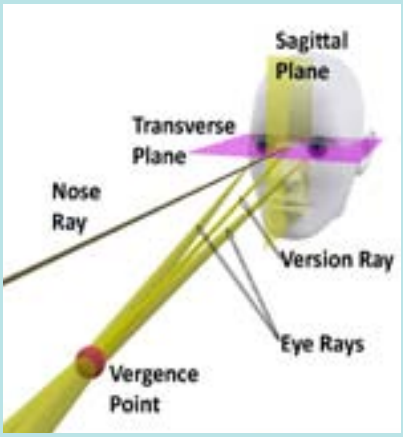
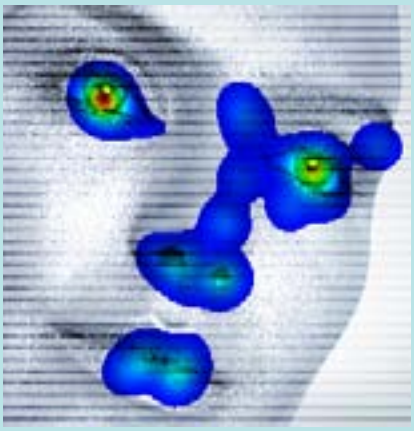
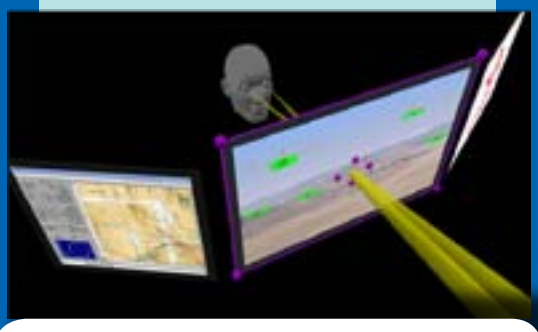
# ViewPoint EyeTracker®

## ARRINGTON RESEARCH, INC.



**400HZ Binocular Scene**



**3D Eye & HeadTracking**

**Virtual Reality (VR) EyeTracking**

Products and Accessories

**2020 - Spring**

## Affordable Quality

Arrington Research eye trackers are used worldwide in psychology, neuroscience, marketing research, sports, training, usability and many other fields.

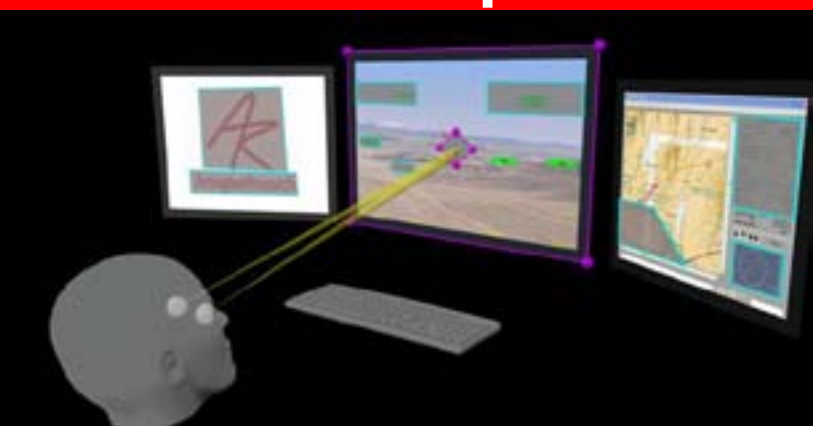
*ViewPoint EyeTracker®* systems are affordable, easy and accurate.

# Contents

# *ViewPoint EyeTracker*® Systems Overview

**Arrington Research, Inc.** designs and manufactures quality and affordable eye tracking products. We have developed the ***ViewPoint EyeTracker*** ® software and a range of hardware solutions that are appropriate for a wide variety of applications.

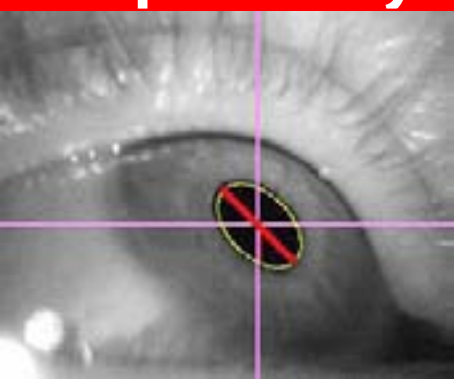
## 3DWorkSpace™



*3DWorkSpace*™ and *3DViewPoint*™ provide precise 3D depth information for 3D monitors and gaze across multiple monitors.


* Auto-calibration
* Auto-image
* 1 point slip correction

## Pupilometry



Rotated elliptical fit provides accurate pupil size in tertiary positions of gaze by using the major axis of rotated elliptical fit. Pupil size in real-time to better than .03 mm resolution with no averaging.


* Turn-key from $5998

## Torsion

Ocular Torsion and Gaze Position in real-time with free gaze eye movement.


