VUZIX®

Wrap™ Tracker 6TC
User Guide

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Overview

The Wrap™ Tracker 6TC is a 6-DoF (Degree of Freedom) capable tracker with compass that plugs directly into Wrap video eyewear. Compatible models include all variations of the Wrap 920 and Wrap 1200 series of eyewear.

The Wrap Tracker provides movement data to a processing device through the Wrap video eyewear and its connection to processing device, such as a Windows based personal computer. At the time this manual was written only Windows based personal computers, connected through a Wrap VGA Adapter, are supported. The information in this manual reflects that application of the Wrap Tracker. Over time additional devices may be supported and information on connecting and using those configurations will be provided in supplemental documentation. Check the Vuzix website (**www.vuzix.com**) for more information.

PC Connection Requirements:
- Wrap 920 or 1200 series video eyewear
- Wrap VGA Adapter (firmware 1.18 or greater)
- Windows based personal computer
  - Windows 7, Vista or XP, 32-bit or 64-bit
- VGA or DVI port (or compatible adapter)
- USB 2.0 port

Note: Wrap VGA Adapter firmware updates are available for download from the Support section of the Vuzix website: www.vuzix.com/support/downloads_drivers.html

Wrap Tracker 6TC
Head tracking brings applications to life – placing you in the middle of the action and virtual worlds where you see where you look.

The Wrap Tracker 6TC is the newest and most advanced head tracker available in the consumer market. This tiny 6 DoF (Degrees of Freedom) capable tracker plugs into a small port on Wrap 920 and 1200 series eyewear and communicates with supporting applications through the eyewear and a Wrap VGA or other compatible adapter.

The Tracker is 6-DoF capable though most applications use only 3-DoF (yaw, pitch, and roll.) An additional 3 axis (X, Y and Z) are available to applications choosing to support them.

Vuzix VR Manager ™
VR Manager is a software application that provides head tracker calibration, drivers for 3D stereoscopic video, and VR support for a wide variety of games, simulators and other applications.

A copy of VR Manager is included with your Wrap Tracker 6TC – available for download from the Vuzix Digital Distribution webpage at **www.vuzix.com/dd**.

Software Download

The software for this product is available for download from the Vuzix website at:

www.vuzix.com/DD

The Vuzix Digital Distribution system provides one-click access to all the latest software and documentation for your product.

1. Go to www.vuzix.com/dd

2. Locate your new Vuzix product

3. Click its "download" button

The latest package of software and documentation will be downloaded to your computer ready for you to unpack and install.

Using This Manual

When viewing a User Guide you may be tempted to skip over certain portions or entire sections. We have tried to make the important points visible and easy to find through special formatting.

Tips & Notations
Tips and important notations are formatted in a distinctive fashion for easy recognition. We suggest that even when skimming a section that you stop and check out these notes.

Note: Tips and special notations are presented in this format.

Instruction Steps
Step-by-step instructions are presented in a bold font, preceded by bullet points. If you are skimming over installation and setup procedures, these are the key points to watch for.

- **Do as directed by this instruction to avoid potential problems.**

- **Double-click the Wrap 920 VR Bundle software package to unpack it.**

- **Read the "Read Me.txt" file and follow any instructions provided.**

Wrap Tracker 6TC Installation

Wrap video eyewear can be used with out without the Tracker installed and the Tracker works only with supporting applications.

To install the Tracker:

- **Plug the Wrap Tracker 6TC into the small oblong port located between the right temple hinge and the right earphone port, on the back of the display module.**
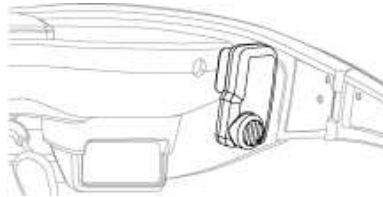
Note: Although the Tracker connector looks much like a UBS micro-B port, it is not. Do not attempt to connect a USB micro-B connector into this port and do not attach the Wrap Tracker 6TC to a USB micro-B cable or device.

