION DEVICE FOR THE SEVERELY HANDICAPPED

- Initial state of the art & user requirements
- Development of the demonstrator & demonstration
- Evaluations and results
- Dissemination & exploitation
- Future developments
- Live test by reviewers
Initial state of the art & User requirements

1998:
• Major constraints
• Limited applications
Initial state of the art & User requirements

constraints of the initial state of the art:

• reduced ambient light
• problems with small pupils
• no efficient tracking of head movements
• poor autonomy
• not a “see and point” interface (mouse emulation)
• compatibility with PC Windows environment
• problems for users lying in bed
these user requirements implied major new technical developments that were not initially planned

the consortium chose to modify the project so as to find solutions to these problems:
- emulate the mouse interface
- redesign the analysis of eye images
- add a 2nd “head” camera in order to locate the eyes
Development of the demonstrator
Development of the demonstrator

- New automated analysis of the eye image solution to small pupils and external lights
Development of the demonstrator

• emulation of mouse interface

  cursor controlled by eye gaze

  mouse events controlled by
  • fixation duration,
  • eye blinks or
  • external contact
Development of the demonstrator

• emulation of mouse interface: mouse events and options

Left button

Selection of single click, double click, drag and drop

Right button

VISIOBOARD

Telematics DE4211
Development of the demonstrator

Standard applications:

- text writing with text editor and on-screen virtual keyboard (Wivik)
- internet: browsing, email, chat …
- multimedia: cdrom, movies, games, …
- drawing
Development of the demonstrator

Specific applications:

- James II (FST) ==> environment control

- Visioboard - First steps (Adapth) => learning how to use Visioboard
Development of the demonstrator

Specific applications:

- Visioboard - Keyboard (Metrovision) => simplified interface

- Visioboard - Easycom (Chu Lille) => specific interface for intensive care
Development of the demonstrator

- Tracking of head movements in 3D
- Analysis of the head image
Development of the demonstrator

Reclining arm and support for adaptation to users in armchair and in bed
5 different evaluation platforms
• ADAPTH, Luxemburg (2 users)
• Cooss Marche, Italy (2 users)
• FST, Switzerland (4 + 16 users)
• Delta7, France (20 + 5 users)
• CHU Lille France (2 users)
Evaluation and results

- 7: not able to use an existing communication device,
- 20: not “efficient” with their present solution
- 3: no need for a new alternative but useful feedback due to their past experience.
Evaluation and results

• 16 : in wheel chairs,
• 7 : in bed
• 7 : 16 users in wheel chairs

Delta7, France

Chu Lille, France

FST, Switzerland
Progressive evaluation

- **step 1:**
  ability to move the mouse cursor over different locations of the screen

- **step 2:**
  ability to point at graphic objects on the screen with decreasing size

- **step 3:**
  ability to write a text with a virtual keyboard

- **step 4:**
  ability to use the full features of the Windows interface
Evaluation and results

Results

- technically, Visioboard has reached the established project goal. In fact the developed “see and point interface” allows to use any mouse driven software on a Windows operating system platform. The achieved pointing precision allows the access to the new information and communication technologies as proposed in the project objectives.

- Visioboard can be used in different positions and environments. Its has been evaluated in a sitting as well as in a lying position in care centres, hospitals and at the user's home.
Evaluation and results

Results
- the installation and the learning phase require the advice and on site presence of an assistive technology expert.

- It has been verified that it is only possible to advice the Visioboard on functional specifications followed by a precise evaluation in comparison with alternative solutions.
Dissemination & Exploitation

The market:

definition of potential customers:

1- achieve better performance with Visioboard compared to any other suitable assistive device

2- can receive support and advice from professionals in assistive technology

3- have the financial capability to buy the system