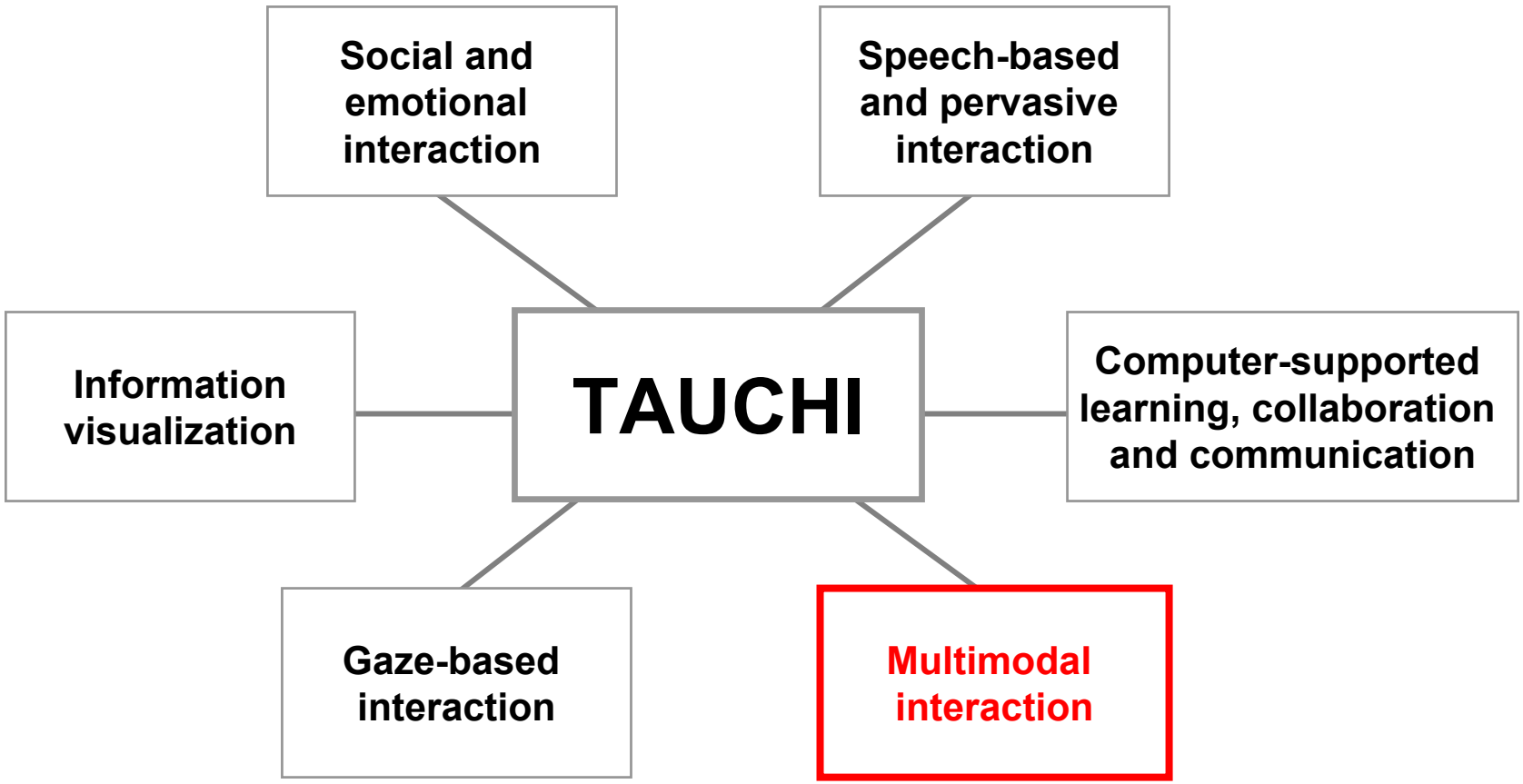
Multimodal Interaction Research Group in the TAUCHI Unit at the University of Tampere