- **Connect the Wrap video eyewear to a Wrap VGA Adapter or other tracker support interface in the normal manner.**

- **Connect the Wrap VGA Adapter or other tracker support interface to the desired source or processing device, such as your computer.**

Note: Be sure to insert the push the cable connector all the way into the "AV" port on the Control Box. Partial insertion is a common error.

VR Manager Installation

> **DO NOT connect your Wrap video eyewear and VGA Adapter to your computer until after the VR Manager software has been installed.**

VR Manager Setup

Compatibility

VR Manager is compatible with 32 and 64-bit versions of Windows 7, Vista and XP using virtually any make or model of graphics card in a desktop, laptop or netbook computer.

Users have reported success connecting to their Wrap 920 and VGA Adapter to other operating systems such as Linux and Mac. Please note that these alternate operating systems are not officially supported and Vuzix does not provide VR Manager equivalent software for those platforms. Some of the described features and capabilities may not be available on other operating systems.

Note: The Wrap 920 VR may display 2D video and play audio on computer systems configured with Mac and other operating systems. These operating environments are not officially supported for this product and neither technical support nor supporting software, such as 3D video drivers and tracker calibration, are provided for these configurations.

System Preparation

It is important that your system be properly prepared before you begin the software installation and that any software or video drivers that may conflict be removed or disabled.

- If you have any of the following installed on your computer, use the Windows Programs and Features Control Panel to uninstall them before proceeding:

- o **3rd party stereoscopic display drivers (any brand)**

- o **Vuzix VR Manager or Vuzix iWear VR920 support software**

- o **Vuzix SDK (Software Development Kit.**

VR Manager Installation

Your Wrap video eyewear requires special 3D video drivers and support software to perform properly and enable all of its features.

To download the latest version of software and documentation for your Vuzix eyewear:

- ▪ **Go to "WWW.VUZIX.COM/DD", locate the listing for your Vuzix eyewear model and then press its "download" button.**

- ▪ **When the download is complete, double-click the file to decompress it.**

Note: The digital distribution files are compressed in a ".zip" file. A .zip compatible compression program comes with Windows so the file will automatically decompress when double-clicked.

Your decompressed files will be in a folder titled "Wrap_Tracker_6TC" This folder contains the complete software set for your Vuzix eyewear, including its documentation.

- ▪ **Locate and double-click the "READ ME.txt" document in the Wrap Tracker 6TC folder.**

The READ ME document contains additional information and special notes that did not make it into this version of the User Guide.

After following any instructions provided in the README document:

- ▪ **Double-click the "VR_Manager_Installer.exe" program located in the "Wrap_Tracker_6TC" folder.**

- **Follow the onscreen instructions, enabling any permission requested by your computer and its operating system.**

Tip: During the installation process, the screens, options and buttons displayed will vary from one version of the Windows to the next. We suggest choosing the default options.

The Setup program will advise you when the installation is complete.

Wrap Eyewear to PC Hardware Connection

Connecting your eyewear to your PC requires only three steps:
- **Connect your Wrap eyewear cable to rectangular port on the Wrap VGA Adapter (Control Box).**

- **Connect the VGA cable from the Control Box to a video port on your PC.**

- **Connect the USB cable from the Control Box to a USB 2.0 port on your PC.**
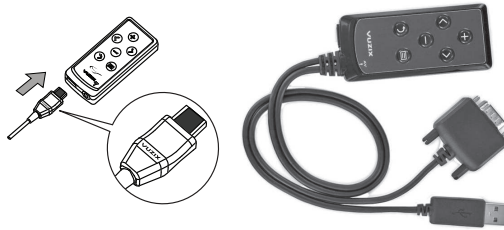
Since there are many potential variations from one computer's configuration to another, here are a few notes that may or may not apply to your computer system:

- The VGA Adapter is equipped with a VGA connector, the most common and adaptable format for video on a PC. If your computer does not have a matching VGA port you can use commonly available port adapters such as a DVI-to-VGA or mini-DVI-to-VGA Adapter. These can be purchased from most computer stores.

