Thank you for your interest in the ASL eye tracking systems. Your consideration is greatly appreciated. To assist you in your evaluations, please review the FREQUENTLY ASKED QUESTIONS.

Who is ASL?

For over 40 years, ASL has been a pioneer in the examination of human eye movement and pupil dynamics. Founded by an MIT scientist in 1962, ASL developed the first video-based eye tracker in 1974. ASL designs, develops, manufactures and distributes eye-tracking equipment worldwide and provides specialty design and development services for the research market; ease of use and operation are the forefront of our designs. ASL was the first company to develop a head-mounted eye tracker, Eye/Head integration, parallax free optics, head tracking assisted remote optics, long range optics for the challenging fMRI environment and many other features that are industry standard. This innovative spirit continues today with the world's broadest and most comprehensive line of video-based eye movement recording and data analysis tools currently available for eye tracking. ASL's reputation for high quality products goes hand in hand with our highly respected technical support staff; the largest in the industry with many representatives having over 20 years of eye tracking experience. Researchers comparing our systems to other eye tracking manufacturers continue to confirm this fact. Every eye tracking system includes unlimited telephone support and access to our technical support website with helpful tutorials, latest software and "Frequently Asked Questions". ASL's systems are color coded for easy set up.

Why do you use Desktop Mounted Optics? Why not put the optics into a monitor?

ASL's desktop/ remote eye tracking system is used by more researchers than any other desktop/remote eye tracking system. ASL continues to adapt to the changing methods and technologies used by researchers in presenting their stimuli by providing the greatest flexibility in display whether using a monitor, television, project screen, or other medium. The advantage of ASL NOT integrating its optics into a monitor is its modularity, which prevents obsolescence of the system. ASL is acutely aware of the ever- changing technologies introduced over the years such as mainframe computer to CRT, to LCD or to TFT. Research currently indicates that a TFT screen has a life expectancy of 3 years. When a technology fails or a new one is introduced the ASL system continues to adapt to the new environment.

Why is ASL the only eye tracking company that has a separate control unit?

The same reason ASL does not have our optics inside a monitor. ASL does not want your system to become obsolete because the computer driving the eye tracking becomes obsolete. Remember when PC's were called 386? What will Windows come out with after XP-Service Pak II? If your eye tracking is in a computer and that computer becomes obsolete, doesn't your eye tracker become obsolete? ASL allows you to interface our control unit with any PC - DOS, Windows 95 through XP. If your computer running the eye tracker obtains a virus, you can switch to another computer. You do not have to stop eye tracking until the virus is removed. In addition ASL's

reputation is built on providing reliable and accurate eye tracking systems. The fact that our EYE-TRAC® 6 control unit -has it's own DSP, means that your data collection is not affected when your operating system refreshes. ASL's control unit provides digital data (x and y gaze position and pupil diameter) as well as two channels of analog output. Here again your analog data is not affected if your operating system refreshes. As mentioned above, ASL does offer multiple EYE-TRAC® 6 Series optics. All EYE-TRAC® 6 Series optics work with the EYE-TRAC® 6 Series control unit. ASL allows researchers to expand their research goals with out having to purchase a completely new system.

Why compensate for head motion with desk mounted optics?

ASL was the first to introduce compensating head motion with desktop/remote optics to the eye tracking community over 10 years ago. ASL offers our VHT- Video Head tracker – which uses face recognition software to instruct the eye tracker to follow head movement. ASL also offers our MHT- magnetic head tracker. This option provides all 6 degrees of freedom the ability to track up to 4 additional sensors. For instance, if you wanted to track the hand as it interacts with a touch screen, or if you wanted to track a baby's foot kicking, the ASL system provides you with a synchronized data file of X and y eye position, all six degrees of the head and all six degrees of the other sensor. This option does require a small sensor to be attached to the participant's head with a headband, bonnet, or baseball cap.

Why does ASL offer Real Time Visual Feedback throughout the experiment?