Prof. Roope Raisamo (rr@cs.uta.fi)

http://www.cs.uta.fi/hci/mmig/

Research Groups in TAUCHI



Usability laboratory

Personnel

Group Leader: Prof. Roope Raisamo

Full-time researchers and teachers:

M.Sc. Poika Isokoski, M.Sc. Maarit Mannonen,
M.Sc. Tatiana Evreinova, M.Sc. Erno Mäkinen,
Ph.D. Grigori Evreinov, Jukka Raisamo, Jouni Salo

Part-time researchers:

Matias Hasu, Petri Tuominen, Saija Patomäki,
B.Ed. Virpi Pasto, Katri Kangas, Jyrki Parviainen

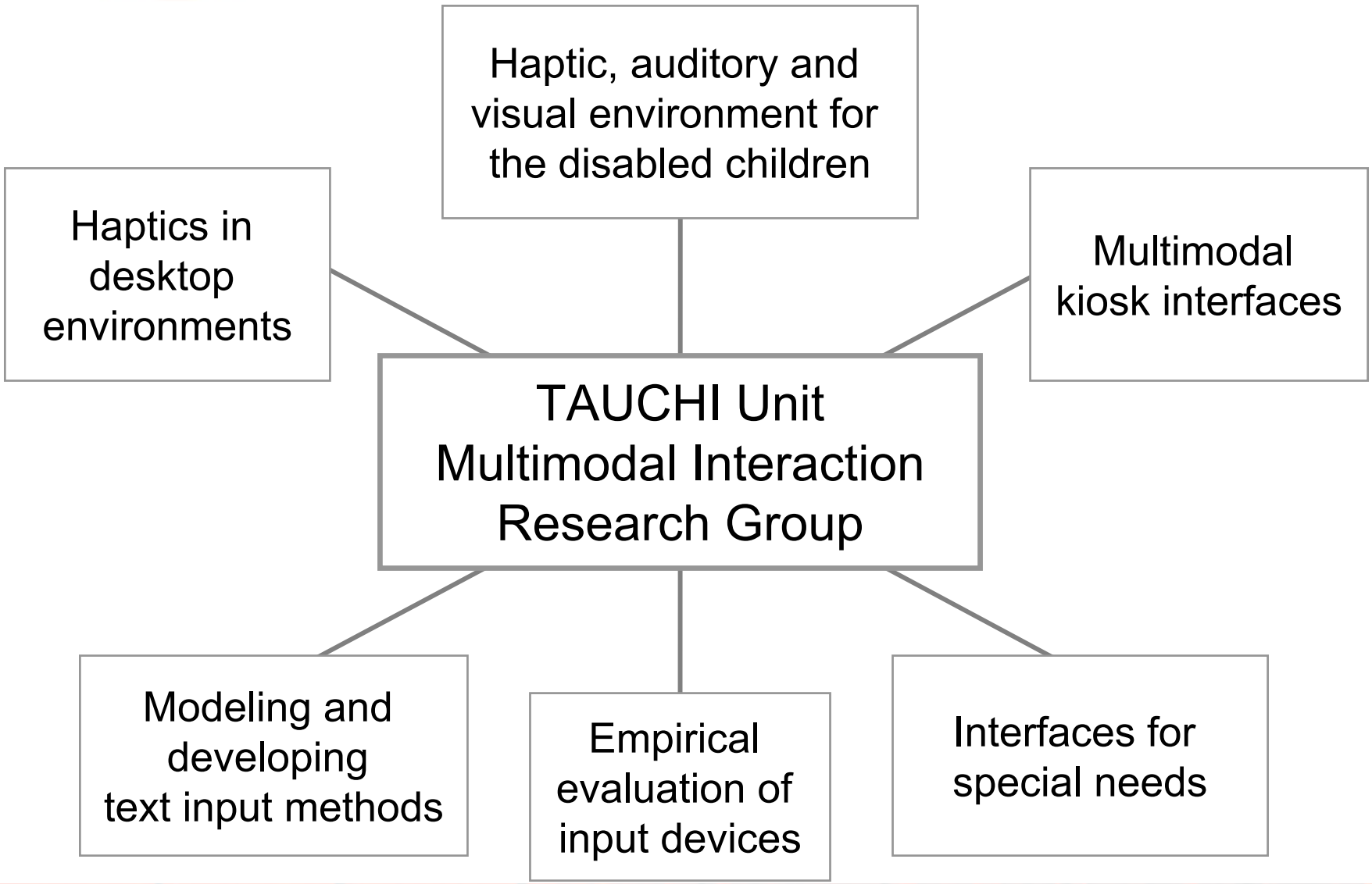
Project coordinator:

Arto Hippula

Other members:

Toni Pakkanen, laboratory engineer

Research themes



Haptic feedback devices

Inexpensive devices:

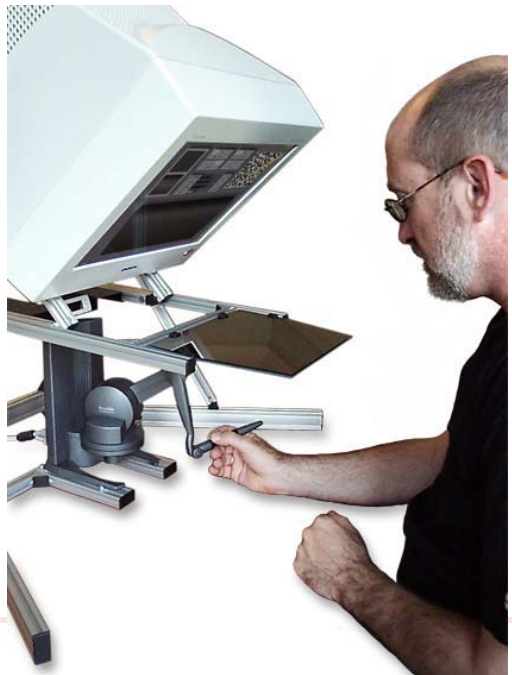
- The most common haptic devices are still the different force-feedback controllers used in computer games, for example force-feedback joysticks and wheels.
- Immersion Corporation's force feedback mouse: Logitech Wingman Force Feedback Gaming Mouse
- Immersion Corporation's tactile feedback mouse: Logitech iFeel Tactile Feedback Mouse

Haptic feedback devices

More sophisticated and expensive devices:

- SensAble Technologies: PHANTOM
- Immersion Corporation: CyberTouch

CyberTouch



PHANTOM

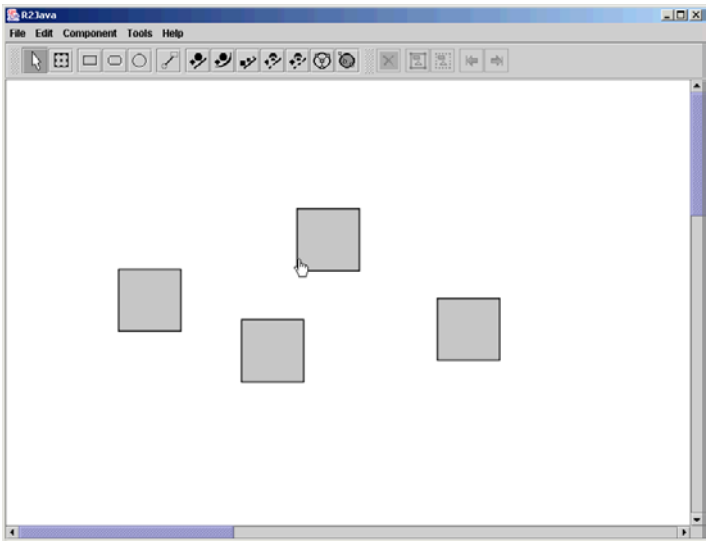
Haptics in Desktop Environments

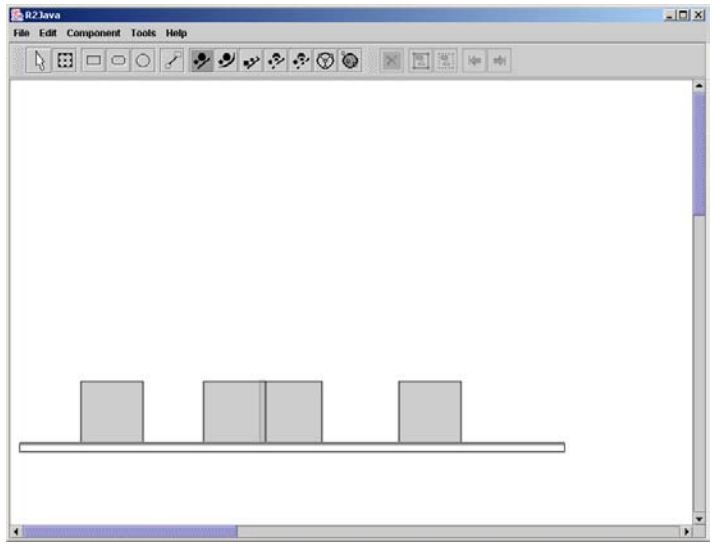
People: Jukka Raisamo, Katri Kangas, Jyrki Parviainen, and Roope Raisamo

Financed by the Academy of Finland and Tekes

- How and when to use haptic feedback in graphical user interfaces?
- We have two main research platforms:
  - In a **diagram editor** we use the TouchSence technology provided by Immersion Corporation (Logitech iFeel Mouse, Logitech Force Feedback Gaming Mouse).
  - In a **3D visualization program** we use the PHANToM device by SensAble and Tactile datagloves by Immersion Corporation .

Alignment Stick[1,2]