- If your computer does not have any video ports available, you can acquire and use a VGA Splitter.

- The USB connector requires a USB 2.0 port able to deliver the required data transfer speed and power. If you are connecting through a USB hub, ensure that the hub is 2.0 compliant and that it is serviced by an external power supply.

At this point you may choose to dawn your eyewear and check out the view but don't be surprised if see only a blue screen – that is normal – as the display settings are likely not configured correctly yet.

Display Configuration

If your display settings are not configured correctly your eyewear will display blank blue screens.

To configure your display settings:
- **Adjust your display resolution to 1024 x 768.**

- **Set the display refresh rate to 60 Hz.**

- **Set your multiple displays configuration for Duplicate, Mirrored or Clone mode. The term used varies by operating system version.**

The steps software elements used to enabling the above display configuration vary between the different version of Windows and, in some cases, software provided with your graphics card can also be used.

As Windows 7 is currently shipping with most Windows based computers, the following are the steps specific to that family of operating system software:
- **Right-click on an open area of your desktop and select "Screen resolution".**

- **From the "Multiple displays:" drop list, select "Duplicate these displays"**

- **Choose "1024x768" from the "Resolution:" drop list,**

- **Click on "Advanced Settings".**
- **Select the "Monitor" tab.**
- **Select a "Screen refresh rate:" of "60 Hertz".**
- **Set the Wrap 920 as the Primary Display.**
- **Apply the changes and close the Control Panel.**

You should now be able to see your desktop in your Wrap video eyewear.

The Wrap 920VR supports display resolutions of 640x480, 800x600, and 1024x768, each at a 60 Hz refresh rate. Though most eyewear users prefer 1024 x 768, you can use any of the above. The lower resolution show a smaller display area but with increased clarity.

Tracker Calibration

The last step in the setup process is to calibrate the Wrap Tracker 6TC.

Your Wrap Tracker uses nine different sensors to track movement. These include gyroscopes, accelerometers and magnetometers. Some of these sensors require calibration.

The gyro calibration will automatically occur the first time the VR Manager software runs and finds a pair of Wrap eyewear tracker installed. This calibration is required whenever the Wrap Tracker is connected to a different computer.

Note: More extensive information on calibration is provided in "Calibrator" chapter of the "VR Manager" section of this guide.

Magnetometers also require calibration. These sensors utilize the earth's magnetic field and are sensitive to certain metallic masses and electronic devices. Common electronic devices, with magnetic fields, that may be near your computer include monitors and speakers, including the tiny earphones provided with your eyewear.

Calibration adjusts for these influencing factors and may be required as those factors change.

To calibrate the tracker on your Wrap eyewear:

- **Start the calibration process by connecting your Wrap eyewear to your computer, with the display configuration correctly set and your desktop displayed in the eyewear.**
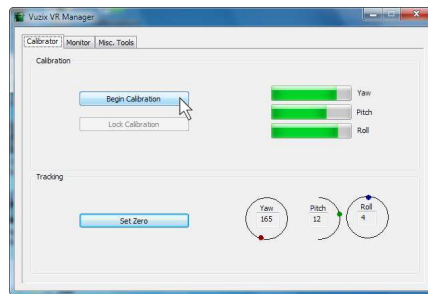
- **Run the VR Manager application.**

If this is the first time VR Manager has been run, with the Tracker installed, a Zero Gyros application will automatically run.