Recruiting and testing participants is a timely and costly activity. ASL provides real time visual data (scene image with superimposed cursor) at all times. This allows the researcher to not only observe the eye tracking data but also indicates how the participant is reacting to the presentation. If changes are needed in the presentation or with instruction to the participant, you can quickly discover that and make the necessary changes before you complete the data collection of all your participants.

Why does ASL use Bright pupil?

For environments ranging from dark, monitor-only illumination, to normal indoor lighting different intensities within a small cubicle, the bright pupil illumination technique has been shown to provide better contrast between the pupil and background features and to produce an image with fewer undesirable artifacts than does the dark pupil illumination technique. This results in a more robust eye tracker performance (i.e. acceptable performance over a wider range of subjects, equipment placement geometry and other environmental variations). Fluorescent lighting is recommended. The bright pupil technique offers even greater advantages as the distance between the subject and the optics increases. The bright pupil signal is a nearly collimated beam retro-reflected from the retina, and therefore its intensity diminishes very little as distance between the eye and camera increases. The isotropic reflections from the surrounding features appear to diminish in brightness with the square of the distance. Thus, contrast between the bright pupil and the surrounding features actually improves with increasing eye to camera

distance, whereas it becomes more and more difficult to distinguish a dark pupil from increasing dark surrounding features as eye to camera distance increases. With bright pupil optics, long eyelashes or mascara do not introduce artifacts. In addition, ASL does offer a "dark pupil" system that works robustly in an outdoor, daylight environment.

Why does ASL offer so many different methods to calibrate?

ASL offers many options so that researchers' methods and goals are not limited.
ASL has been offering the two-point calibration method for over 10 years. Our infant community, which started in 1978, has been using the two-point calibration method. Over the years, with various research experiments and various participant's ability, ASL has offered:

- The industry standard of 9 point – equally spaced through the tracking area.
- The two point used with infants and small children
- Any subset of 2 to 9 points depending on your experiment and your participant's ability
- Calibration in non consecutive order – again more flexibility for uncooperative subjects
- Drop a point calibration – if participant has a stigmatism and it is impossible to track one of the four corners, you can eliminate that calibration point instead of eliminating the participant from the study.
- One point off set calibration – typically used with our head mounted optics if the participants moved the optics. Allow you to make an adjustment without stopping the entire experiment.
- Calibration files can be saved and recalled.

How easy is it to synchronize acquisition of the eye tracker data with the stimulus presentation and/or other data?

ASL has always provided its researchers with the ability to send markers to and from their presentations to the eye tracking system. A female, 25 pin, D type connector labeled "XDAT" is provided on the back panel of the EYE-TRAC® 6 Series control unit. The XDAT connector provides access to a parallel digital port that is used as a means of inputting external data (of the users choice) for recording on the Interface PC hard disk along with eye tracker data. The Eye-Trace User Interface program, along with the other eye tracker data can record sixteen bits of parallel, TTL level, positive true data, from any source. Each bit is interpreted as 0 when the corresponding pin is low (ground), and as 1 when the corresponding pin is high (5 Volts). The eye tracker samples the XDAT port once every eye camera video field, and is recorded along with the eye position data from corresponding eye camera video field. The current XDAT value is always displayed near the bottom center of the interface program screen. ASL also offers Auto FILE OPEN and RECORD feature. The external data (XDAT) input to the eye tracker can be used by an external device to open data files on the Interface Program PC, as well as to start and stop recording.

What is ASL's transport delay?

ASL like all eye tracking systems has a transport delay. Please note that ASL's transport delay is constant and can be removed prior to data analysis. A data sample is output by the eye tracker control unit for every eye camera video field. There is a transport delay of about 3 video fields. The camera pixels charge up during 1 video field, the video data is transmitted to the system and digitized during the next field, and is processed by the system during part of the third field. The new data is available at the serial or analog output port near the end of the third field, so each data sample contains information that is about 3 fields old. With a 60 Hz (NTSC format) eye camera, this corresponds to a transport delay of about 50 ms (3/60 of a second).

