

Kinarm Gaze-Tracker[™]

Fully Integrated Gaze-Tracking for Kinarm Labs[™]



Quick Facts

- Designed specifically for Kinarm Virtual Reality System; End-Point and Exoskeleton platforms
- Head-free to ensure flexibility and subject comfort
- Workspace maximized with highest achievable accuracy
- Calibration and data collection integrated with Dexterit-E[™], our Kinarm control software
- Can control experimental paradigm in real-time
- Can upgrade existing Kinarm Lab

Gaze-tracking is an essential behavioural measure for researchers studying eye-hand coordination and the oculomotor system.

With the Kinarm Gaze-Tracker installed in a Kinarm Lab, both motor and gaze measures are seamlessly integrated for effective experimental control and data analysis. There is no need to customize and coordinate multiple hardware solutions.

A Solid Foundation: EyeLink 1000 Plus Remote[™]

The EyeLink 1000 Plus is a high-performance measurement device that establishes the technical benchmarks that all video-based eye trackers strive to achieve. It was the right choice for Kinarm Labs:

- Best head-free solution (highest accuracy, speed, etc)
- Robust and flexible tracker with a significant customer base and track record of successful research use

Head-Free Tracking – the natural solution

A head-free solution was the natural choice.

- In the Kinarm Virtual Reality System, space is limited, so head-free tracking ensures nothing interferes with natural behaviour
- Experimental set-up is greatly simplified - essential when investigating eye-hand coordination in elderly or paediatric subjects

The Challenge of Integration

The EyeLink 1000 Plus Remote is customized to work effectively in a Kinarm Lab.

- Custom algorithms to handle a horizontal image plane
- Custom hot mirrors, sized to fit the large viewing area of the Kinarm Virtual Reality Display
- Zero interference with Kinarm robots
- Calibration and data collection integrated with our Kinarm control software: Dexterit-E™

Gaze-tracking in a Kinarm Virtual Reality Environment

Workspace Area

The range over which gaze-tracking is calibrated is roughly ellipsoid: $\sim 55^\circ$ in the horizontal and $\sim 40^\circ$ in the vertical. In the horizontal plane of the Kinarm Virtual Reality System, these gaze angle ranges correspond to ~ 50 cm x ~ 30 cm. Gaze beyond this calibrated area will have some variance from actual. Gaze-tracking is centered in the middle of the Kinarm Lab workspace so that the range is optimized for use with the Kinarm. Some Kinarm Standard Tests use workspace outside of the tracked area.

Subject Setup

The EyeLink 1000 Plus Remote requires a quick 13 point calibration followed by validation; flexible enough for patient use in clinical research.

Recovery from Loss of Tracking

When tracking is interrupted, a target sticker on the subject's head provides eye distance and relative position information to ensure fast recovery.

Kinarm provides all technical support for the Kinarm Gaze-Tracker.

To learn more, please contact sales@Kinarm.com.

Two Labs: One Gaze-Tracking Solution



Kinarm End-Point Lab™



Kinarm Exoskeleton Lab™

Key Specifications

- Sampling Rate: 500 Hz.
- Resolution: 0.05° RMS.
- Mean accuracy, as measured in the Kinarm Lab workspace:
 - under $\sim 0.5^\circ$ with minimal head movement
 - up to $\sim 1^\circ$ for extreme head motion
- Data output: gaze position (X, Y) and vector (gaze direction); pupil position (X, Y, Z) and area; time stamp and events