- **When the Zero Gyros screen appears:**

  - **Place the Wrap eyewear flat on your desk facing your computer.**

  - **Do not move the eyewear while the gyro zeroing process is being performed.**
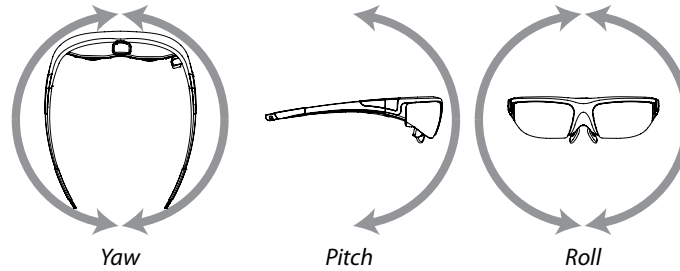
  - **Follow the on-screen instructions.**

Upon completion of the gyro zeroing process, the VR Manager program will complete loading and present you with its Calibration screen.

Tip: For the most accurate calibration, try to stabilize earphone movement and position your eyewear as close as possible to the position it will be in when used. This will minimize fluctuations in the eyewear's relative position to nearby magnetic influences.

- **Press the "Begin Calibration" button.**

- **Holding your eyewear as near as possible to where they would be when worn, upright and facing your desktop computer monitor, rotate them as follows:**

    o **Rotate your eyewear fully through each of the three axes.**

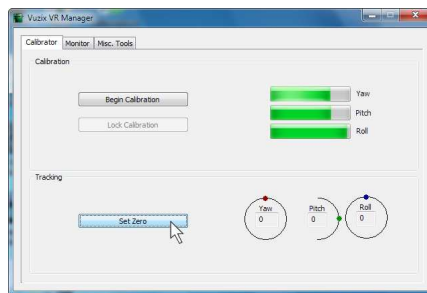*Yaw*   *Pitch*   *Roll*

This process captures tracker data through its full range of movement for the yaw, pitch and roll axis. The indicator bars will move while additional data is being received but will stop when no new data is received, indicating its full range of movement has been captured.

Note: The indicator bars will not fill completely – this is normal.

- **When the indicator bars stop moving, press the "Lock Calibration" button.**
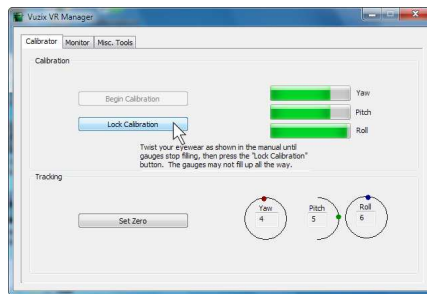
- **Put on your eyewear or place them in the position in which they will be used – upright, at eyelevel and facing your computer – and then press the "Set Zero" button.**


The Set Zero button establishes the Tracker's home or centered position. As you move your head you will see the indicators and values in the Yaw, Pitch and Roll indicators reflect movement relative to that centered position.

Your Wrap video eyewear is now setup and ready for use.

Some types of video and certain operating situations may require audio or video adjustment to achieve optimum performance.

Using The Tracker

The Wrap Tracker 6TC is a 6-DoF (Degrees of Freedom) capable tracker with compass. It plugs directly into your Wrap eyewear and communicates with your computer through the VGA Control Box USB connection.
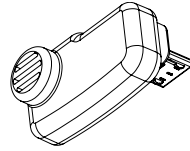
Installation

Installation of a Tracker onto your Wrap eyewear is as simple as plugging it into the eyewear and installing the VR Manager software.
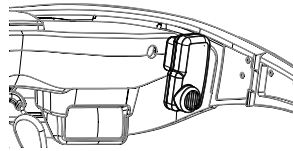
The Tracker plugs into the small connector, that looks similar to a micro-USB connector, to the right side of the display module.

Note: Although the tracker connector looks similar to a micro-USB connector, it is not. Do not attempt to connect a USB device or cable into this port.

The Tracker requires calibration before being used and periodically thereafter.

- If you connect your Tracker to a different computer, you should reset or zero the gyro (see Misc Tools of VR Manager.)