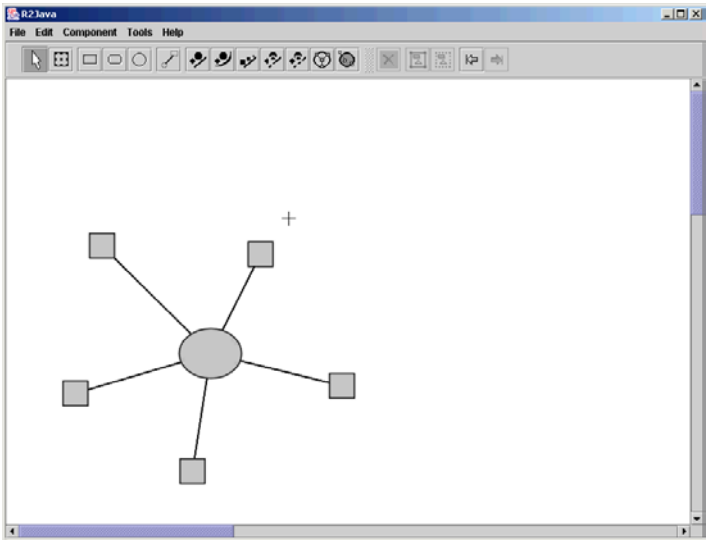


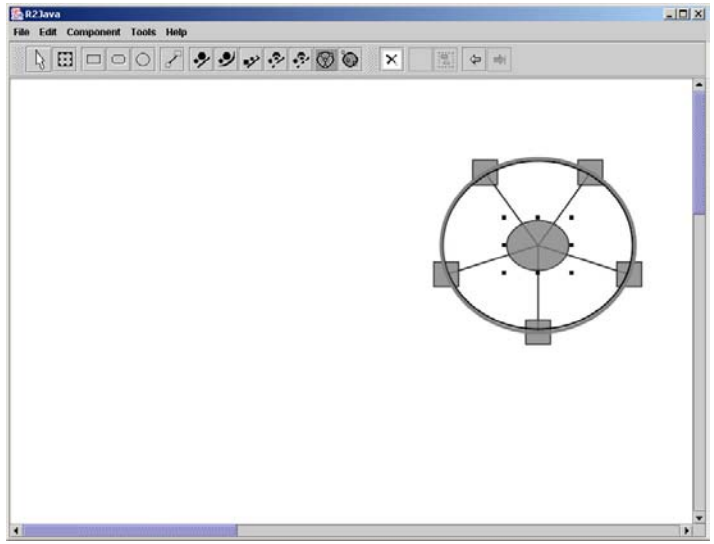


- Provides linear alignment with an interactive tool
  - the tool cursor can be freely adjusted and moved
  - the selected objects stick with the cursor
- Removes one step in the alignment process compared with the command-based tools

[1] Raisamo & Räihä 1996, [2] Raisamo & Räihä 2000

Alignment Ellipse[3]

