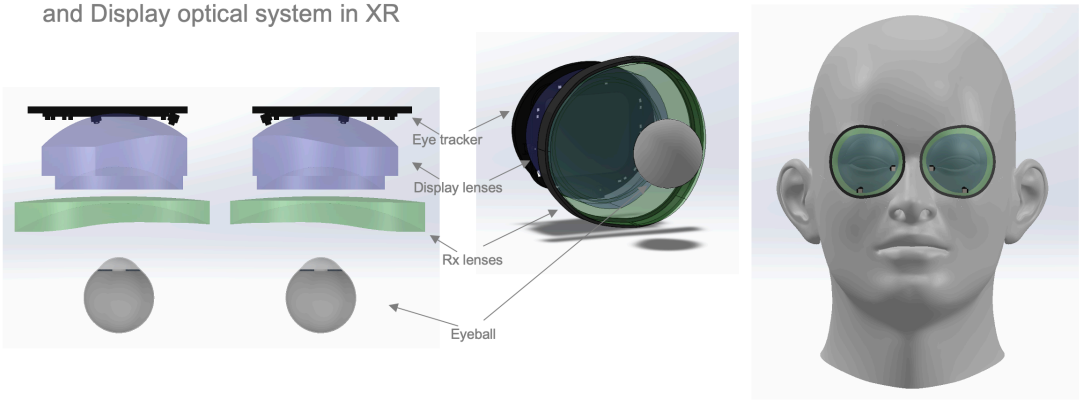
GUARDIANGLOW

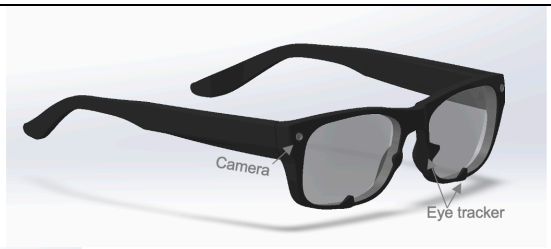
Eye Tracking solution for XR and AI glasses –

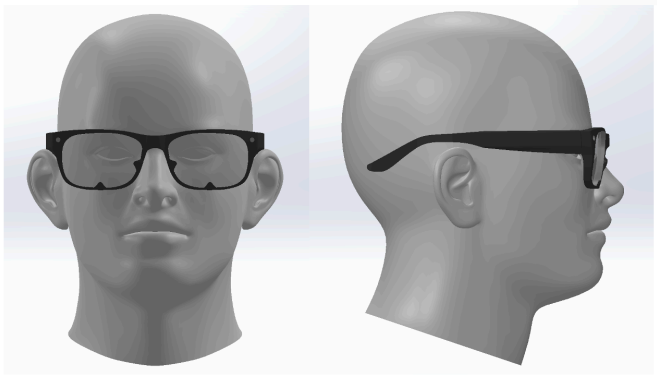
"New multitouch interface" for the next computing era

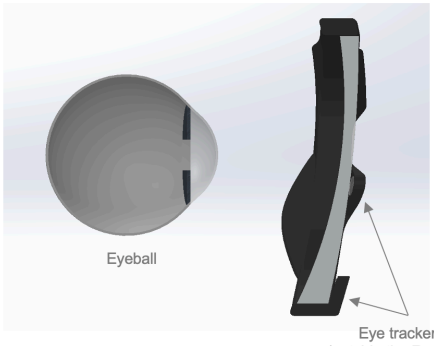
Eye tracking solution behind Rx and Display optical system in XR

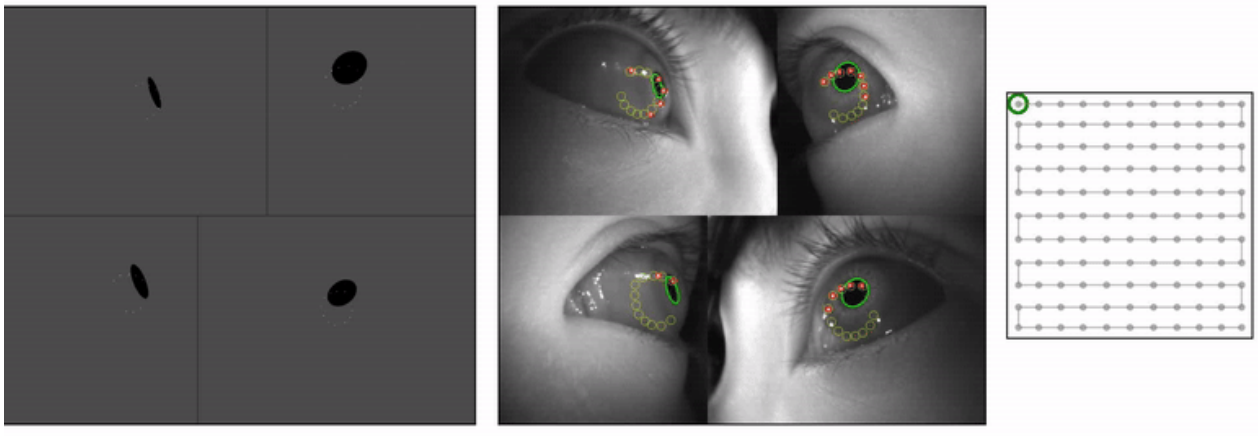


Eye tracking solution through Rx with better performance for AI glasses









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Overview

Eye tracking is an essential human-machine interface in XR and AI glasses, and plays a vital role in providing engaging user experiences: foveated rendering, reduction of motion sickness, dynamic color correction. For example, the Apple Vision Pro utilizes eye tracking for more than a dozen functions, positioning it as a key component for delivering high-quality XR experiences.