* 0.25 - 0.5 º accuracy
* 0.15 º resolution

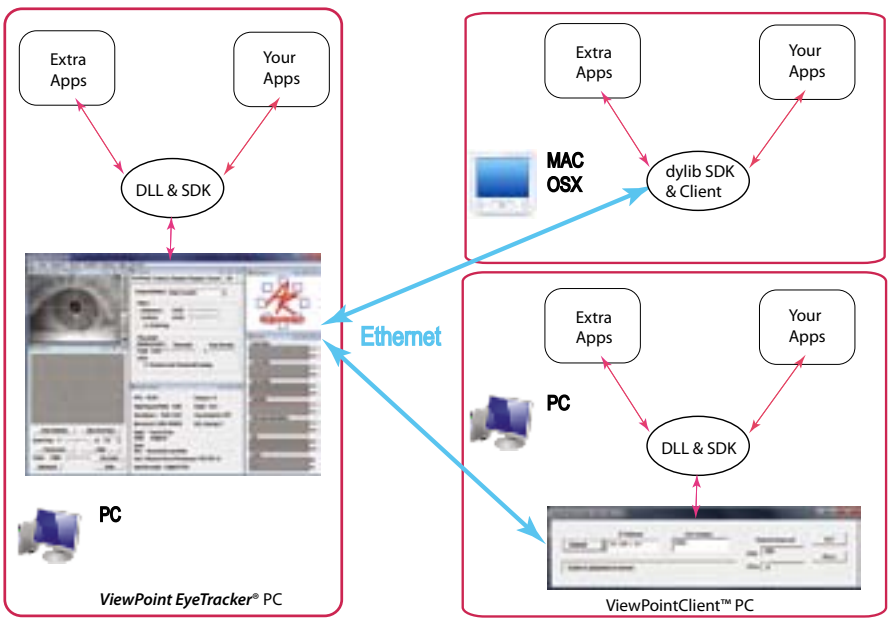
## Interfaces

Many real-time communication features.


* Complete control
* Remote control

# Inter-Computer Communication

## Ethernet Communication




An Ethernet server is built into the *ViewPoint EyeTracker* ®, which provides a real-time interface between multiple computers:

* Real-time streaming data
* Real-time control of the *ViewPoint EyeTracker* ®
* Real-time streaming video

# Software Developer's Kit (SDK)

The *ViewPoint EyeTracker* ® includes a powerful Software Developer's Kit (SDK) that allows other programs to seamlessly interface with *ViewPoint* in real-time. The SDK interface is based on a Dynamic-Link Library (DLL for PC, dylib for MAC OSX, and .so for Linux). It provides real-time access to all *ViewPoint* data and complete external control of the *ViewPoint EyeTracker* ®. It allows calibration stimuli in the User's own stimulus window, or the User's application to draw into *ViewPoint*'s Stimulus and GazeSpace windows.

**Event-Driven Real-Time Callback-Function Sample Code**

```
#include "vpx.h"
int theCallbackFunction( int msg, int subMsg, int param1, int param2, void* user ptr );
{
    if ( ( VPX_DAT_FRESH == msg ) && ( EYE_A == subMsg ) ) {
        VPX_RealPoint gp;  // a structure with two floats for (x,y) values
        VPX_GetGazePoint2( EYE_A, &gp );   // pass variable by reference
        printf("GazePoint = ( %g, %g ) \n", gp.x, gp.y );
    }
}

void main()
{
    VPX_InsertCallback( theCallbackFunction, this );
}
```

### Sample Code for Demo Apps

* ANSI C
* Win32 (C)
* Python
* MFC (C,C++)
* BASIC

Samples show how to: Open/Close the *ViewPoint* application; access all data in real-time; completely control *ViewPoint* externally, e.g.: Open/Close/Pause/Resume data files; insert synchronized real-time dataMarkers and stringData, merge data from various sources, and much more!

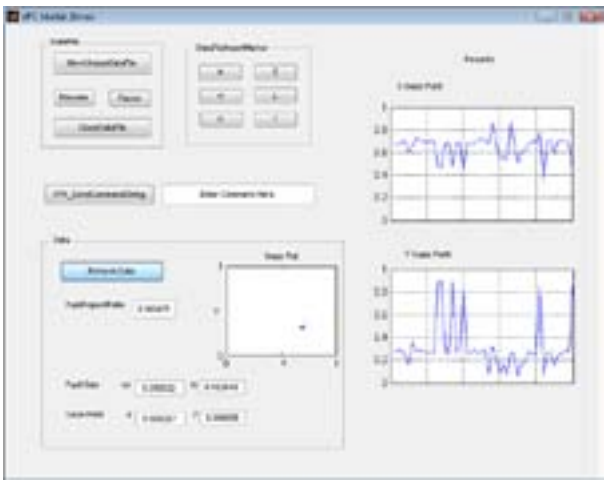
Every GUI ( slider, button, menu) has an equivalent Command Line Interface (CLI) command, that can be sent from remote computers, included in scripts, and provide custom startup for for complete external control of *ViewPoint*.

```
VPX_SendCommand( "calibration_Points 16");
VPX_SendCommand( "calibration_Start");
VPX_SendCommand( "dataFile_NewName '%s' ", dataFileName );
VPX_SendCommand( "dataFile_InsertString 'Showing picture of cat.' ");
VPX_SendCommand( "stateEngine On");
```

You can also associate commands with FKeys, Digital Inputs, etc.

