VISIONTRAK

REAL TIME EYE/HEAD TRACKING

QUICK AND ACCURATE EYE TRACKING

The VisionTrak™ head mounted eye tracking system is a time tested, fully integrated turnkey solution for eye and target tracking. This robust system, developed by ISCAN, Inc. of Burlington, MA, collects pupil size, eye movement, and eye point-of-regard data from human subjects while allowing complete freedom of head movement. Distinctive system features allow for quick and accurate data collection and analysis for a variety of applications and environments.

FEATURES

Easy and Flexible Setup

System setup and subject calibration are fast and easy. VisionTrak is fully functional under virtually any lighting conditions, with a wide range of subject acceptance including eyeglasses, sunglasses, contact lenses, or drooping eyelids.

Adaptable Lightweight Headgear

Very small and lightweight eye and scene imaging components are available mounted on a baseball cap or headband, allowing the subject to move freely while accurately recording pupil and raw eye data. Assemblies can also be easily mounted to virtually any headgear, such as a helmet-mounted display (HMD). Parallax-free scene imaging with subject point-of-gaze calibration is accurate over full depth of focus.

Easy Data Collection/Calibration

With VisionTrak, calibration is so simple it can be performed in minutes. All data collection and calibration procedures are performed from the operator's console using simple eye angle calibration procedures with built-in fixation monitoring and blink detection subsystems.

Built-in Data Analysis

Sophisticated point-of-regard analysis software correlates subject fixations to objects within the viewed area. Collected data can be graphically displayed in real time. VisionTrak depicts recorded parameters as raw data, velocity, or acceleration. The system software automatically computes averages, maximum, minimum, and standard deviation.

Freedom of Movement

VisionTrak enables a subject to have full head and eye range of motion while it simultaneously collects eye movement and point-of-regard data. With the addition of Polhemus' FASTRAK®, the world's leading electromagnetic tracking system, eye motion can be tracked in conjunction with head movement for a complete head tracking solution.

Real-time Measurement

VisionTrak automatically tracks point-of-regard, the correlation of the raw eye position to the precise position on the scene, in real time. The image being viewed by the subject is identified by crosshairs and instantaneously superimposed over live imagery.

Data Analysis

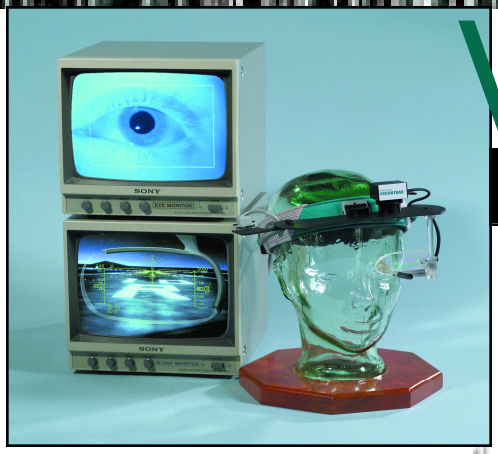
Sophisticated, built-in analysis software allows data to be viewed in tabular or graphical format. It also computes velocities and accelerations, or analyzes with user-defined elements. VisionTrak extracts and records the subject's eye image and raw eye movements, while controlling data collection.

Data Collection

The user-friendly graphical user interface (GUI) built into VisionTrak collects data on the pupil and corneal reflection positions such as: pupil diameters, eye point-of-regard, and a variety of auxiliary parameters. Once collected, data can easily be reviewed, printed, exported, or stored directly on the system.

APPLICATIONS

- Driving/Piloting Evaluation and Training
- Human Factors Evaluation
- Military Simulation and Training
- V ision Research
- Psycho-visual Experiments
- Drug and Alcohol Response Testing
- Surgical Simulation and Training
- Handicapped Communication
- Advertising/Web Evaluation
- Retail Effectiveness Assessment



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SYSTEM OVERVIEW

Head Mounted Eye and Scene Imaging Subsystems

Ultra-lightweight miniature electronic and optical components generate clear, in-focus eye and scene video images for virtually any subject. Tiny eye and scene imaging components are available mounted on a baseball cap or headband or can be affixed to virtually any headgear.

A transparent dichroic mirror mounted in front of the subject's eye generates the eye video, by reflecting the eye image into a highly sensitive head mounted video camera. A single LED provides low level IR illumination.

The miniature scene camera, mounted below the subject's line-of-sight, provides a true, non-reversed, color image of the viewed scene, which yields a parallax-free scene image suitable for direct input to the autocalibration system. Initial calibration is maintained when looking at any scene, whether closer up or farther away from the initial point of calibration.

SYSTEM COMPONENTS

A PC based unit containing the following hardwar e and software:

HARDWARE

Eye Tracking Processor

The eye tracking processor automatically tracks the center of a subject's pupil, the reflection from the corneal surface, and measures pupil size, all in real time. Horizontal and vertical crosshairs automatically center over the pupil and corneal reflection to indicate proper tracking of the two targets.

Autocalibration Processor

Calibration is straightforward and can be completed in a few seconds. The autocalibration processor precisely calculates the subject's point-of-gaze with respect to the scene being viewed using raw eye position data generated by the eye tracking processor. Manual cursor control allows objects to be delimited for quantitative gaze/object correlation. A 24-hour clock is used for video frame-by-frame analysis of the output data.

V ideo Monitors and Cables

Two nine-inch black and white video monitors and all necessary cabling and connectors are included with the system. One monitor displays the eye image while the other displays the scene image with the superimposed point-of-regard.

SOFTWARE

Data Acquisition, Control, and Analysis Softwar e

VisionTrak Raw Eye Movement Data Acquisition Software (DAQ), allows the eye imaging and tracking data collection process to be adjusted for any subject from the operator's computer console. Incoming data can be seen graphically in real time and instantly analyzed or exported in real time to other devices. The software stores data in native and ASCII formats, and allows complete data review and automatic determination of calibrated velocities and accelerations.

VisionTrak Point-of-Regard Fixation Analysis Software (PFA) further analyzes raw point-of-regard data, breaking down where the subject is looking and correlating it to what the subject is looking at. The raw data can be quantified into eye fixations according to user adjustable criteria, which can then be viewed in tabular lists or graphical display formats to indicate the subject's visual scan path. The number of fixations, total fixation time, and scan path parameters are also automatically computed. In addition, objects in the stimulus scene can be designated, and the eye fixations can be correlated to indicate the visual response to particular scene elements. A variety of table, bar, and pie chart formats can be selected to present the results.

UPGRADE OPTIONS

Optional Head Tracking System

Using FASTRAK, the world's leading electromagnetic motion tracker, in conjunction with VisionTrak enables users to track eye motion simultaneously with head motion. This enables six degrees of freedom head tracking in conjunction with eye tracking for a complete real time solution.

V isionTrak Global System:

This option includes Line of Sight (LOS) software which combines eye and head vectors for Point-of-Regard output and PFA software for advanced analysis. The Global Imaging system includes an additional camera that provides a view of the users' point-of-regard, overlaid on the scene.

Binocular System:

The Binocular system is an eye-tracking system, monitoring both eyes simultaneously while offering all the features and benefits of the standard VisionTrak system.

V isionTrak Wireless Option:

The wireless option is an untethered system that allows the subject to move naturally in any environment without restriction while offering all the features and benefits of the standard VisionTrak system.

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