Do you offer an SDK?

Yes, ASL's Software Development Kit (SDK) –is an external interface to connect Eye Tracker with third party applications. Using Microsoft COM technology and sample applications. It allows the user to read data files from third party applications written in C++, Visual Basic, Matlab, Eprime, Presentation, etc. Development Kit (SDK). Users can customize the viewer for their own purposes such as recording data to disk or integrating eye tracker with other applications.

What other software and hardware, do you work with?

The list includes, but is not limited to, the following:

Matlab software	Optotrak Tracking Systems	Biopac
Eprime software	NVis – HMD optics	Noldus Observational Coding
Presentation software	Virtual Reality – HMD optics	Software
Cortex software	NVision HMD optics	Triangle Research Software
Tempo software	Igoogle HMD optics	Mindware
Ascesion Tracking System	Crystal Eye Glasses	Microsoft Office
Polhemus Tracking systems	Neuroscan EEG	James Long System
Intersense Tracking Systems	Qualysis	Mac Display presentations
		Cortech EEG

What analysis software is offered?

Every EYE-TRAC® 6 Series system includes ASL's EYENAL program. EYENAL stands for Eye Analysis Software. EYENAL is an "off-line" data analysis program for processing eye movement and pupil diameter information recorded on EYEDAT and EYEHEAD data files. EYENAL identifies eye fixations; matches fixations with designated areas of interest on the scene, and calculate related scan pattern statistics. Subsequent statistical data is saved in Text file formats suitable for further processing with other data analysis or spreadsheet programs. EYENAL will also automatically export any of the original or analyzed data to Excel. Please see attached brochure.

Why use Gazetracker?

ASL can also provide Gazetracker. Gazetracker software is a presentation and analysis software for static images, dynamic images, video and live video data. Gazetracker is recommended for analysis of software applications, webpages and videos. Unlike other eye tracking analysis software, Gazetracker allows you to use Internet Explorer – giving participants a natural testing experience. Other software requires you to use their browser. When analyzing other software on the computer, Gazetracker does not limit you to just analyzing a screen recording avi file.

Gazetracker provides rich detail data that is segment based upon the windows the subject interacts with**. ?** Gazetracker provided more data visualization tools such as order of fixation in regions of interest, and pupil diameter graphs. Video export can combine multiple views into one video clips – viewing the gaze replay, pupil dilations and area of interest. Gazetracker provides an Application Programming Interface (API) which does not restrict you from using the Gazetracker interface.

What type of eye tracking optics do you offer?

ASL offers the largest selection of eye tracking optics. Below is our listing:

- 60 Hz lightweight head mounted optics (8 ounces)
- 60 Hz lightweight head mounted outdoor optics (10 ounces)
- 120/240/360 Hz lightweight head mounted optics (10 ounces)
- 120/240/360 Hz Binocular head mounted optics (14 ounces)
- 120/240/360 Hz lightweight head mounted optics attached to a forehead chinrest
- 60 Hz mini optics in a variety of HDM (Head Mounted Displays)
- 120/240 Hz mini optics in a variety of HDM (Head Mounted Displays)
- Customize applications of our head mounted optics attached to a variety of head gear
- 60 Hz desktop pan/tilt optics 120/240/360 Hz desktop pan/tilt optics
- 60 Hz Long Range optics up to 16 feet for the fMRI or MEG environment
- 120/240 Hz Long Range optics up to 16 feet away for the fMRI or MEG environment
- Entry level 60 Hz optics attached to chinrest – can be upgraded to any of the optics listed above.

Why so many?

As stated, ASL has been providing eye-tracking systems for over 30 years. ASL realizes that funding is limited but research goals changes. By offering a variety of optics, this allows researcher to change their research goals without having to purchase an entirely new system.

Applied Science Laboratories
175 Middlesex Turnpike, Bedford, MA 01730 USA
Tel.: (781) 275-4000 ■ Fax: (781) 275-3388 ■ www.asleyetracking.com ■ Email: asl@asleyetracking.com