Dikablis Glasses & D-Lab Eye-Tracking
1. Overview D-Lab Measurement & Analysis Solution
2. Dikablis Glasses
3. D-Lab Eye-Tracking Software
4. Outlook
1. Overview
Overview

**Sensors**
- DataStream: Network, CAN, Fieldbus
- Videos: PAL, IP, IP PTZ, DVI
- Eye-Tracking: Head-Mounted, HMD

**Audio**
- Network, CAN, Fieldbus

**Physiology**
- Motion

**Process Software**
- D-Lab
- Plan → Measure → Analyze
2. Dikablis Glasses
Dikablis Glasses

- Dikablis Glasses
  - Cable
  - Mobile
  - Wireless
- Tracking frequency: 50Hz
- Weight: 69g
- Accuracy:
  - Pupil detection: 0,1°
  - Glance direction: 0,3° – 0,5°
- Camera viewing angle: 45° - 120°
- Portable with:
  - Normal glasses
  - Shutter glasses
  - Polarized glasses
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  - Normal glasses
  - Shutter glasses
  - Polarized glasses
- Hardware Development Kit covers all other cases (e.g. HMD integration)
Dikablis Glasses - Versions

**Dikablis Cable**
- Mobility: 50m
- Data-Transmission via Cable
- Live View & Real-time & Offline access to data

**Dikablis Mobile**
- Mobility: unlimited
- Data is recorded on 11” laptop
- Real-time & Offline access to data
- Battery life: 3h

**Dikablis Wireless**
- Mobility: up to 500m
- Data-Transmission via wireless digital radio communications
- Live View & Real-time & Offline access to data
- Battery life: 2.5h
3. D-Lab Eye-Tracking Software
Changing Lighting Conditions

Hardware:
- 11mm thick bandpass filter in front of eye-camera
- Perfect adjustment between:
  - Band of the bandpass filter
  - IR illumination
  - Sensitivity of eye-camera chip

Software:
- Blending Mode
- All raw data is stored (videos of field-camera and eye-camera)
- Allows:
  - Control of pupil detection
  - Offline pupil detection

Result:
- Data can always be analyzed under all kinds of conditions
- No data has to be thrown away
Coordinate Systems

- Transformation from fixations in field-cam coordinates in marker coordinates
- Fixation in all marker coordinate systems
- Allows design of eye-controlled interaction with any kind of devices

Pupil detection – eye-cam coordinates

Fixations in field-cam coordinates

Marker detection

(2,2/1,8)
Data Analysis – Marker-based

- D-Lab detects markers and uses them as a reference
- Markers can be attached in the environment (static) or at dynamically moving AOIs
- One can define an unlimited number of AOIs of any shape per Marker
- D-Lab analyzes automatically glances towards defined AOIs
Data Analysis – SmartTrack

- D-Lab detects natural objects (static or dynamic) and uses them as markers
- AOIs can be defined relative to these markers (by drawing polygons)
- D-Lab analyzes automatically glances towards defined AOIs
Data Analysis – Workflow and Metrics

**AOI Definition and calculation of glance durations**
- AOIs of any shape can be defined
- Glance durations are calculated automatically
- Glance durations are visualized as timeline bars and in a list

**Statistical Analysis**
Define rules for the Calculation of Glance Metrics:
- Select Task Intervals
- Select Areas of Interest
- Select Metrics (glance based and pupil based)

**Visualization of Results**
- Tables with Metrics and Descriptive Statistics are automatically created
- Graphical visualization as GazeFlow Diagrams and HeatMaps
4. Outlook
Dikablis Glasses

• New Dikablis SmartGlasses in January 2014:
  – New Design in Google Glasses Style
  – HD FieldCamera
  – Monocular/Binocular Eye-Tracking with 120Hz

• New Dikablis HRGlasses in July 2014:
  – FullHD FieldCamera
  – Binocular 250Hz

D-Lab Software:

• Continued integration of 3rd Party sensors and related methods
  (e.g. Remote Eye-Tracker, GPS, Motion Capturing, Physiology, etc.)
• Scripting language (realtime and offline)
Thank you!