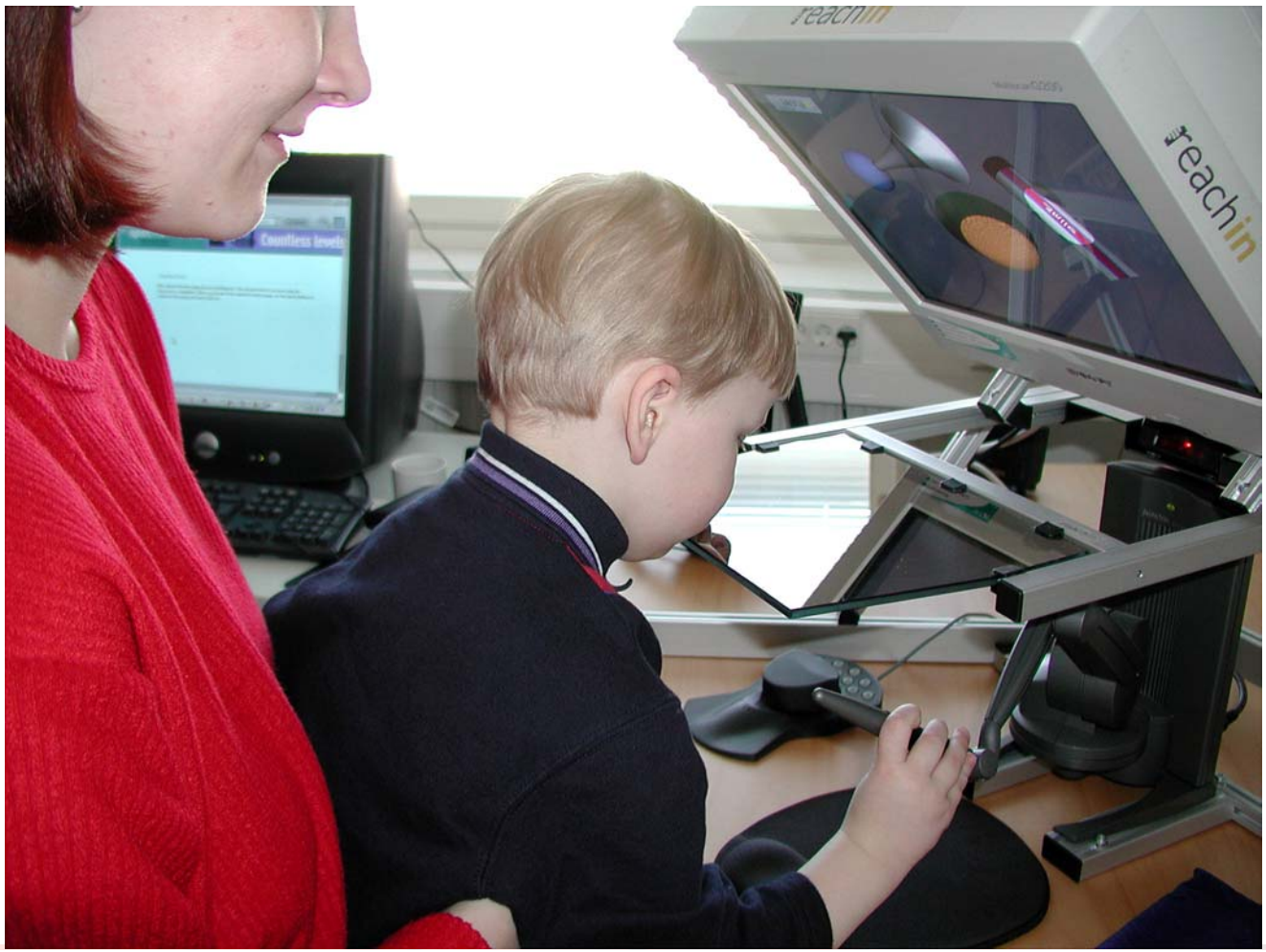




- Follows a rubberband metaphor
- Makes it easy to align objects in a circular form around the center object
  - can be used to create clusters for several purposes

[3] Raisamo and Raisamo 2002

Haptic, auditory and visual environment for visually impaired children



Haptic, auditory and visual environment for visually impaired children

People: Maarit Mannonen, Virpi Pasto, Jouni Salo, Arto Hippula, and Roope Raisamo

Financed by NUH, Nordiskt Utvecklingscenter för Handikapphjälpmedel

- Haptics will be used with visual and auditory modalities to make the user interface more informative and concrete.
  - Our focus in on tutoring systems for the visually impaired children
- Redundant information can compensate for disabilities.
- We cooperate with the research teams and organizations for the disabled people in the Nordic Countries.

Multimodal kiosk interfaces

Multimodal kiosk interfaces

- Currently possible applications with the kiosk
  - Interface agent can turn to user's direction
  - The agent can greet and farewell the users
  - Help can be provided to the user
  - Users can be invited to use the kiosk, when detected nearby

Multimodal kiosk interfaces[4,5]

People: Erno Mäkinen, Petri Tuominen,
Saija Patomäki, Matias Hasu, and Roope Raisamo

Financed by Tekes (& Helsinki University of Technology)

- The emphasis is on research and development of multimodal information kiosk interfaces.
  - Our present kiosk is a multimodal system in which a touchscreen acts as the main input and output device.
  - machine vision, user interface agents and alternative input methods are investigated and developed to augment the interface.

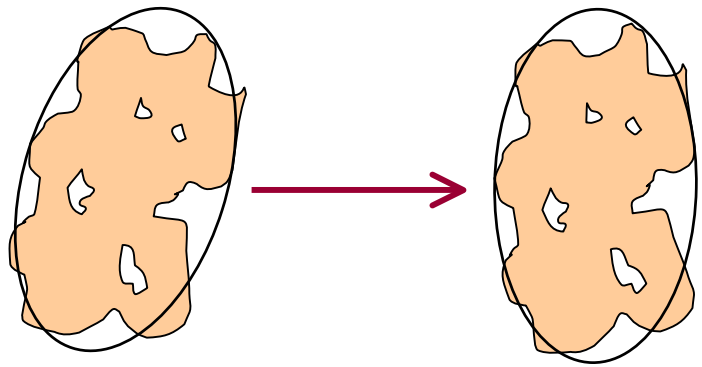
[4] Mäkinen *et al*. 2002, [5] Mäkinen and Raisamo 2002