# Interfaces

We provide interfaces between the *ViewPoint EyeTracker* ® and 3*rd* party applications. These provide access to data, complete eye tracker control and data integration and synchronization, all in real-time. Real-time communication on the same machine and via Ethernet on remote machines.



***ViewPoint EyeTracker*® Toolbox for MATLAB®**
Includes a demonstration interface
Works with ***Psychtoolbox - Macintosh & PC***
*ViewPoint EyeTracker Toolbox* is included *free*

**Python, LabVIEW & E-Prime®** E-BASIC
Examples & sample source code included *free*

**Presentation®** binocular interface, documentation and sample scenarios demonstrating the interface included *free*

# *ViewPoint* ~ Voltage Systems

*ViewPoint EyeTracker*® systems can be supplied with Analog and Digital I/O TTL capabilities.

**AnalogOut & Digital I/O TTL Option:**

| | | |
|---|---|---|
| Item 0015 | 2-Channel AnalogOut | $1,400 |
| Item 0022 | 4-Channel AnalogOut | $1,900 |
| Item 0024 | 8-Channel AnalogOut | $2,500 |

Select from dozens of variables including: Position of Gaze, Pupil Size, Velocity, Torsion, and Raw Data (pupil, glint or vector etc.). Includes the same Digital I/O TTL capabilities as Item 0016 below.

**Digital I/O TTL In/Out option:**

| | | |
|---|---|---|
| Item 0016 | Digital I/O TTL In/Out | $900 |

Input channels (8) can trigger command strings (specified by the user) to control any aspect of *ViewPoint*, including the insertion of synchronization markers into *ViewPoint* data files, Pause / Resume, Calibrate etc.

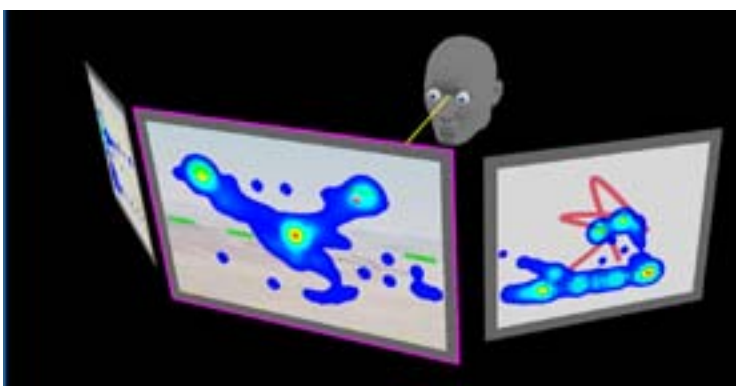
Output channels (8) can be set by the *ViewPoint* ***ExperimentEngine***™ and can indicate whether the Position Of Gaze is inside a Region Of Interest (ROI), etc.

Edge Trigger @- nsec

# Head and EyeTracker Integration Solution

## *3DWorkSpace*™ Turnkey Solution to EyeTracking & HeadTracking Integration

* Intuitive 3D graphics show exactly what the head and eyes are doing together
* Heat, Fog, Torch & ROI-linkage maps over multiple monitors and objects
* Fast & Easy - setup and calibration in less than 5 minutes
* Quaternion transformations eliminate gimbal lock and provide glitch-free, smooth and efficient rotations

