

## Wrap<sup>™</sup> 1200DXAR

User Guide



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## Read the Safety and Warranty information before proceeding.

# Wrap 1200DXAR Introduction

### **Overview**

The WRAP 1200DXAR is a digital video eyewear product designed for use in augmented reality (AR) applications. It provides a video display, video capture, audio, head tracking, plus HMDI<sup>®</sup> and USB interfaces to a Windows computer for processing and providing AR content.



Realistic augmented reality requires a capture and delivery system that provides the user with view of the real world as well as video capture for recognition of markers or other targeting and positioning indicators. The video capture must them be processed and augmented with the computer generated content or data and presented to the user. The Wrap 1200DXAR is that capture and delivery system, allowing you to use virtually any of the leading AR authoring software to process and populate your AR content.

The WRAP 1200DXAR is intended for use with a Windows based personal computer, though many of its components are compatible with other PC operating systems and other video sources providing an HDMI video out port.

### 2D/3D Display

The display module provides widescreen 16:9 video on a 75-inch virtual display\* system. Standard 2D and multiple formats of 3D video are supported. The Wrap display system is worn like a pair of sunglasses with it multiple adjustments enabling personal display and comfort adjustment.

\* The Wrap 1200DXAR display is visually equivalent to a 75-inch display viewed from a distance of 10 feet (3 meters).

### Controller

The Wrap 1200DXAR Controller contains a rechargeable battery to enable video viewing using a wide assortment of HDMI-compliant devices and a USB port enables battery charging as well as continuous use when connected to a 0.5A USB power, like those found on most modern desktop and laptop computers.

A High-Definition Multimedia Interface enables an audio/video connection to virtually any HDMI-compliant source device.

#### Stereo USB Camera

The most visually striking feature of the Wrap 1200DXAR is its stereo camera pair mounted on the face of the eyewear. This stereo camera system enables 3D video capture of the user's real-world view.

The stereo cameras capture video at up to 60 frames per second in 640 x 480 resolution and are recognized by your computer as two independent USB webcams. No special or proprietary APIs are required to access and process what they capture.

The cameras connect to a Windows based computer through a dedicated USB 2.0 connection.

#### Head Tracker

The Wrap Tracker, is a 3-DoF (Degrees of Freedom) motion tracker that places you in the middle of the action. It plugs into a small port on back of the eyewear's display module and communicates head position and movement to the computer through the Controller's USB 2.0 connection.

Tracker use required explicit support in applications or support via a VR Manager Extension. VR Manager is a Windows compatible software application that enables tracker calibration and provides Extensions that enable 3D video and/or head tracker support to a wide variety of games, simulators and other applications.

#### Removable Earphones

Removable noise-isolating earphones provide high quality audio. The eyewear system can be used with or without the earphones, enabling the use of alternate audio systems.

Vuzix provides an AR/VR SDK for Windows that demonstrates 3D video and head tracker support. The SDK is available for free download from the Vuzix website.

## **System Requirements**

- Windows based personal computer HDMI output (*full product support*)
- HDMI compliant video source (*audio/video playback only*)
- 2, USB 2.0 ports providing 0.5A of power or greater

## **Downloads & Updates**

Vuzix provides online access to WRAP 1200DXAR software, documentation and updates.

- To download the complete set of WRAP 1200DXAR software and documentation, go to: www.vuzix.com/DD
- To download individual files and/or updates, go to: <u>www.vuzix.com/downloads</u>

# Installation & Setup

This section leads you through the installation and connection of your WRAP 1200DXAR eyewear to a Windows based personal computer.

## Step 1: Charging the Controller

For instructions on using the Wrap 1200DXAR as a video display device only, download the Wrap 1200DX User Guide from the Vuzix website. The Wrap 1200DXAR is powered by a rechargeable lithium-ion battery in the Controller. The battery is charged through the Controller's USB port, connected to your computer. When connected to a computer with an adequate power supply, you are able to playback video continuously.

