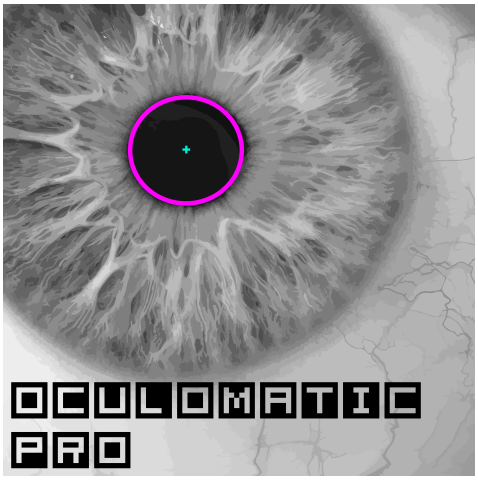

Fast and precise measurement of eye position, movement and gaze is critical for many oculomotor, vision, and behavior studies. The gold standard for high-resolution eye tracking is magnetic tracking using search coils implanted in the eye (sclera) or an uncomfortable contact lens. This technique is invasive and requires strong magnetic fields that generate noise in electrophysiology DAQ systems. Oculomatic Pro is an affordable, infrared-video tracking system that rivals the performance of magnetic systems while being noise-free and non-invasive.

The Oculomatic Pro software tracks eye position frame-byframe – in real time. It employs an advanced contour-tracking algorithm that matches the contour of a thresholded-input image and then computes the binary image moments to find the centroid. Contour tracking is robust (unlike ellipse-fitting and Hough circle transforms) even when the pupil is dilated and partially occluded by eye lid or during non-ideal lighting conditions. Simultaneous tracking of pupil and corneal reflection (CR) also provides tolerance to small head movements. Eye position (gaze) signals can be filtered using a heuristic algorithm that eliminates artifacts (eye blinks, partial occlusions). Raw or filtered gaze coordinates (x,y) can be sent to stimulus / behavior control or neural DAQ system as analog signals or via shared memory on the same computer – in real time.

	Specifications
measurement	Pupil only, Corneal reflection or both
accuracy	<0.3° typical (<0.2° in simulation)
spatial resolution	<0.15° typical (<0.05° in simulation)
temporal resolution	1000 Hz
latency	<1 ms
output (digital)	shared memory interface for matlab and c++
output (analog)	analog voltages via NI-DAQ for x,y gaze positions
calibration	5 point affine, 9 point polynomial built in
max gaze angle	+/- 35°
OS compatible	Windows 7/8/10

Oculomatic Pro contains:
- 1000Hz camera
- 35mm lens (can be specified)
- 5m locking ethernet cable
- IR light source (840nm)
- PoE power injector
- Flexible deskmount stand
- National Instruments DAQ
- Oculomatic Pro software key

We recommend the following PC hardware:
- 6th gen core i5 or better
- SSD system disk
- Nvidia geforce 960 or better
- 8Gb RAM
- dedicated 1Gbit ethernet