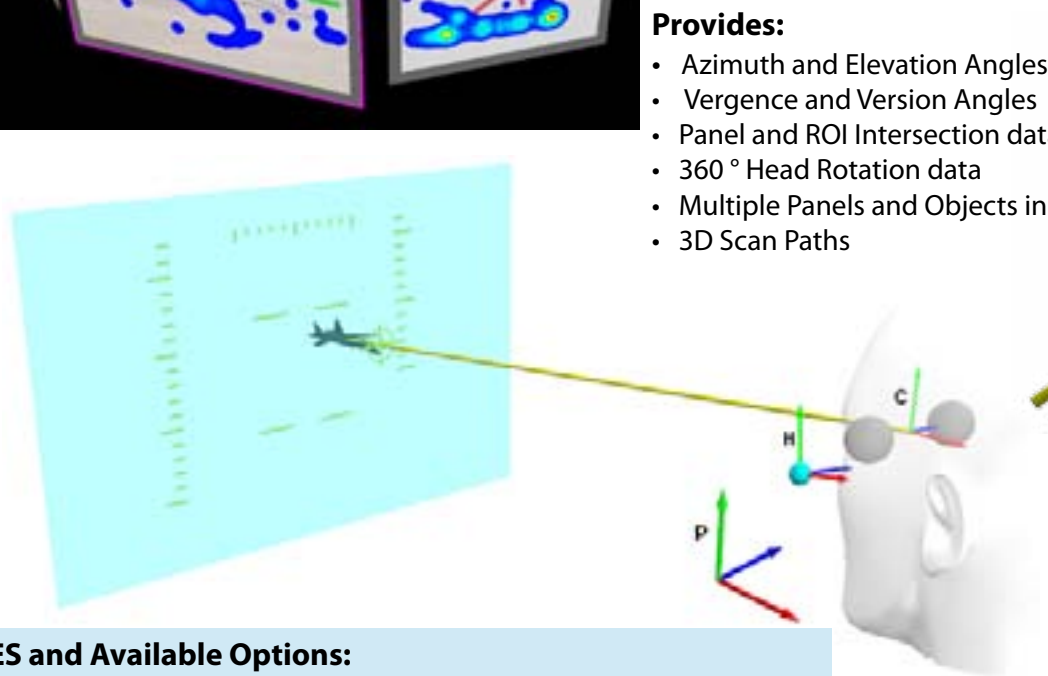


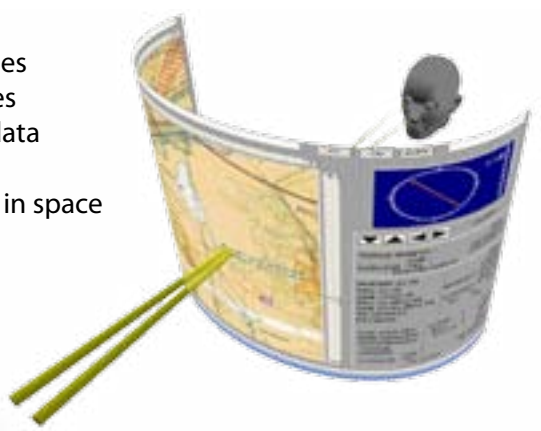
**3D Solution Perfect for:**

- Simulation & Training - offering real-time & after-action review
- Cockpit, Bridge, Control Center, Ergonomic Design & Analysis
- Kinematics, Motor Control, Eye-Hand coordination
- Torsion, Vestibular-Ocular Reflex (VOR), and other eye movements
- Tracking on curved display panels

**Provides:**

- Azimuth and Elevation Angles
- Vergence and Version Angles
- Panel and ROI Intersection data
- 360 ° Head Rotation data
- Multiple Panels and Objects in space
- 3D Scan Paths



**Multiple Participant**
add $10,998
each additional

**PRICES and Available Options:**

#3D-B7NP03 *3DWorkSpace*™ Complete (no SceneCamera) $24,998
*For customers starting from scratch:*
* *ViewPoint EyeTracker* ® software with Trackable Binocular *EyeFrames*™
* *3DWorkSpace*™ software, 3-camera Rigid Body Tracker, Stylus & Trackables

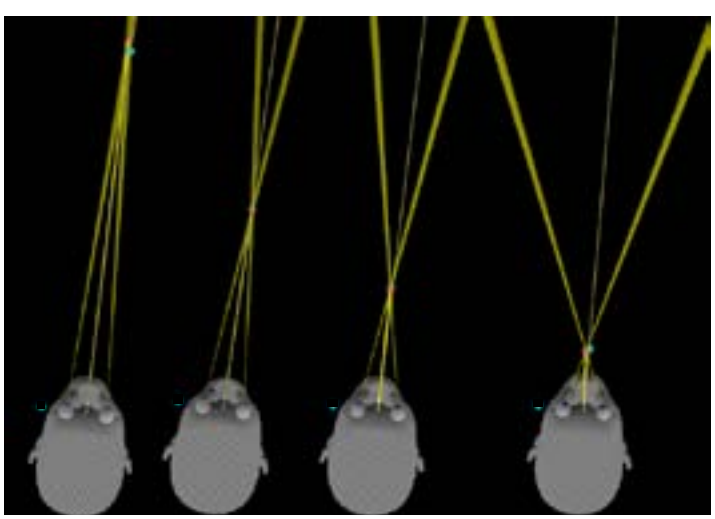
#3D-BS7NP03 *3DWorkSpace*™ Complete (with SceneCamera) $27,498
*As above plus SceneCamera software option and hardware*

#3D-NP03 *3DWorkSpace*™ Upgrade $15,000
*For customers that already own ViewPoint Binocular EyeFrames*
* *3DWorkSpace*™ Software, 3-camera Rigid Body Tracker, Stylus & Trackables

#3D-NPC Extra Camera for Rigid Body Tracker $999

**Accurate Depth from Vergence**

Blue Balls = Targets Red Balls = 3D GazePoints



***3DViewPoint*™**

The Fixed-Head version of *3DWorkSpace*™ is available, see Page 13.

# EyeFrame SceneCamera Systems

Light weight and comfortable, the eye tracking system can be worn without discomfort for long periods. View real-time gaze or recorded movies with gaze point shown clearly over the scene video. Easily adjustable in size and compatible with glasses, this design is well received by subjects who mostly dislike cumbersome helmet, or clumsy baseball cap style systems.