The USB cable provided with your eyewear has two different connectors, a small Mini-B connector and a standard sized Type A connector.



 Plug the small Mini-B connector into the USB port on the Controller and the larger Type A connector into the USB port on your computer.

### Prior to First Use

Prior to using the Wrap 1200DXAR its battery must charged for a minimum of four (4) hours, using a USB power source providing a minimum of 0.5 Amps. Most modern desktop and laptop computers provide sufficient power. Check your computer's specifications if you are unsure of your USB port's power output.

## Step 2: Install Software

### **Digital Download**

Software and documentation for Vuzix video eyewear products is provided in an eco-friendly electronic format, downloaded from the Vuzix Digital Download webpage.



The USB port on your computer must provide a minimum of 0.5 Amps of power.

- Using your web browser, go to <u>http://www.vuzix.com/dd</u>.
- Download the software and documentation package for the Wrap 1200DXAR.
- Decompress the .zip file and save its contents to a convenient location.
- Review the documentation provided.
- Open the "Camera\_Drivers" folder and run the "drv\_uvc\_20100202\_whql.exe" installer application.
- Follow the onscreen instructions.
- Open the "VR\_Manager\_4.1" folder and run the "Setup.exe" installer application.
- Follow the onscreen instructions.

The specific steps of your install procedure will vary dependent upon the version of the Windows operating system installed on your computer. The installer application will advise you of the actions required by your system.

The installation process will install Windows compatible camera driver and the Vuzix VR Manager software for head tracker calibration.

### **Step 3: Connecting Accessories**

### Earphones

Audio is provided through the HDMI connection to an HDMI-compliant computer. Be sure to adjust the volume to a safe and comfortable level before inserting the earphones into your ears. The volume is controlled through the "+" (plus) and "-" (minus) buttons on the Controller.

Plug the stereo earphones into the jacks above each of the eyewear displays.



The noise-isolating earphones are not required for the proper operation of the eyewear. Unplug the earphones if you prefer to use an alternate speaker system.

### Wrap Tracker

The Wrap Tracker is a 3-degree of freedom tracker that plugs into the Wrap 1200DXAR video display module near the right temple hinge.

Most HDMI-compliant adapters support audio but some adapters, such as DVI-to-HDMI do not. If audio is not supported by your system, you'll have to use an alternate speaker system.



Plug your Wrap Tracker into the small port on the back of the display module, to the right of the earphone port.

See the "VR Manager User Guide" for instructions on calibrating the tracker.

## Step 4: Connecting to your Computer

Three connections joint your Wrap 1200DXAR to your Windows based computer system, two from the controller to the computer and one from the stereo camera pair.

### Controller

The Wrap 1200DXAR Controller provides two ports, a HDMI port and a USB port. Cables are provided to connect both of these to an HDMI-compliant Windows based personal computer.

The HDMI port provides audio and video to the eyewear system while the USB port provides power and head tracker data support.



 Use the cables provided, connect the High Speed HDMI<sup>®</sup> Cable from the Controller to your computer and the Controller's USB port to a USB 2.0 port on your computer.

### Camera

The stereo camera pair connects to the computer independently through a separate USB connection.

Additional adapters or cables may be required for your installation.

Cables not certified as High Speed HDMI® Cables and may not provide the same level of performance and/or compatibility. Both cameras connect through this single USB cable. The amount of data required to support two cameras is heavy and its bandwidth may exceed the capabilities of some USB controllers.



Connect the camera's cable to a USB 2.0 port on your Windows computer.

## Step 5: Adjustment & Configuration

### **Power On/Off**



- Press the "Power & Menu" button to turn the eyewear on.
- Press and hold the "Power & Menu" button to turn the eyewear off.

If no video signal is detected for a period exceeding 30 seconds, the eyewear display will automatically turn off to conserve power.