- If you move the tracker to a different location or rearrange nearby electronic devices, we suggest re-calibrating the tracker as the changes may have effected it calibration.

- Periodically "Set Zero" to re-center the home position

The calibration process is performed using the VR Manager software, described in the next section of this manual.

Degrees of Freedom
The Wrap Tracker 6TC supports 6 degrees of freedom (DOF) tracking.
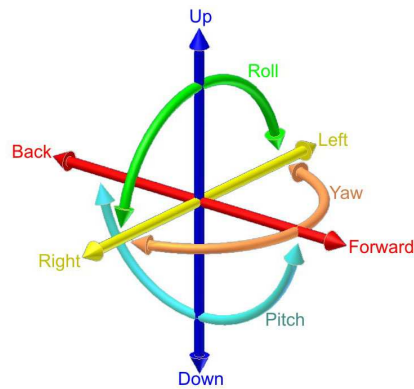
Three degrees of freedom tracking (yaw, pitch and roll) are supported by the VR Manager software and in tracker enabled Vuzix Extensions. The additional 3 DOF, X, Y and Z, (up/down, left/right and forward/back) require direct or native support written directly into applications.

Note: A royalty free Software Developer Kit (SDK) is available to assist software developers in enabling native support for the Wrap Tracker 6TC in their applications. It provides sample code and technical information that enables programmers to read raw tracker sensor data. See the Support section of this User Guide for additional information on the Vuzix Developer Program, found in the Developer Program section of the Vuzix website: **www.vuzix.com/developer**.

Using VR Manager 3.x

VR Manager version 3.x is a software application that provides support services for Vuzix video eyewear products connected to a Windows based personal computer. It provides a calibration system for a Wrap Tracker, support for Vuzix Extensions, and diagnostic tools.

The VR Manager's interface is divided into three sections, Calibrator, Monitor, and Misc. Tools, each accessed through tabs along the top of its window.
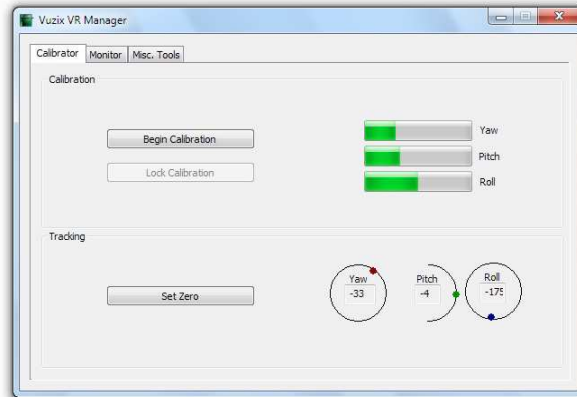
Calibrator: Enables calibration of the Wrap Tracker.

Monitor: Provides access to and management of Vuzix Extension files. These Extension files enable stereoscopic 3D video and/or head tracking in select applications lacking native support for these features.

Misc. Tools: Technical data and diagnostic resources designed to assist in troubleshooting stereoscopic 3D and tracking problems.

Tracker Calibration

The Wrap Tracker uses multiple sensors for calculating movement and positioning. Magnetometers are among these sensors and they are influenced by natural magnetic fields and the magnetic fields created by certain electronic devices. In order to compensate for these influences they must be calibrated, initial and whenever the operating environment changes. The Tracker also contains gyroscopic sensors that require zeroing before they're used and whenever the Tracker is connected to a different computer system.

To calibrate the tracker on your Wrap eyewear:

- **Start the calibration process by connecting your Wrap eyewear to your computer, with the display configuration correctly set and your desktop displayed in the eyewear.**

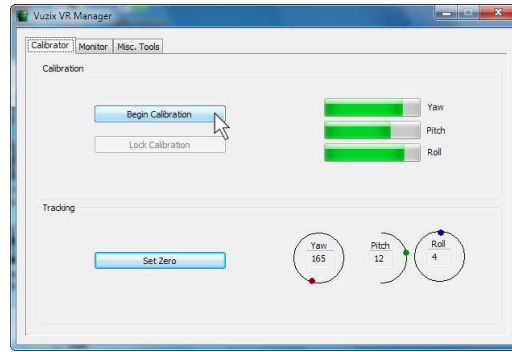- **Run the VR Manager application.**

If this is the first time VR Manager has been run, with the Tracker installed, a Zero Gyros application will automatically run.

