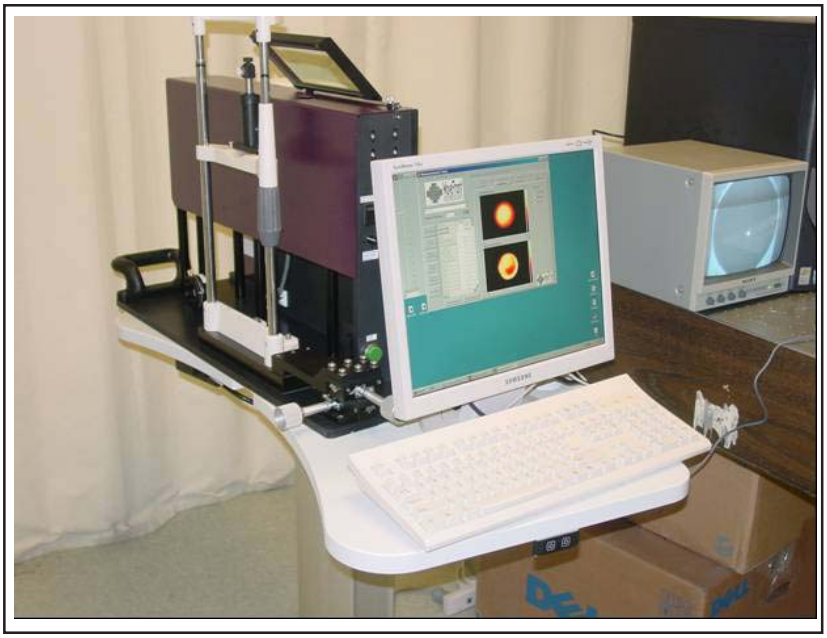
COAS-VR
Wavefront Aberrometer
Technical Description

COAS-VR is a custom instrument made for advanced research into vision and contact lens wear. It combines two systems together for advanced research into vision. The systems are:

1) ***COAS*** wavefront aberrometer
2) VR Vision Research open view optical relay system

The open view clear optical path allows the researcher to present the patient with a variety of optical stimuli. These could be simple eye-charts, computer monitors, or contrast sensitivity charts.
For accommodation research, binocular stimulus is important to replicate real-world experiences of the patient. So the large beam splitter allows both eyes to see the stimulus while wavefront measurements are made of one eye. Targets can be placed at different distances or gaze angles from the eye to stimulate different levels of accommodation. Illumination levels can be varied as well.
The time series acquisition abilities of ***COAS*** and an eye tracker system make possible a number of experiments.
The iris camera in ***COAS*** has an infrared long pass filter located in front of it. With this arrangement, the iris camera will not see any room lights. Also, the ***COAS-VR*** can be used in dark rooms and the doctor can still see the patient's eyes to do alignments.

The ***COAS*** Wavefront Analyzer is an advanced system for acquiring data to diagnose the visual functions of the eye. The unit performs a complete analysis of the eye's optical path based on advanced wavefront sensing technology.



In this picture, the patient sits at the left side and looks through a 100 by 200mm wide beamsplitter. The doctor sits in front of the computer screen at the right side of the screen. The doctor can easily reach the chin rest adjusts to align the patient to the ***COAS-VR*** instrument.

The open view is achieved by putting a 4 x 8 inch beamsplitter at the end of a precision optical relay telescope. The patient views any target the researcher provides through the beam splitter that transmits 95% of visible light. Infrared light reflecting off the beam splitter is used to measure the refraction and aberrations of the eye. The telescope has a 1 to 1 magnification so the ***COAS*** specifications are unchanged.

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COAS-VR Technical Specifications

- Accuracy – same as regular ***COAS*** or ***COAS-HD***
- Spherical Equivalent Range – same as regular ***COAS*** or ***COAS-HD***
- Astigmatism Range – same as regular ***COAS*** or ***COAS-HD***
- Spatial Resolution – same as regular ***COAS*** or ***COAS-HD***
- Field of View – same as regular ***COAS*** or ***COAS-HD***
- Acquisition rate – ***COAS***: 15 frames per second ***COAS-HD***: 12 frames per second
- Patient Alignment – doctor uses chin rest with XYZ geared dovetail stages to align patient according to view on alignment camera (patient moves, instrument is fixed)
- Alignment camera – standard video, infrared illumination
- Beam splitter – infrared reflects 100% - visible light transmits 95%, reflects 5%
- Beam splitter dimensions – standard dimension 4x8 inches, 45 degree angle
- Beam splitter frame – removable plastic frame
- Alignment Laser – flip in 635 nm red laser beam to assist locating external targets
- Internal target – white spoked wheel, visible to patient when turned up

Options:

1. 2x2 inch beam splitter (instead of standard 4x8inch beamsplitter).

2. Internal targets inside ***COAS-VR*** path to allow patients to align their line of sight to optical axis of wavefront aberrometer. Red dot at infinity focus, green dot at 11 inches focus. When patient aligns himself to the optical axis, the center of the red dot appears yellow. SLD beam at 850 nm is visible as small red dot at infinity focus. User has control over brightness of internal targets and can turn them off if desired.

3. Eye tracker run by a second computer. The eye tracker data acquisition can be started and stopped by the ***COAS*** computer. The patient can also be tasked with miscellaneous scan, search or blinking tasks that would tend to disturb the stability of a contact lens.

The input for the eye tracker is the video signal from the COAS iris alignment camera. The eye is illuminated by a single 950 nm infrared LED located about 4 inches away from the eye, slightly below the optical axis. The eye tracker software can measure the direction of gaze of the eye by measuring the location of the corneal reflex of the infrared LED relative to the dark pupil. A special version of the eye tracker software is also available to measure the position of a contact lens if it has been marked with two dark dots.