* Binocular allows correction for parallax error
* The lightest weight at less than 35g
* No beam splitter to adjust, clean or shatter
* Fits any face
* No head tracker is required
* Laptop systems and battery packs available

**400 Hz Binocular USB System Now Available!**

**Wireless !**

**Binocular SceneCamera**

Real-time digital wireless data with Eye & Scene Video

**Specifications***

| | |
|---|---|
| Speed | 30 Hz or 60 Hz tracking |
| Tracking | Binocular |
| Accuracy | 0.25° - 1.0° visual arc |
| Resolution | 0.15° visual arc |
| **Hardware** | |
| EyeFrames | Light weight |
| Eye Cameras | Binocular |
| Scene Camera | Color 67° horizontal FOV (default), |
| | High Res. Color camera M12 lens options: |
| | FOV available: 89° , 78° , 67° , 44° , 33° , 23° |
| | High Res. B/W Low light camera M9 lens option: |
| | FOV available: 150° , 130° , 92° , 40° , 28° , 19° |
| **Calibration** | |
| Performed | With respect to the camera view (camera sensor) |
| Ease | Save and reuse calibrations |
| | One step slip correction |
| Options | Binocular works with *3DWorkSpace*™ |
| | *For AnalogOut and TTL In/Out options -- see page 4* |

**Problems Solved!**

Parallax errors and frame torsion errors are real problems with monocular systems. *ViewPoint* binocular systems eliminate these problems using proprietary algorithms providing accuracy over the entire range of distance.

**PRICES and Available Options:**

**Binocular SceneCamera System**

| | | | |
|---|---|---|---|
| Item BSU07 | USB 2.0 Silver Box * | 60 Hz tracking | $13,998 |
| Item BSU07-220 | USB 2.0 Digital Camera | 220 Hz tracking | $19,998 |
| Item BSU07-400 | USB 2.0 Digital Camera | 400 Hz tracking | $22,998 |

**Lens Kits:** Include all six lenses listed above for B/W or color SceneCamera $389

**Two EyeTrackers in One:** With a means of fixing the head, such as the *HeadLock*™ with *EyeFrame Clips*, you can also use this system to measure Position of Gaze relative to the display screen of a computer. The same software functionality is included.

***HeadLock*™ *with EyeFrame Clips option* -- *see page 12*** $2,796

# 400 Hz Head Fixed Systems

Calibration is performed with respect to a computer screen or projector display. Use with your own method of head stabilization or alternatively with our *HeadLock*™ Ultra Precision Head Positioner ™.

## *HeadLock*™ Ultra Precision Head Positioner ™

- Rigid
- Stable
- Comfortable

### *HeadLock*™

| | | | |
|---|---|---|---|
| **Binocular** | | | |
| Item BHU400 | Binocular | 400 Hz | $17,998 |
| Item BHU03 | Binocular | 220 Hz | $14,498 |
| Item BHU903 | Binocular | 90 Hz | $10,998 |
| **Monocular** | | | |
| Item MHU400 | Monocular | 400 Hz | $12,498 |
| Item MHU03 | Monocular | 220 Hz | $9,998 |
| Item MHU903 | Monocular | 90 Hz | $7,998 |

### Specifications

| | |
|---|---|
| Speed | 400 Hz tracking (220 Hz & 90 Hz available) |
| Tracking | Monocular or Binocular |
| Accuracy | 0.25° - 1.0° visual arc |
| Resolution | 0.15° visual arc |
| **Hardware** | |
| Camera | Digital USB 2.0 Cameras & Cables |
| Illiminator | IR Illumination Source |
| Rest | Ultra Precision Head Positioner |
| **Calibration** | |
| Performed | With respect to the display screen |
| Ease | Save and reuse calibrations |
| | One step slip correction |
| Options | Works with *3DViewPoint*™, see Page 13 (Binocular required) |

- Digital USB 2.0 Global Shutter Camera
- No external power supply required
- Use with a lap top or desk top computer
- Can be supplied with different lens options to suit your required camera to eye working distance

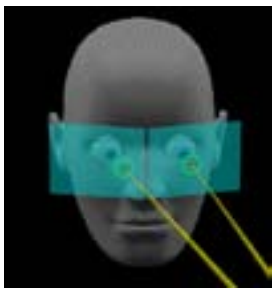
### Remote

| | | | |
|---|---|---|---|
| **Binocular** | | | |
| Item BCU400 | Binocular | 400 Hz | $15,498 |
| Item BCU02 | Binocular | 220 Hz | $12,498 |
| Item BCU902 | Binocular | 90 Hz | $8,998 |
| **Monocular** | | | |
| Item MCU400 | Monocular | 400 Hz | $9,998 |
| Item MCU02 | Monocular | 220 Hz | $7,998 |
| Item MCU902 | Monocular | 90 Hz | $5,998 |

Standard lens options for Remote / Desk Mounted systems ( custom lenses also available ):

| Distance | Lens |
|---|---|
| 11 cm to 17cm | 12mm |
| 16 cm to 26 cm | 16mm |
| 32 cm to 44 cm | 25mm |
| 45 cm to 70 cm | 35mm |
| 63 cm to 96 cm | 50mm |
| 117 cm to 170 cm | 75mm |