- **When the Zero Gyros screen appears:**

    o **Place the Wrap eyewear flat on your desk facing your computer.**

    o **Do not move the eyewear while the gyro zeroing process is being performed.**

    o **Follow the on-screen instructions.**

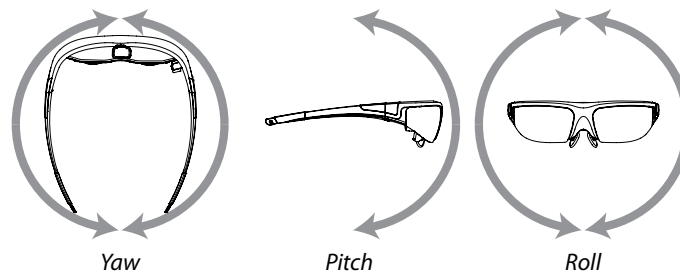Upon completion of the gyro zeroing process, the VR Manager program will complete loading and present you with its Calibration screen.

Tip: For the most accurate calibration, try to stabilize earphone movement and position your eyewear as close as possible to the position it will be in when used. This will minimize fluctuations in the eyewear's relative position to nearby magnetic influences.

- **Press the "Begin Calibration" button.**

- **Holding your eyewear as near as possible to where they would be when worn, upright and facing your desktop computer monitor, rotate them as follows:**

  - **Rotate your eyewear fully through each of the three axes.**

Yaw   *Pitch*   *Roll*

This process captures tracker data through its full range of movement for the yaw, pitch and roll axis. The indicator bars will move while additional data is being received but will stop when no new data is received, indicating its full range of movement has been captured.

▪ **When the indicator bars stop moving, press the "Lock Calibration" button.**

▪ **Put on your eyewear or place them in the position in which they will be used – upright, at eyelevel and facing your computer – and then press the "Set Zero" button.**

The Set Zero button establishes the Tracker's home or centered position. As you move your head you will see the indicators and values in the Yaw, Pitch and Roll indicators reflect movement relative to that centered position.

Drift

Some degree of drift on the Yaw axis is normal.

The Wrap Tracker provides an auto-centering capability that will automatically compensate for most drift while the Tracker is in use. Occasionally, before starting a session you can use the Set Zero button to re-center the Tracker for optimum calibration. You do not have to go through the entire calibration process to use the Set Zero function.

Vuzix Extensions Monitor

Stereoscopic 3D video and head tracking require support specific to each application. This may be incorporated directly into the application (native support) or externally through a Vuzix Extension.

Vuzix Extensions are accessed and managed through the Monitor section of the VR Manager. The Title list shows all of the Vuzix Extensions and their current status.
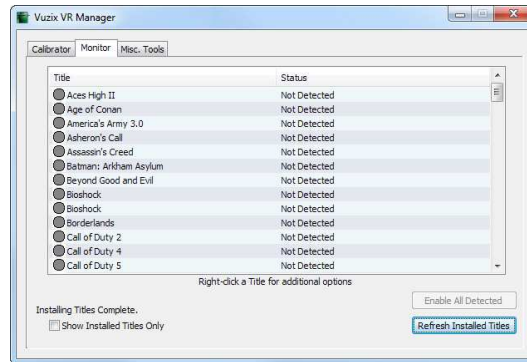
Note: Software titles employing native 3D video and/or head tracking support are not listed in the Monitor, as they do not require VR Manager Extension support. Only titles requiring Extensions are included in the Monitor listing.