See the "Controller & OSD" section for additional controls and display options information.

If you press the Power & menu button again, after it is turned on, the OSD (On Screen Display) screen will be displayed.

### Video Display

The WRAP 1200DXAR does not require any configuration for displaying 2D or 3D video from HDMI-compliant devices.

If connected to a computer that is not fully HDMI-compliant, some configuration may be required to enable the eyewear to function as an external monitor.

If your computer does not automatically configure to the correct resolution, with the eyewear display duplicating the image on your desktop or laptop monitor, adjust its video display settings as follows: Other resolutions may be available on your computer system but may not display in the proper aspect ratio. For best results, use one of these supported resolutions.

If an alternate audio system is used, volume controlled through that system's controls.

Multiple Displays: Duplicate or mirrored display **Resolution:** One of the following resolutions

### Audio

The WRAP 1200DXAR is equipped with removable stereo earphones. Small, medium and large noise-isolation rings are included.

Press the plus (+) or minus (-) button on the Controller to adjust the volume.

1152 x 648

1280 x 720

1600 x 900

1920 x 1080

Do not put the earphones into your ears until the audio volume has been set to a moderate and safe level.

### **Focal Adjustment**

The focus of each eye's display can be adjusted independently from approximately +2 to -4 diopters. If this adjustment is insufficient, the eyewear can be worn over many styles of prescription eyeglasses.



- Close one eye and slide the adjuster above your open eye to achieve the sharpest focus.
- Repeat the process, closing the opposite eye.

### Eye Separation Adjustment

This distance between your eyes, InterPupillary Distance (IPD), varies from one person to the next. If your eyes are not correctly aligned with the displays, the image may appear dark or disappear entirely. An IPD adjustment enables you to align each display with its respective eye.



Each display adjusts independently by sliding it left or right.

- Close one eye and slide the display box for the other eye left or right to provide the clearest and brightest image.
- Repeat the process to adjust the other display.

## Accutilt<sup>®</sup> Display Angle Adjustment

The angle of your displays can also impact their clarity. Vuzix eyewear is equipped with a patented Accutilt system that enables the display to be to be tilted up or down by up to 15 degrees.



 Adjust the display angle, by rotating the up/down tilt of display module, to achieve the best quality image.

### Nose Bridge

The nose bridge assembly is adjustable both in length and the angle/width of its pads.



- Slide the nose pad assembly in or out to adjust the display height of your eyewear. The eyewear displays should be aligned to the same level as your eyes.
- Bend the nose pad wires to adjust the pad separation and angle.

Just as is the case with prescription eyeglasses, the wire arms of the nose pads are designed for adjustment for a single user. Excessive and/or frequent adjustment or sharp bends in the wire arms may weaken and break them. Replacement nose pads are available from Vuzix.

If the stem pulls completely out, simply slip it back into its slot taking care that the serrated strip faces toward you – away from the eyewear display assembly.

### **Tether Strap**

For active applications a tether strap can be used to provide a more secure fit.



- Attached each end of the tether strap to the eyelets on the eyewear stems.
- Adjust the strap synch for a comfortable and secure fit.

# **Controller & OSD**

The WRAP 1200DXAR Controller provides access to audio controls as well as the OSD, a menu system for controlling the eyewear's On-Screen Display (OSD) options. Volume and the OSD options are managed through the four buttons on the Controller.



## **Controller Buttons**

	Power & Menu	Powers up the video eyewear and enable its on-screen display menu (OSD).
		Press the "Power & Menu" button again, once the device is powered on, to display the OSD.
(+)	Plus Selector	Increases adjustment settings of current OSD selection.
		Increases volume if the OSD is inactive.
$\bigcirc$	Minus Selector	Decreases adjustment settings of current OSD selection.
		Decreases volume if the OSD is inactive.
$\bigcirc$	Return – Go Back	Press it once to turn off the OSD, if it is displayed.