# Virtual Reality (VR) Eye Tracking



***ViewPoint EyeTracker®* Advantages**

*ViewPoint* provides calibration for:

- Canted / Tilted Displays
- Full or Partial Binocular Overlap
- See-thru or Opaque Displays

## Self-Install Modules

- VR or Stereo glasses

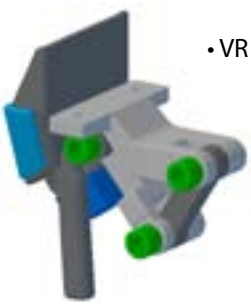
*60 Hz* EyeTracker

**Binoc: $10,698**

**Mono: $7,998**

## Folded Optics Modules

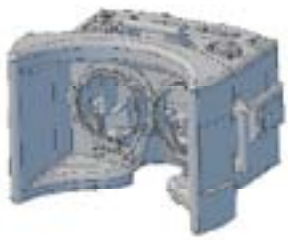
- VR or Stereo glasses



**Binoc: $14,498**

**Mono: $11,498**

## Bespoke Systems



**Oculus Integration**

**Binoc: $14,998**

**Mono: $11,998**

**NVIS ST-50 Integration**

**Binoc: $16,998;**

**Mono: $13,998**

**NVIS nVisor MH60**

**Binoc: $30,948**

**Mono: $27,948**

**Hololens Integration**

**Binoc: $16,998**

**Mono: $13,998**

**HTC VIVE Integration**

**Binoc: $16,998**

**Mono: $13,998**

***High Speed Binocular***

**400 Hz, 220 Hz, 90 Hz, 60 Hz USB**

**New and Aftermarket for most HMDs**

**Please contact us for details**

***Please ask us for a quote on any VR integration.***

- *HTC Vive*
- *Samsung*
- *Oculus*
- *Sony*
- *NVIS*
- *Hololens*
- *More!*

# Pupilometry / Nystagmus

**Pupil Size Measurement EyeFrame Systems**

* Rotated elliptical fit provides accurate pupil size in tertiary positions of gaze by using the major axis of rotated elliptical fit.
* *ViewPoint EyeTracker*® systems provide pupil size measurements in real-time to better than .03 mm resolution with no Averaging.

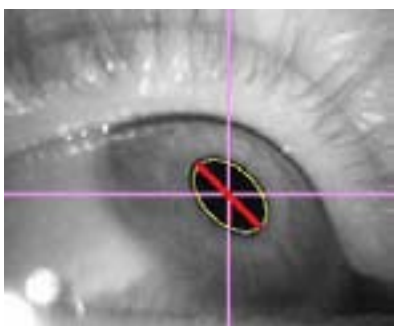
These systems are perfect if you are interested only in relative eye movements, nystagmus or pupil size. Included: *ViewPoint EyeTracker* ® PC-60 software, eye camera(s) mounted on the light weight *EyeFrames*™, frame grabber, power supply and all cables. **No Scene Camera.**

**PRICES:**

| | | |
|---|---|---|
| Item BPU07 | Binocular system for pupil size / eye movements | $11,498 |
| Item MPU07 | Monocular system for pupil size / eye movements | $9,498 |
| Item BPU07-220 | Binocular system for pupil size/eye movements | $16,498 |
| Item MPU07-220 | Monocular system for pupil size/eye movements | $14,498 |

**Bonus!** With a means of fixing the head you can also use this system to measure Position of Gaze relative to the display screen of a computer. The same software functionality is included.

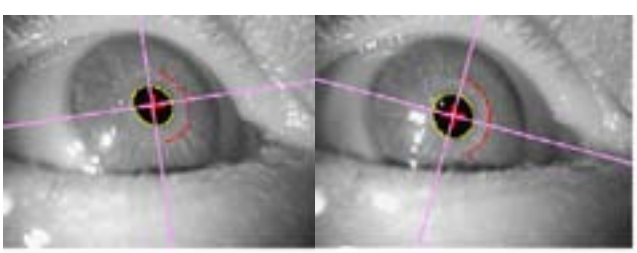
***HeadLock™ with EyeFrame Clips*** add $2,796



# Torsion

**Free-Gaze Ocular Torsion Measurement in Real-Time (Software Option)**

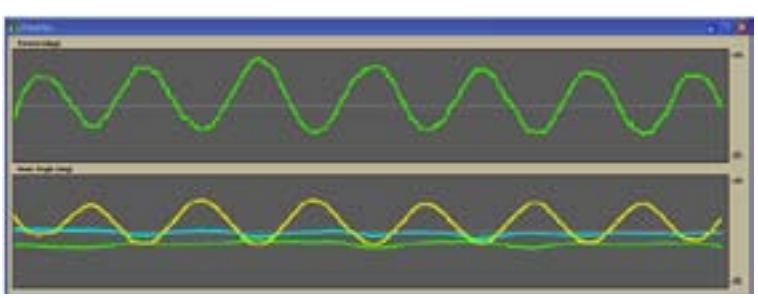
* Torsion is the rotation of the eye-ball about the Line of Sight, i.e. rotation about the z-axis. *ViewPoint* measures Torsion and Position of Gaze simultaneously in real-time. Data can also be accessed real-time from other applications. Real-time feedback is displayed in the PenPlot window.
* Available as an additional option with all systems, including 400 Hz systems.