However, eye tracking is still not widely integrated into XR and AI glasses. Three major challenges hinder its adoption: 1) Current eye tracking solutions struggle with optical interference from prescription lenses and display optics. 2) They often fail to accommodate the diverse anatomical differences among users, such as variation in cornea size and astigmatism. 3) Balancing performance with design constraints—such as location, size, power, weight and cost—poses further challenges for the wide implementation of eye tracking in XR.

Guardian Glow's eye tracking solution directly addresses these issues. By tightly integrating advanced computer vision algorithms with cutting-edge optical design, we have effectively resolved these pain points, making eye tracking a robust, easy-to-use and efficient user interface for XR and AI glasses.

Features

	Our solution	Existing
Eye tracking functionality for uncorrected vision	Yes	Yes
Foundational hardware with user calibration	Yes	Yes
Optimal performance with prescription (Rx) and XR optics	Yes, & automatic compensation for different Rx	Usually increased error
Design flexibility for various XR architectures	Yes, with end-to-end statistical performance prediction	Usually trial and error approach
In-depth user calibration tailored to individual eye anatomy	Yes	Usually no
Virtual testing available during the design phase (no prototyping required)	Yes, full-system prediction with different eyes/ systems	Usually time-consuming experimental trials
Compatible with 95% of the population, accounting for statistical eye differences	Yes	Usually larger percentage of decreased performance
Comprehensive calibration software and machinery for R&D and manufacturing	Yes	Usually lack fast solution for manufacturing
Integration of software systems	Algo fully open to clients for system optimization	Typically licensing a Blackbox API
Integration of hardware systems	Minimum information sharing needed from clients	Usually requires display optical design & prototype

Applications

Key component for AR/VR, AI glasses, Smart screens

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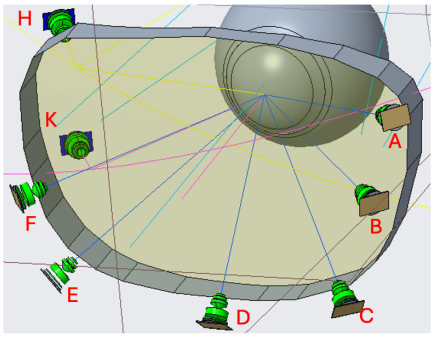
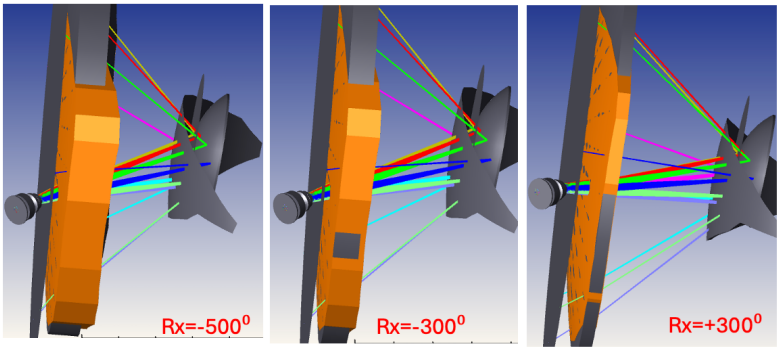
Design and Operation Principles

- Our solution **combines eye tracking optical design with computer vision algorithms** to seamlessly integrate ET with complex display/optics systems of VR/AR and AI glasses
- **Virtual testing available** during the design phase (no prototyping required) to compare designs for system-level performance / cost within given constraints
- **Accommodates over 90% of the population** by taking statistical differences in eye anatomy into design phase, supported by a curated eye database (e.g., scanned cornea shape) and simulation model to cover different shapes of eyeballs
- Designed for various prescription (Rx) and viewing optics, with a validation platform to assess performance across Rx, optics, and displays
- Have established performance specs for each user feature that requires eye tracking. Have built mathematical models of user experience, such as motion sickness and color uniformity, to define eye tracker requirements
- Offer **a comprehensive, robust eye tracking solutio**n encompassing algorithms, optical design, manufacturing design, sensing modules, calibration methods and machinery, software APIs, and system-level feature demonstrations





Typical Specification

Basic architecture	IR LEDs and cameras. Through-optics or reflect off surface
Angular Accuracy	~ 0.4 deg (uncorrected eye), ~0.6 deg (behind optics)
Positional Accuracy	~ 0.5 mm
Frame rate	90 FPS – 120 FPS
Latency	~15 ms
Weight	~ 15 g
Power consumption	Hardware: ~100mW per eye when running
Compatible Rx range	Custom designed Rx preferably Power: -7D to +3D, Astigmatism: 0~3D
Compatible Viewing optics	Pancake (catadioptric), Refractive
Saccade detection	Coming
Operation temperature	0 – 40 ℃

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