Extension Notes

Extension Notes describe the capabilities, configuration instruction and manual installation information for each Extension.

iWearMonitor(Version 3.0): Microsoft Flight Simulator X

Vuzix Corporation:
Copyright: 2007, 2008
Version: 4.0.0.5

Application Name: Microsoft Flight Simulator X (Acceleration compatible)
Publisher: Microsoft Game Studios
Tracking Support: Yaw,Pitch and Roll
Stereo Support: Vuzix Stereoscopy

WARNING:
    The VR920's Addon dialog management is not available with the RTM version of flightsim.
    <Control F7> and <Control F8> will not be available without the SP1 update.
    Tracking and Stereoscopy will continue to operate under RTM in it's default configuration.
    - Provided the Vuzix Eyewear is detected as a connected monitor during startup of flight sim,
    stereoscopy will be enabled.
    - If not detected stereoscopy will be disabled.
    - Tracking will be enabled with default filter settings on startup.

1. MS Flight Sim requires the following files to be installed:
    <IWRDLLTracker.dll> Into the
    <IWRDLLTracker.dll.manifest> Into the
    "<MS Flight Sim installation directory>\Microsoft Games\Microsoft Flight Simulator X\Modules" directory.

    <D3D9.dll > Into the
    "<MS Flight Sim installation directory>\Microsoft Games\Microsoft Flight Simulator X" directory.

2. And, copy (Or add the contents of) the <DLL.xml> file Into the (DLL.xml) file that is at
    "C:\Documents and Settings\<User ID>\Application Data\Microsoft\FSX" directory.

OK

Not all Vuzix Extension includes both stereoscopic 3D video and tracking support; some may support only one. Some Extension may also include support for additional features and capabilities, such as Hot Keys for zooming in your view.

To access the Vuzix Extension Notes:
- **Double-click on any Extension title, or**

- **Right-click on an Extension title and choose "View Extension Info" from the pop-up menu.**

Enabling Extensions

Vuzix Extensions are automatically installed with the VR Manager but they are not automatically enabled.

In order for an Extension to be used, the VR Manager must detect the appropriate file directory and the Extension must be enabled. Only after being enabled will an Extension's tracking and/or stereoscopic 3D video support be available for use.

Color-coded indicators show the current status of each Extension.

A grey marker indicates an Extension that has not yet been associated with an application directory.

A yellow indicator identifies Extensions for which the appropriate directories have been found but the Extension has not yet been enabled.

A green indicator identifies Extensions linked to applications and enabled, ready to use.
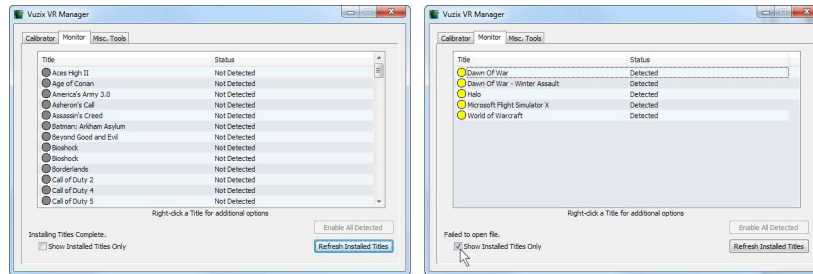
To better manage the long list of Extensions, enable the "Show Installed Titles Only" option, in the lower-left corner of the window. This restricts the list to only Extension with matching applications on your computer.

Detecting Installed Applications

When the VR Manager is installed it searches for installed applications with matching Vuzix Extensions. It them identifies the appropriate Extension with a yellow indicator – available but not enabled. If an application is installed after VR Manager, you must manually initiate a title search for an Extension to be associated with the newly installed programs.

To detect newly installed programs:

- **Press the "Refresh Installed Titles".**

Tip: VR Manager may be unable to find applications that have been installed in a directory other than the one suggested by the install program. You can manually locate an application's file directory by right clicking on the desired Extension and choosing "Browse for Directory" from the pop-up menu.