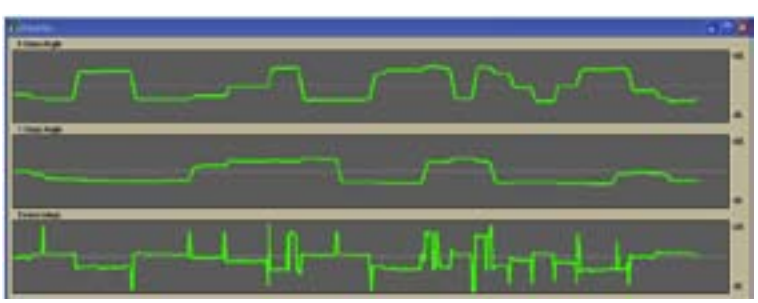
**PRICES:**

Item 0035 3D-VOG (X,Y Torsion) $1,998 as an add-on option

Note: Binocular Torsions is included free with *3DViewPoint* ™



Torsion from head roll



Torsion from saccades

# Integrator / OEM Solutions

* Integrator systems are for users who have the technical expertise and time to develop their own camera and illumination hardware. All Integrator systems include *ViewPoint EyeTracker®* software. USB-400, USB-220, USB-90 systems include global-shutter cameras with IR-pass filter; add M12 lens for $98 (FOV: 89º, 78º, 67º, 44º, 33º, 23º), add C-mount lens for $295 (12mm, 16mm, 25mm, 35mm, 50mm, 75mm). The 60 Hz systems include only the frame grabber device.
* Fee based consulting for integration can be provided.

**PRICES:**

**HMD / Head-Fixed Use**

| | | | |
|---|---|---|---|
| **Binocular** | | | |
| Item BIU601 | 60 Hz | USB 2.0 : Silver Box | $7,998 |
| Item BIU400 | 400 Hz | USB 2.0 : M12-Board or C/CS Camera | $14,498 |
| Item BIU01 | 220 Hz | USB 2.0 : M12-Board or C/CS Camera | $11,498 |
| Item BIU901 | 90 Hz | USB 2.0 : M12-Board or C/CS Camera | $7,998 |
| **Monocular** | | | |
| Item MIU601 | 60 Hz | USB 2.0 : Silver Box | $5,998 |
| Item MIU400 | 400 Hz | USB 2.0 : M12-Board or C/CS Camera | $8,998 |
| Item MIU01 | 220 Hz | USB 2.0 : M12-Board or C/CS Camera | $6,998 |
| Item MIU901 | 90 Hz | USB 2.0 : M12-Board or C/CS Camera | $5,498 |

**SceneCamera Use**

| | | | |
|---|---|---|---|
| **Binocular** | | | |
| Item BSIU601 | 60 Hz | USB 2.0 : Silver Box | $9,998 |
| Item BSIU01 | 220 Hz | USB 2.0 : Digital Camera | $15,498 |
| **Monocular** | | | |
| Item MSIU601 | 60 Hz | USB 2.0 : Silver Box | $7,998 |
| Item MSIU01 | 220 Hz | USB 2.0 : Digital Camera | $13,498 |

M12-Board

C/CS

Silver Box

# Custom Solutions

**Custom Hardware**

We can provide custom hardware modifications including different camera-to-eye working distances.

**Custom Software**

Private labelling, private logos, custom interfaces and custom look and feel.

**Prototyping & Custom Manufacturing**

Fast single item prototypes or low volume runs.

**Integration & Embedded Solutions**

Custom software and communication interfaces.

**Let us help you bring your product to market faster!!**

# fMRI Synchronization with Ultrafast Voltage Edge-Trigger

*ViewPoint EyeTracker* ® can be purchased bundled with fMRI compatible hardware systems from a number of manufacturers including:

nnl

Resonance Technology, Inc.

MRA Inc.

Avotec
INCORPORATED

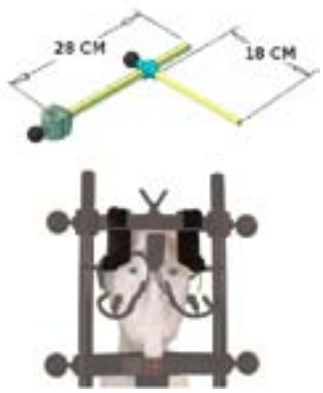
***UPGRADE AFTERMARKET!***

***Many customers have chosen to upgrade their fMRI eyetracker aftermarket with quality ViewPoint EyeTracker ® software for better results -- Please Enquire !***

# HardWare Options

### *HeadLock*™ - Ultra Precision Head Positioner ™

* Rigid and stable.