## **OSD** Display Controls

With the device on, press the Power & Menu button to display the OSD.



The display resolution is displayed in the top left corner, along with the current display mode. The battery level is displayed in the top right corner.

### **Display Mode**

The display mode menu options, titled "3D" and brightness and contrast setting controls are illustrated above.

Four display modes are supported:

- "2D" for standard 2 dimensional content,
- "SxS" for side-by-side formatted 3D content,
- "T/B" for top/bottom formatted 3D content, and
- Frame packed 3D content.

Manual display configuration can only be done when the HDMI technology does not detect 3D content.

### **Brightness**

Use the + and – buttons to adjust the screen brightness.

### Contrast

Use the + and – buttons to adjust the contrast of the screen.

## Eyewear Reference

## **Video Display**

Most HDMI devices do not require display configuration adjustment when connected to a Wrap 1200DXAR. Some computer systems may require adjustments to their display settings to enable the Wrap 1200DXAR as second or external display.

The computer must be configured to support the Wrap 1200DXAR as an external monitor, duplication its desktop or laptop monitor. Depending upon your operating system this configuration may be referred to as duplicate, mirrored, or clone display mode.

If the display settings do not automatically adjust to a resolution commonly supported by the desktop and eyewear monitors, it must be manually set to one of the following resolutions:

- 1152 x 648
- 1280 x 720
- 1600 x 900
- 1920 x 1080

2D and 3D video is supported on all known makes and models of Windows compatible graphics cards. No additional 3D drivers are required.

### **3D Video**

By default the eyewear supports standard 2D video. Stereoscopic 3D video support is provided for side-by-side, top/bottom and frame packed content. A compliant HDMI 3D capable source will automatically configure the eyewear for the correct 3D mode and enable 3D display. You will not be able to change the 3D settings of the eyewear when it is automatically configured in this manner.

### Battery

The Controller contains a rechargeable lithium ion battery, recharged by connecting it to a USB charger (wall outlet or computer port) with an output of 1 amp or greater.

Recharging a fully depleted battery can take up to 8 hours.

The Vuzix icon on the Controller will illuminate red while the device is plugged into the charger. If the device is plugged in and turned on, the red illumination will

Other resolutions may be available on your computer system but may not display in the proper aspect ratio. For best results, use one of these supported resolutions.

Video content must be displayed "full screen" on a PC to be viewed in 3D. remain on and the blue illumination will flash indicating that the device is on and charging.

### **Stereo Camera Pair**

The Wrap 1200DXAR provides two independent VGA (640x480) cameras with natural eye separation to provide realistic stereoscopic 3D image capture. The cameras provide full-frame, sub-sampled or windowed 8-bit images in a wide range of formats, controlled through the Serial Camera Control Bus (SCCB) interface.

Each camera has an image array capable of operating at up to 30 frames per second (fps) in VGA with complete user control over image quality, formatting and output data transfer. All required image processing functions, including exposure control, gamma, white balance, color saturation, hue control and more are programmable through the SCCB interface.

Active Array Size	640 x 480
Temp. Range (stable image)	0°C to 70°C
Output Formats (8-bit)	YUV/YCbCr 4:2:2
	RGB565/555/444
	GRB 4:2:2
	Raw RGB Data
Max Image Transfer Rate	30 fps for VGA
Sensitivity	1.3 V/(Lux•sec)
S/N Ratio	46 bB
Dynamic Range	52 dB
Scan Mode	Progressive
Electronics Exposure	Up to 510:1 (for selected fps)
Pixel Size	3.6 μm x 3.6 μm

The USB controllers in some PCs have difficulty satisfying the bandwidth requirements of two cameras.

- If your cameras are connected through a USB hub or use a USB extension cable, try connecting the cameras directly to a USB port on your computer.
- If you encounter this issue, try using a different USB port, such as a USB 3.0 port, as it may use a different controller or try using it on a different computer.
- If the above fail to resolve the issue, lower the bandwidth requirement by reducing the frame rate to 15 fps.