Enabling Extension

To use an Extension, it must be associated with an application and then enabled. Enabling loads the required files and makes program configuration changes if required.

To enable a single Extension:

- **Right-click each detected Extension (yellow) and choose "Enable Title Support" from the menu options.**

To enable all Extensions:

- **Press the "Enable All Detected" button to enable all the detected (yellow) Extension in a single action.**
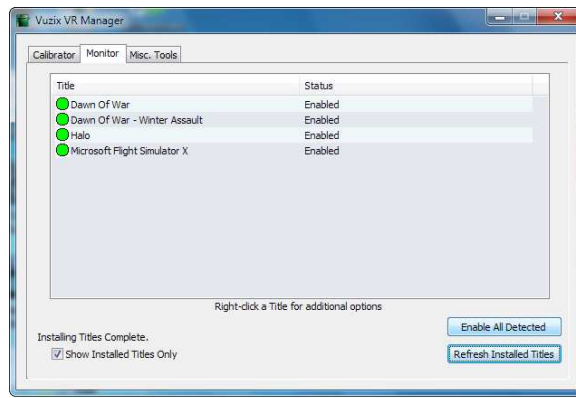
Once enabled, the Extension's indicator is green.

Misc. VR Manager Tools

This section of the VR Manager provides assistance in identifying and correcting technical problems with your Vuzix eyewear and Extensions. It provides Vuzix Customer Service with the information required to quickly identify the cause and solution to your problem.
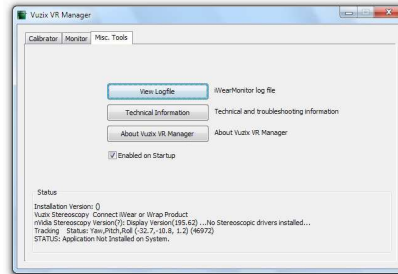
View Logfile
The VR Manager creates a log file of recent activity. Customer Service may request you open the file and provide them with its contents.

Technical Information
This provides technical information that may assist you in troubleshooting problems encountered with your eyewear and extension supported titles.

About Vuzix VR Manager
Clicking on this button provides information on the current versions of supporting software and hardware firmware.

Status
Status displays technical information regarding your Vuzix hardware, drivers and other information that might assist Customer Service in identifying the cause of a problem you are encountering.

Zero Gyros

The first time VR Manager is run, it will sense the Tracker and advise that its Gyros require zeroing.

If you connect your Wrap Tracker to a different computer, you will have to zero your Tracker's gyros again.

To manual initiate a Zero Gyro process:

- **Place your eyewear flat on a desktop and do not move it during the Zero Gyro process.**

- **Press the "Zero Gyros" button.**

- **Follow the on-screen instructions.**

Troubleshooting

If the tracking does not re-center correctly or drifts.

1. The Wrap Tracker does require re-calibration from time to time. Open the VR Manager software and follow the calibration instructions provide earlier in this manual to re-calibrate your tracker.

2. Magnetic interference will play havoc with a head-tracker. If you are near and substantial metal objects or magnetic devices, like large speakers, re-positioning may be required to lessen the magnetic interference.

Support Services

For product support and information please contact Vuzix at:

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 contacting support services please provide the following information:

- Serial number, complete model name, and model number of your Vuzix product.

- 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.

Vuzix Developer Program

Vuzix provides a Developer Support Program that offers support services to software developers, including access to an SDK for tracker and stereoscopic video support. This SDK is available for royalty free use and can be downloaded free of charge from the Vuzix website.

For additional information of the Vuzix Developer Support Program, go to:
www.vuzix.com/support/developer

FCC Compliance

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures: 1) Increase the separation between the equipment and receiver or 2) Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.

Waste Electrical & Electronic Equipment (WEEE)

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.

VUZIX ®

View the Future ®