**PRICES:**

| | | |
|---|---|---|
| Item 0037 | *HeadLock*™ | $2,498 (no Accessory Mount) |
| Item 0038 | Accessory Mount | $399 |
| Item 0039 | Clips for 60 Hz EyeFrames | $298 |
| Item 0041 | Clips for 220 Hz EyeFrames | $298 |

### Analog HookUp / Access:

* Provides BNC connectors for easy access to analog voltage signals
* Connects to Items 0015 and 0022

**PRICES:**

| | | |
|---|---|---|
| Item 0047 | Analog Hookup / Access (8 BNC Connectors) | $349 |

### SceneCamera Lens Kits

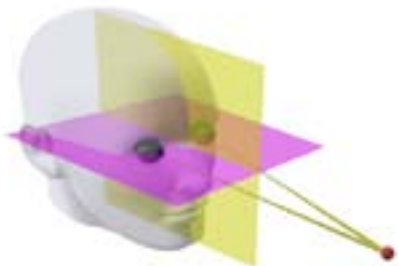
* LKM12 for Color SceneCamera — Kit includes FOV: 89º , 78º , 67º , 44º , 33º , 23º
* LKM09 for Monochrome Scene — Kit includes FOV: 150º , 130º , 92º , 40º , 28º , 19º

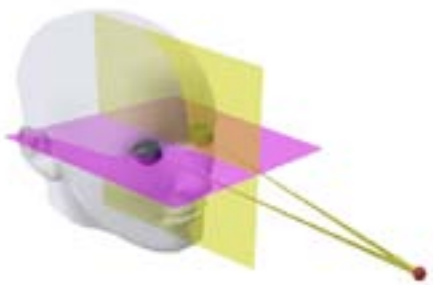
**PRICES:**

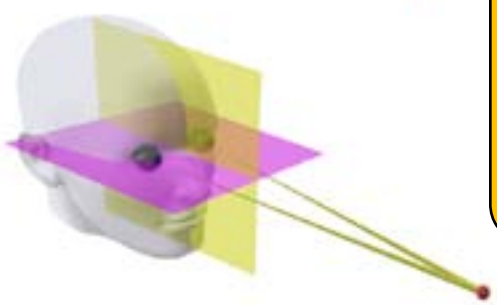
| | |
|---|---|
| Item 0029 (Color) | $389 |
| Item 0026 (B&W) | $389 |

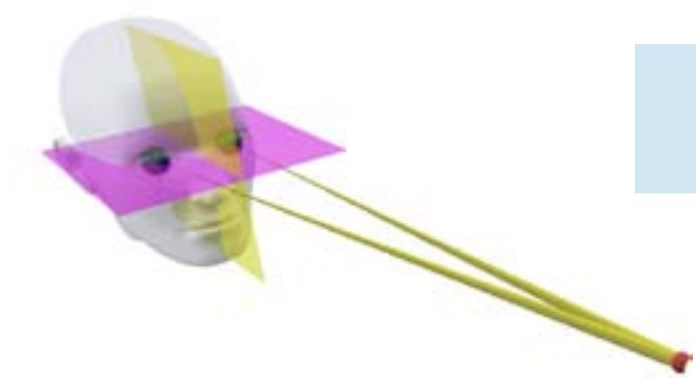
# 3DViewPoint™

***3DViewPoint™ Professional*** ~ The Head-Fixed version of ***3DWorkSpace™***



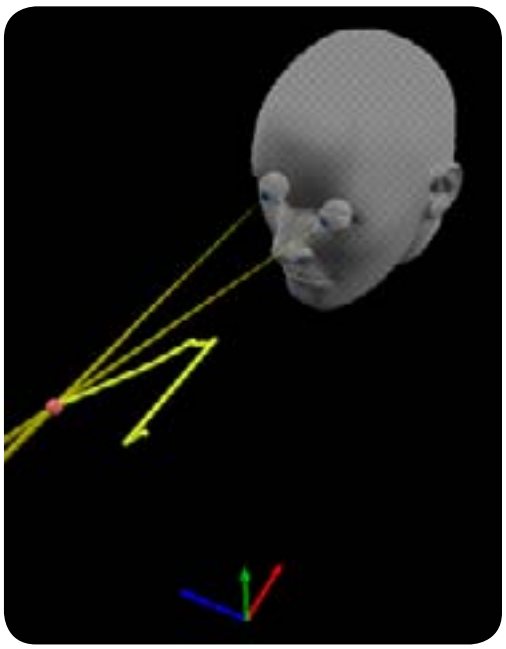






*** New Features***

- *** Intuitive 3D Graphics**
- *** Angular Calculations**
- *** Fast & Easy Setup**
- *** Post-hoc ROI Respecification**
- *** Polygon / Concave ROI**
- *** Torsion across 3D Gaze**
- *** Vergence & Version Angles**
- *** 3D ScanPaths in Depth**
- *** Heat, Fog and Torch Maps**
- *** Quaternion Transforms**
- *** No head tracking required**
- *** 400 Hz compatible**



**PRICES:**

Item 3DVP ***3DViewPoint™*** Professional software option add $4,998

*Enhances Binocular Head-Fixed products*

## 400 Hz Binocular and Scene EyeFrames

 February 2020

## Contact information

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ArringtonResearch

# 400 Hz Binocular EyeTracker with Real-time Torsion