## **Nose Bridge**

The WRAP 1200DX's nose bridge and pads are adjustable. For the best viewing experience your displays should be centered in front of your eyes. By sliding the nose

"AMCap" is a Windows application installed with the Wrap 1200DXAR for verification of proper camera operation. bridge assembly's stem in or out of the display module you can adjust the resting height of the displays. By bending the wire nose pad arms you can address the angle and spread of the pad to achieve optimum comfort.



To adjust the nose bridge:

 Slide the nose bridge assembly in and out to adjust its reach to position the eyewear displays directly in your line of sight.

If you pull the nose bridge assembly too far out it will come completely out of the display module. Don't worry if this happens as it can be easily slid back in and enables you to replace the nose bridge assembly should it be broken.

 Gently bend the wire arms of the nose pad to achieve a comfortable fit with the pad's face resting on the bridge of your nose – in the same manner that you would adjust the nose pads on standard eyeglasses.

Gentle persuasion with a pair of needle nose pliers works best to bend the wire nose pad arms. This places the least amount of strain on the assembly and adjacent parts. The wire nose pad arms are not designed for frequent bending or sharp angles as this may weaken and break them. Replacement nose pad assemblies are available for purchase from Vuzix (www.vuzix.com).

## **Eye-separation Adjustment**

IPD (InterPupillary Distance) is the distance separating your eyes - sometimes referred to simplify as "eye-separation". IPD varies from one person to the next and when yours does not match close enough to the eyewear displays, the image in one eye or the other may darken or disappear entirely.



Each display adjusts independently by sliding it left or right.

To adjust the IPD:

 Close one eye and slide the display box for the other eye left or right to provide the clearest and brightest image. Repeat the process to adjust the other display.

### **Accutilt Adjustment**

Your WRAP 1200DXAR is equipped with a patented view angle adjustment called "Accutilt". The mechanism allows you to rotate and tilt the display module up and down approximately 15° to achieve the best quality display.



To adjust the viewing angle:

Pivot the display assembly to achieve the best quality display.

### Wrap Noise-Isolating Earphones

The noise isolating earphones provided with the Wrap 1200DXAR are removable and the eyewear can be used with or without them attached. The earphones are interchangeable and can be used on either the left or right side.



Three sizes of noise-isolators are provided, allowing you to adjust for a secure and comfortable fit. Simply slide one noise isolator off the speaker stem and slide another on.

Volume adjustment for the earphones is controlled using the Adjustment Buttons on the Controller. Take care that the volume is set to a low level before inserting the earphones into your ears.



Adjustment Buttons

If you are using an alternate audio system, use that audio system's controls to adjust volume.

## Wrap Tracker

The Wrap Tracker adds see-where-you-look capabilities to AR content viewed on a Windows PC. This 3-DOF head tracker with compass plugs into the back of the eyewear's display module and connects to a Windows based computer through the Controller's USB cable.



Head tracking requires explicit support in software applications. This support is demonstrated in the Vuzix AR/VR SDK for Windows, available for free download from the Vuzix website.

Go to the Vuzix website for more information on the Wrap Tracker.

### **Tether Strap**



A tether strap or lanyard is provided for those unaccustomed to wearing glasses or who are moving around while wearing the WRAP 1200DX. The tether will help secure (but not prevent) it from falling off and possible damaged.

The ends of the tether strap loop over the hooks at the end of each eyewear stem.

## **Developer Tools and Support**

Vuzix works with a large number of software developers and academic institutions developing a variety of AR applications. One of the services we provide to assist in these efforts is an SDK that can be freely downloaded from our website and used without royalty for non-competing products, for private or commercial use.

