

SUCCESS STORY PROFILE: APPLIED SCIENCE LABORATORIES

BY NANCY ANISFIELD

Applied Science Laboratories (ASL), based in Bedford, MA, has been developing and manufacturing state-of-the-art eye tracking systems for three decades. ASL systems are used worldwide in a variety of scientific, medical, academic and commercial applications. Research in fields ranging from ergonomics to cognition, marketing to flight simulation have found ASL's systems vital to the study of human response.

The range of applications for ASL's eye trackers is staggering. They are being used to study what people look at on a web page, in a grocery store, on a movie screen or in an art gallery. Psycholinguistic scholars use the trackers in cognitive studies to determine how we process language. Infant studies—where head trackers are essential because of the subjects' movements—rely on the trackers for information about where an infant looks as he or she responds to sounds and images. Eye trackers are even being used to train radiologists how to read mammograms more accurately.

Does a basketball player look at the hoop during a free throw? Do a shooter's eyes follow the target or the end of the rifle barrel? Which monitors does an anesthesiologist watch most? The questions are as unlimited as the opportunities to learn more about how humans function in their world.

Virginia Salem, ASL Director of Customer Relations, talks enthusiastically about the remarkable applications for eye tracking. "So much of what is being done with eye tracking is for human good—infant studies, research on disabilities—studies that are very helpful to people. Our systems are so adaptable and we have tremendous experience here," says Salem.

For nearly ten years, ASL has offered systems that incorporate eye tracking with head tracking, using Ascension Technology's motion trackers. Today, ASL's proprietary EYEHEAD integration package merges eye and head position data, computing real-time point of regard. Using a magnetic motion tracker, a gimbal and a laser pointer, the system defines an environment presenting up to 20 surfaces. Head mounted tracking systems compute the location of the gaze vector in true 3D space. The EYEHEAD data presented to the technician or researcher includes identification of the scene surface, coordinates of the gaze point on the surface, the distance of the eye from the spot being fixated and pupil diameter. With 1 degree of accuracy, the system can identify gaze points on monitor screens, keyboards, poster displays, etc. Without head tracking, the only information the system can record is through video.

Head tracking in these studies gives the technician more freedom. The eye trackers themselves have a +/- 25 degree range. Without a head tracker, when a subject looks out of that range or makes a fast head movement, the technician operating the system must reacquire the eye. With Ascension's trackers, head position data controls the pan tilt on the remote camera for immediate reacquisition.

Salem explains another reason why using the motion tracker is so important. "Head tracking gives the subject more freedom of movement without loss of data. Earlier systems had subjects keep their heads contained on a chin rest or with a bite bar. A big advantage of head tracking is that a subject can be more comfortable and the research can be more comprehensive because the researcher can ask the subject questions."

ASL eye tracking systems are compatible with some other motion tracking systems, but the Ascension Flock of Birds and miniBIRD are the company's trackers of choice—the ones ASL uses in pre-packaged systems. "Ascension's trackers are reliable, they give us excellent data and no problems. They cost less than others, too," says Salem.

Affordability is critical to many research projects. Over the past thirty years, the cost of eye tracking systems has been reduced dramatically. At the same time, the technology has improved at an equally stunning pace. Advances in ease of use, accuracy, flexibility and reliability can all be credited to ASL's expertise in the field.