

## Übung 6 – Mensch-Maschine-Interaktion

### **Topic: Novel Applications for Gaze Tracking Input**

#### ***Part 1: User Interface Concept and Interaction Design***

(Per-group task, 2 weeks)

In gaze tracking solutions, the gaze direction of the user (where the user looks on the screen) is used as input, similar to other pointing devices, such as a mouse. So far, these systems are mainly used for disabled people (e.g. gaze keyboard for paralysed people). However, this modality could also be used for novel interactive applications.

Your task is to create a design for an application which makes use of eye gaze user interaction. Consider the following side conditions:

- The minimum target size on screen should be about 50 pixels
- Allow for a delay time of up to 100 ms (time required for low-level recognition and tracking)
- For selecting (“clicking”), you can use several options: Dwell time (position of gaze does not change for certain time, e.g. 800 ms), blinking (user closes and opens eyes) or multi-modal interaction (pressing a key or mouse button).

As a starting point, you may consider enhancing conventional desktops or desktop applications with an additional modality, enhancing applications for accessing and viewing media, interactive games, or domain-specific applications where people do not have their hands free.

Describe your concept using additional screen sketches on no more than two pages. Your concept should be novel and not reproduce typical existing eye gaze applications.

#### ***Part 2: Prototypical Implementation***

(Per-group homework, 2 weeks)

Create an application which implements the main ideas of your concept. The implementation is a prototype, so you can simulate functionality which is not easy to implement fully. For example, use a screenshot of the application that is manipulated rather than implementing the full application.

The prototype should be tested with the gaze tracker available at the lab in Amalienstraße. The gaze tracker is based on a Windows XP computer which offers a Java runtime environment.

Access to the gaze tracking data is possible via a TCP connection to the local host.

The eye gaze data consists of lines of ASCII text in the following format:

```
timestamp:x-position:y-position:pupil-width:pupil-height
```

The timestamp is measured in milliseconds. A new line of data appears roughly every 20 ms.

The x and y position and width/height are measured in screen pixels, the screen resolution is 1024x768. Coordinates may be negative if the user's gaze is directed outside the screen. The used coordinate system is the standard screen coordinate system with the origin at the upper left corner of the screen. An example stream of eye tracking data can be obtained by connecting to IP 141.84.8.49 on port 5000. In Java, TCP connections can be made using the `Socket` class.

**Submission:**

- Submission of the solution is by email to [mmi1@hcilab.org](mailto:mmi1@hcilab.org)
- Part 1: Please use a PDF attachment named `uebung6-gruppeN.pdf` (N is your group number). The document must be written in English.
- Part 2: Use a zip attachment named `uebung6-gruppeN.zip`
- Deadline for submission: **Tuesday, January 24th 2006, 8 a.m.**
- In the week of January 16th to 20th, there are no exercises, but we are available to help and advise on problems with the eye tracker
- Presentation of results: Exercises on January 24th/25th/27th. Each group member must be able to explain her/his group's solution in the exercises session.