## Vuzix AR/VR SDK

The Vuzix AR/VR SDK (Software Development Kit) is a set of development resources and examples that demonstrate the application of native support for special features and capabilities provided by certain models of Vuzix video eyewear. It is available for download from the Vuzix website and can be used royalty-free in any non-competing application, including commercial software.

### SDK – Windows Version

Vuzix AR/VR SDK examples are provided in: C++, C# and XNA

The Vuzix AR/VR SDK demonstrates support for:

OpenGL:	Full screen and windowed mode
DirectX:	Full screen and windowed mode
XNA:	Full screen and windowed mode

MFC windowed mode application, demonstrating head tracking only support.

### Product ID

The SDK demonstrates using "Product ID" to identify what products features and capabilities are operational. Different Vuzix eyewear models may feature different stereoscopy, head tracking and other technologies.

### Head Tracking

The Wrap Tracker supports 3-degree (yaw, pitch and roll) of freedom head tracking. RAW and Cooked output is available from the Wrap Tracker and is demonstrated in the SDK.

### AR Extension

Support for the AR camera and ALVAR fiduciary markers provided by the Vuzix AR/VR SDK in its AR Extension, packed in a separate installer. It demonstrates the use of OpenCV for camera support.

## Acquiring Vuzix VR/AR SDK

The Vuzix AR/VR SDK is available for download and royalty free use in noncompeting applications, including commercial products. It can be licensed and downloaded from the Vuzix website's Support/Developer Program web page: www.vuzix.com/developer



Your eyewear is virtually maintenance free, requiring only occasional cleaning with a soft microfiber cloth. Do not spray cleaners onto the eyewear or any of its components or immerse them in water. If required, spray a small amount of optical lens cleaner on a microfiber cloth and use that to clean stubborn marks or oily film.

Never use solvents, abrasive cleaners or paper towel on your eyewear. These items will damage the lens coatings, permanently degrading the eyewear's image quality.

# Support Services

Customer Service and Technical and Warranty Support are provided only through the region office and distribution center from which the product originated. Due to importation, duty and other considerations these services cannot be provided for product purchased in another region.

Technical support and product warranty cannot be provided for product not purchased or originating from that region. As an example, product purchased from a US online retailer cannot receive support or warranty service through our United Kingdom Customer Support services. Support service for U.S. product is provided exclusively by our U.S. Customer Service facilities.

If you are unsure of the correct region to contact for these services, please refer to the following list of distribution regions or ask the vendor providing the product: Japan: Japan only United Kingdom: United Kingdom, Europe, Russia, Middle East, and Africa United States: United States, Canada, Central & South America, Asia (other than Japan), Australia, and New Zealand

### Product originating from the United Kingdom, please contact:

Corporate Website:	www.vuzix.com/uksite
Email Customer Support:	vuzix@tmti.com
Customer Helpline:	0044 844 477 2977
Customer Service Hours:	9 AM to 6 PM GMT Monday to Saturday

### Product originating from the United States, please contact:

Corporate Website:	www.vuzix.com
Email Customer Support:	technical_support@vuzix.com
Customer Helpline:	(800) 436-7838
Customer Service Hours:	9 AM to 6 PM EST, weekdays

When requesting technical support please provide the following information:

- Serial number, complete model name, and model number of your video eyewear.
- Make and model number of the audio video device being used.
- The name of any video content related to your support needs.
- Detailed explanation of the symptoms you are experiencing your questions.

# Waste Electrical & Electronic Equipment

1. The equipment that you bought has required the extraction and use of natural resources for its production. It may contain hazardous substances that could impact health and the environment.

2. In order to avoid the dissemination of those substances in our environment and to diminish the pressure on the natural resources, we encourage you to use the appropriate take-back systems. Those systems will reuse or recycle most of the materials of your end life equipment in a sound way.

3. The crossed-out wheeled bin symbol invites you to use those systems.

4. If you need more information on the collection, reuse and recycling systems, please contact your local or regional waste administration.

5. You can also contact us for more information on the environmental performances of our products.



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