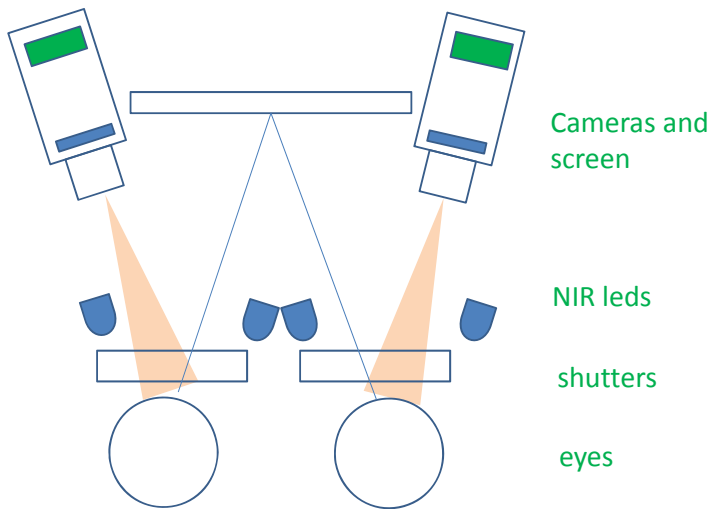
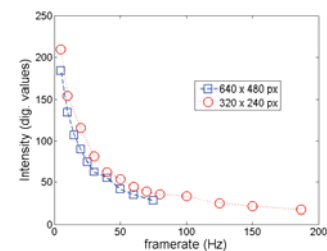


Eye pupil is a relatively slow acting system, which is a part of neural system and can be used as indicator of neural load and visual fatigue. To study the eye pupil cooperation we developed the system incorporating high frame rate CCD equipped with IR band pass filter and narrow angle optical objective.

Band pass filter is chosen to transmit the light other 850 nm wavelength. The sensitivity of CCD to infrared illumination is shown in fig1.

Fig.1. CCD matrix sensitivity to 880 nm IR light

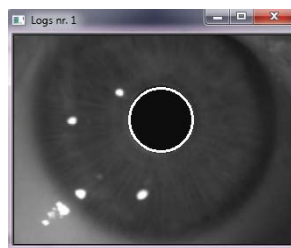


Our system consists of two capturing cameras for each eye and electronic ferroelectric shutters [1], which separate the stimuli for each eye. Studying illumination influence on visual fatigue it is prevalent to block the specific spectral signal by shutter, in cases then cannot control directly. Liquid crystal shutter holds also beneficial light polarization properties. Signal separation allows tracking the eye pupil latencies in fellow eye while stimulating other. Real time tracking and analysis of pupil parameters is provided to reduce the amount of data.

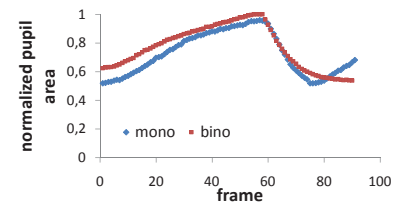
FLC shutters in action [1]



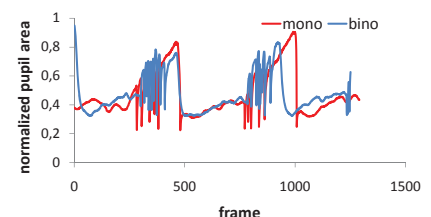
Pupil tracking



Pupil response to 1 s stimuli bino/mono stimulation conditions (60 fps)



Pupil response to 5 s stimuli bino/mono stimulation conditions (60 fps)



- Developed system is ready for high speed (till 187 Hz) pupil tracking.
- Pupil area is a good parameter for pupil size analysis.
- Preliminary analysis of 1s stimulation shows differences in monocular and binocular stimulation.
- System is to be developed for more sophisticated signal translation and response tracking.

1. S. Fomins, M. Ozolinsh, G. Krumina, V.Karitāns. Ferroelectric liquid crystal glasses for amblyopia research. *Integrated Ferroelectrics*, 103:10-17 (2008).

## Acknowledgement

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