



## EYEHEAD™

### Combining Head Tracking

#### EYEHEAD Integration with Head Mounted Optics

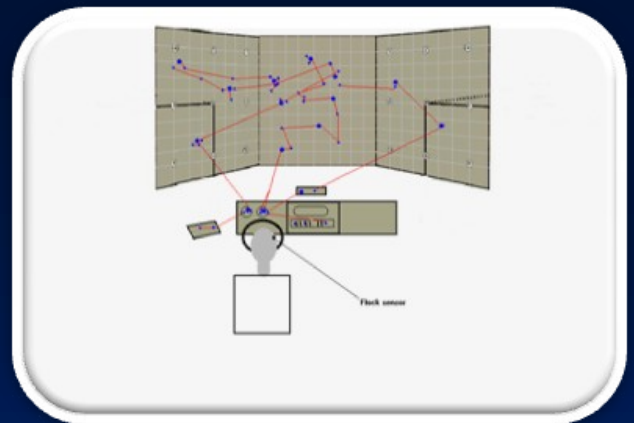
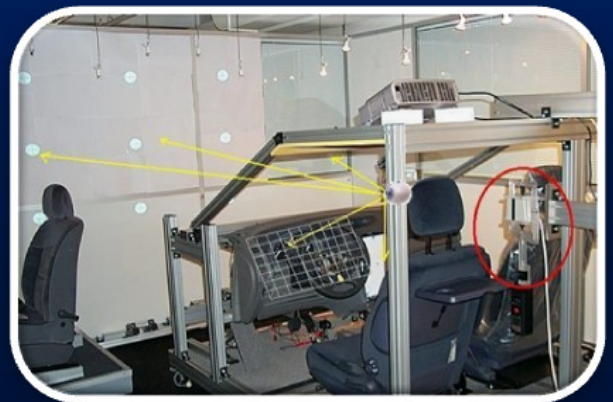
EYEHEAD™ integration is necessary to get digital data that specifies point of gaze with respect to stationary objects in the environment. The EYEHEAD integration package, for use with head mounted optics, enables integration of eye and head position data to compute real time point of regard. Required hardware includes a head tracking device, such as the Ascension Flock of Birds or Laser Bird, Optotrak Certus, the Polhemus Fast Track or the Intersense tracking system. All are supported by the ASL eye tracking system.

#### EYEHEAD Environment

The EYEHEAD™ "environment" consists of the head tracker transmitter and up to 20 surfaces of interest. Typical surfaces include monitor screens, keyboards, poster displays, slide screens, walls, etc. EYEHEAD data consists of the identification number of the scene surface being viewed, coordinates of the gaze point on that surface, the distance of the eye from the spot being fixated, and pupil diameter. Note that this information does not indicate what the subject is viewing in the environment.

#### What are the advantages of the ASL system when combined with a head tracker?

- Computes the location of the gaze vector in true 3 dimensional space
- Determines intersection of gaze with multiple flat surfaces whose location, orientation and boundaries are known in true 3D space.
- Surfaces are easily specified to system using a laser pointing device (3 points define a surface)



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## EYEHEAD™

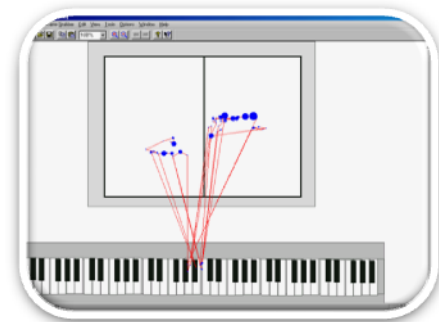
### Combining Head Tracking

- Can accurately superimpose a point of gaze cursor on the image from a stationary (non-head mounted). Most systems can only superimpose a cursor on a head mounted scene camera image.
- Better image than head mounted camera
- Less to wear on the head
- One less element to set up and adjust
- System gives long term accuracy and does not require frequent recalibration.

ASL systems come bundled with our exclusive ASL Results analysis software, which will:

- Reduce data to a list of fixations
- Specify areas of interest
- Match fixations with areas of interest
- Compute statistics relating fixations to areas of interest
- Superimpose plot of fixation "scan path" over image viewed by subject

Area	Fixations	Time	Area	Fixations	Time	Area	Fixations	Time	Area	Fixations	Time
Area 1	10	1.2	Area 2	15	1.8	Area 3	20	2.5	Area 4	5	0.8
Area 5	8	1.0	Area 6	12	1.5	Area 7	18	2.2	Area 8	3	0.5
Area 9	6	0.9	Area 10	9	1.2	Area 11	14	1.8	Area 12	7	1.0



### Sample EYEHEAD™ data

The raw data was gathered as a subject played an electric piano keyboard with a music book above the keyboard.

"piano2.env" was environment file used for "EYEHEAD Integration".

The music stand was also the calibration surface and is scene plane 0.

The piano keyboard was set up as scene plane 1.

EYEHEAD™ integration combined with head mounted optics when playing the piano .

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