

Annex 1 – Technical Specifications

Eye-tracking system - requirements

We seek an independently working system which allows monitoring of a tested person’s gaze, particularly for the needs of traffic surveys within the research of the transport infrastructure arrangement impact on tested persons when driving in traffic, including subsequent evaluation. It is a mobile method to monitor and distinguish gazes within the safety analysis and analysis of tested person’s gazes in space. The system must include hardware equipment for an easy use in a vehicle or another means of transport and software for the evaluation of data recorded during driving.

The system must allow:

- recording of a tested person’s gaze in a video-recording with simultaneous recording of his/her eye movement and subsequent evaluation of the recording,
- monitoring of a tested person’s gaze (driver) and effectively evaluate his/her gaze and eye reaction, particularly what he/she saw, whether he/she perceived what he/she saw, and whether he/she was able to realize and react correctly to a perceived pattern or element,
- monitoring of directly visible eye gaze courses and all parameters of physiological parameters of eyes (e.g. eye fixation, movement and direction of gazes, foveal (2° angle) and parafoveal (10° angle) eye vision, winking and winking rate, time of closed lids, size and movement of pupils, etc.).

Requirements to HARDWARE:

- compact lightweight structure in the form of glasses + recording device which can be placed e.g. on a tested person’s belt
- recording of tested person’s eyes as well as recording of the gaze scene
- operation temperature range min. -10°C to +50°C
- ability to resist dynamic load during movement in a vehicle
- minimum number 2 pcs
- the lowest weight not disturbing a tested person
- sufficiently resistant construction resistant to wear out
- designed for particular use while driving in traffic
- evaluation particularly from a video, also possible from static images
- video-recording resolution min. 640x480 pixels
- time of recording in traffic using a built-in batter for at least 60 minutes
- time axis for an easy movement within the video-recording

Requirements to SOFTWARE:

- easy to use
- evaluation with the use of software independently of the system provider
- ability to process and evaluate the statistics of tested person’s gaze monitoring
- exporting of results in tables (e.g. to Excel), list of values, graphs, and statistics, including export of the video-recording
- working under Windows: WinXP/Win7/Win8
- number of licenses 2 pcs
- free of charge update and upgrade for minimum of 3 years from contract conclusion
- software must be able to evaluate and export at least the following requirements:
 - **Time bubbles (time circles)** – used for the evaluation and visualization of the frequency and length of tested person’s gaze to his/her interest point and view. Displayed on a video, e.g. with the use of circles (bubbles), the larger circle, the longer time moment which tested person spent looking at a single spot.
 - **Perception performance** – Visualization of tested person’s ability to perceive image information. The perception is displayed with the use of colours, shapes, or contrast in the video.
 - **Perception circles** – Visualisation with the use of circles outlining a spot the tested person looks at, at the same time a line (path) should be marked representing visual memory of approx 1 second (short-term memory). Furthermore, it should be possible to display two concentric circles: one for more focused gaze of tested person (foveal) and the other less focused (parafoveal), so that it could be possible to identify what a person can see and is able to perceive.
 - **Priority area** – Display of concentration and division of the examined scene out of all eye fixations of the tested person into certain spots of the visible scenes, so that it would be possible to identify what is the most attractive for the eye of the tested person in a given scene, so-called interest intensity, heatmap (area of interest).
 - **Perceived image** – only shows the part of image which was perceived.
 - **Gaze path** – constant (within the pre-determined time) display of eye gaze trajectory path on the examined scene. This trajectory needs to be marked in the recorded video.
 - **Winking analysis** – Duration of individual winks, number of winks in time
 - **Revelation of information defects** – Determine where, when and for how long the perception of tested person, looking at scene, was interrupted.
 - **Summary of findings** – Final summary of the analysis of the tested person’s perception in the form of tables, lists, graphs, and statistical evaluation.

General requirements:

- complete functional system without the need to be further developed which would cause the time delay of delivery
- operating personnel training for 5 persons included in the price of delivery