Computer Vision Method

Background model

Subtraction

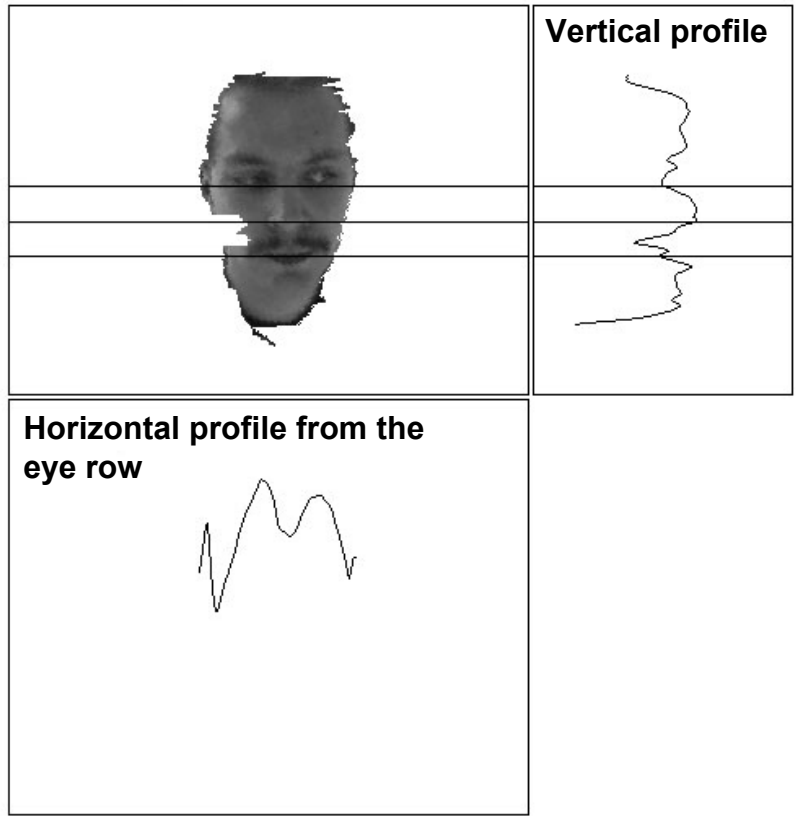
Skin colored regions



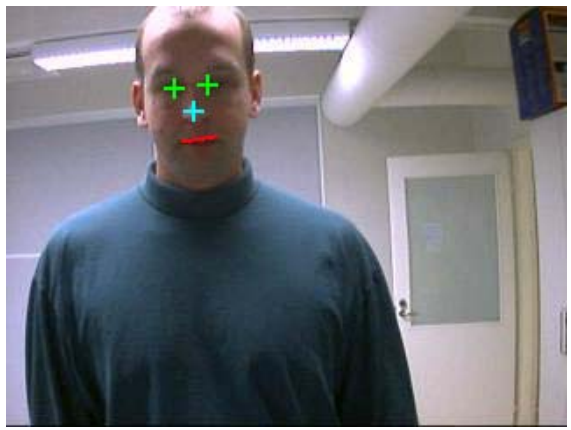
Best fitting ellipse

Computer Vision Method

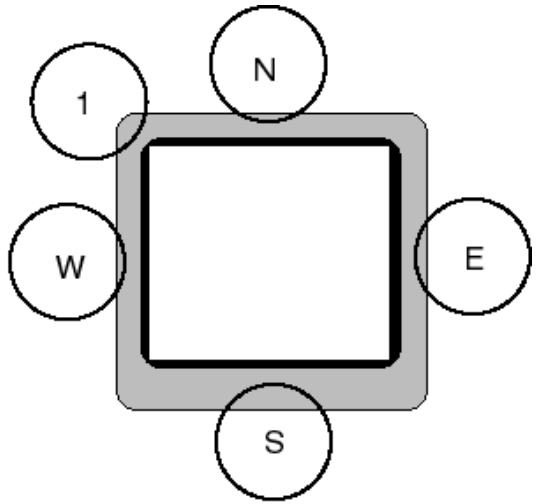
- Min-Max Analysis
  - Vertical profile
  - Horizontal profile
  - Facial feature candidates
- Fuzzy Analysis
  - 11 Fuzzy rules based on face geometry
  - Face probability
  - Locations of the facial features in the face



