Eye-Controlled Interaction
Using the Dikablis Eye-Tracker

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Content

1. Motivation
2. Dikablis Eye-Tracking System
3. Technical Realisation
4. Demo Video
5. Applications
1. Motivation
Motivation

Tetraplegia
– Palsy of feet and hand
– Caused by Locked-In Syndrom and Accidents

Figures
– 6,000 cases in Germany
– Approx. 72,000 cases all over Europe

Idea
– Enable those people to control devices in the environment directly using their eyes
2. Dikablis Eye-Tracking System
Dikablis Eye-Tracking System

Head-Unit
- Weight: 69g
- Can be worn with normal glasses
- No limitation in head- and body movement

Versions
- Cable: 50m
- Wireless: 500m
- Wireless Plus: 5000m
Dikablis Eye-Tracking System

**Head-Unit**
- Weight: 69g
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- No limitation in head- and body movement

**Versions**
- Cable: 50m
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**Software**
- Dikablis Recording Software:
  - Live View
  - Realtime Interface
- D-Lab Analysis Software
  - Automated gaze data analysis due to marker-based head-position measurement
  - Automated Area of Interest based analysis
3. Technical Realisation
Eye-Camera

Field-Camera

Pupil Detection
eye_y

eye_x

Calibration
field_y

field_x

Marker Detection

x- and y-coordinates of the corners of the markers in the coordinate system of the field-camera
Eye-Camera

Pupil Detection

eye_y

eye_x

Calibration

field_y

field_x

Field-Camera

Marker Detection

x- and y-coordinates of the corners of the markers in the coordinate system of the field-camera
Pupil Detection

eye_x

eye_y

Calibration

field_x

field_y

Marker Detection

x- and y-coordinates of the corners of the markers in the coordinate system of the field-camera

marker_x

field_y

field_x
- Transformation from fixation in field-cam coordinates in marker coordinates
- Fixation in all marker coordinate systems
- Allows design of eye-controlled interaction with any kind of devices
Digitalisation of the Environment – Interaction Areas
4. Demo Video
5. Applications
Applications

- Eye-Control for any kind of devices
- Interaction solutions for disabled people and hands free operation
- Development of multimodal interaction strategies
- Integration of subjects’ behavior into experimental design
- Head-Position measurement in any environment
- User-based execution of events
...Discussion

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