Results



Modeling and developing text input methods



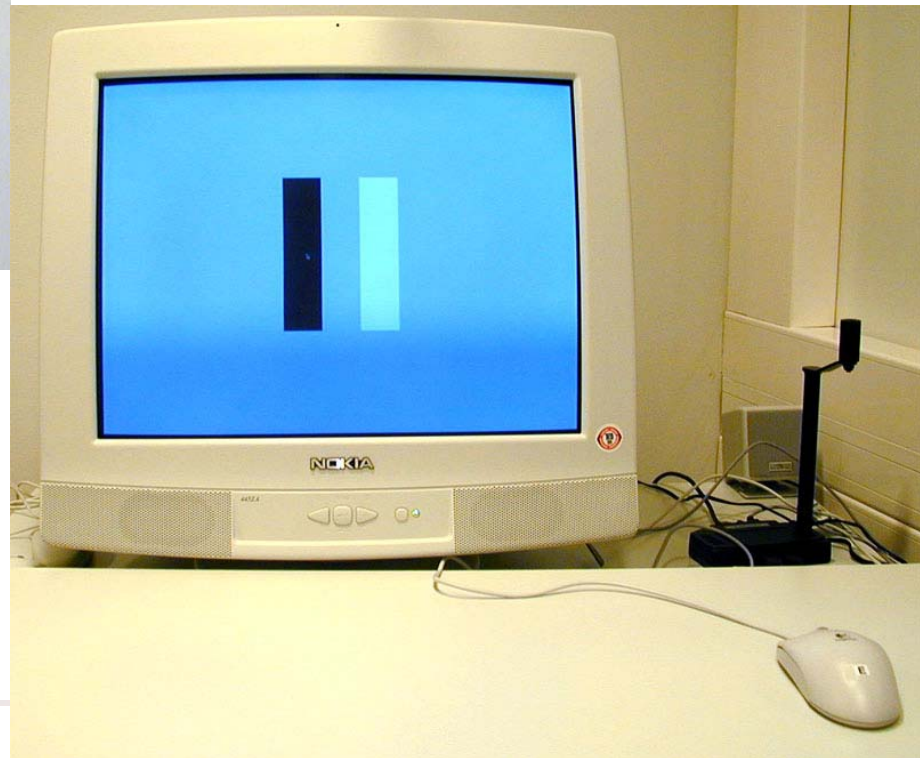
Modeling and developing text input methods

People: Poika Isokoski and Roope Raisamo

Financed by Tampere Graduate School for Information Science and Engineering (TISE)

- The emergence of small mobile computing devices has brought up the need to change the way we write.
  - Both handwriting and touch-typing skills are equally useless when writing with a typical mobile phone.
- The goal of our text input research:
  - To produce knowledge and technology that is needed by the device manufacturers and the users to choose wisely when they decide upon which writing system to use.

Empirical Testing of Input Devices



Empirical Testing of Input Devices

Empirical Testing of Input Devices

People: Poika Isokoski, Toni Pakkanen, and Roope Raisamo

Financed by the TISE and the University of Tampere.

- Fitt's Law testing.
- Developing models to predict the use of certain devices.
- Testing of different classes of input devices for different tasks.

Interfaces for special needs

People: Grigori Evreinov, Tatiana Evreinova, and Roope Raisamo

Financed by the Academy of Finland and CIMO

- Auditory feedback, sonification
- Haptic interaction devices based on different technologies.
- Displays for special needs
  - Near-eye displays
  - Ambient displays

Reachin Display

Haptic Display:

PHANTOM™ Desktop
Position resolution: 0.02 mm
Workspace: 16 x 13 x 13 cm
Maximum exertable force: 6.4 N (1.45 lb)
End effector: Stylus
6 DOF positioning, 3 DOF haptic feedback

Visual Display:

Mirror type: Semi-transparent
Monitor type: 17” Sony Trinitron CRT
Resolution: 1280 x 720 @ 120Hz
3D stereo: CrystalEyes, wireless
Positioning device: 6 DOF
Magellan/SpaceMouse

Summary

- The Multimodal Interaction Research Group at TAUCHI is a group of 16 people.
- Our research covers multimodal aspects of visual, auditory and haptic feedback in selected topics.
- Our research is constructive and iterative, building real multimodal systems that are empirically evaluated.

Summary

- Thank you! Questions?