



VRDL

***Hardware
&
Overview***

Instruction Manual

Virtual Reality Glove

Virtual Reality Development Lab™

By Digital Tech Frontier, LLC.



Cyber-Glove Interface

What is it?

The P5 is an innovative, glove-like peripheral device, based upon proprietary bend sensor and remote tracking technologies and provides users with these features.

- Lightweight, ergonomic design for easy, intuitive play. Weighs just 4.5 oz.
- The first widely available virtual 3D controller
- Mouse-mode compatible with any application
- 6 degrees of tracking (X, Y, Z, Yaw, Pitch and Roll) to ensure realistic movement - most trackball, joystick and mouse controllers offer only 2 degrees of freedom
- Bend-sensor and optical-tracking technology to provide true-to-life mobility
- Easy, plug-and-play setup - plugs right into the USB port of your PC or MAC
- Infrared control receptor with scratch-resistant, anti-reflective lens
- East-to-use anywhere - desktop, living room, etc...

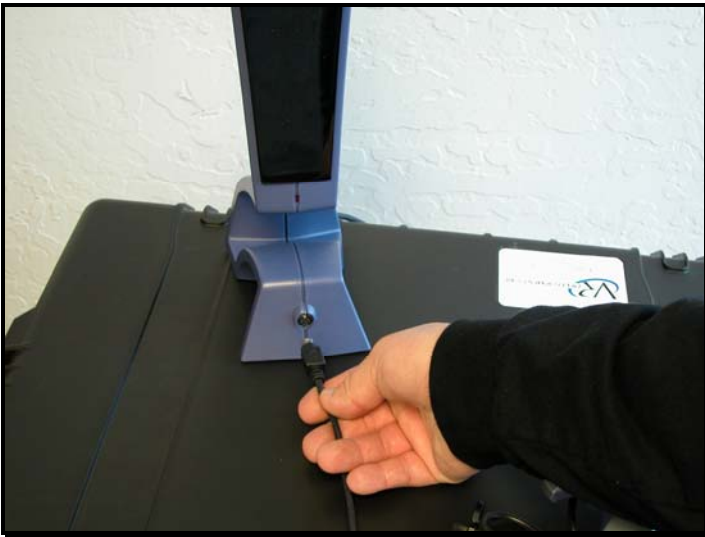
Why Use it?

With the Cyber-Glove as an interface to the virtual world the user is not tethered to a surface like with a mouse on a desk. The glove allows the user to interface the VRDL worlds that they create with turn of a wrist or a snap of a finger. Students and teachers alike can navigate through there creative environments more naturally through hand gestures and finger pointing. Rather than clicking a mouse the user points a finger and rather than rolling the mouse on the desktop the user turns their hand in the direction they want to travel in. Making the Virtual Reality Development Lab one of the most advanced and easy to use VR Labs in the country.



Step 1: Connect the Hardware

1. Carefully remove the package contents from the box. In addition to the receptor and glove, you should have rings for larger sized hands, and a PC only calibration CD. On the MAC the glove should work automatically once plugged into the USB port of the computer.
2. Plug the glove's connector into the front of the tower receptor.



3. Plug the USB cable into the USB port on the back of your computer.



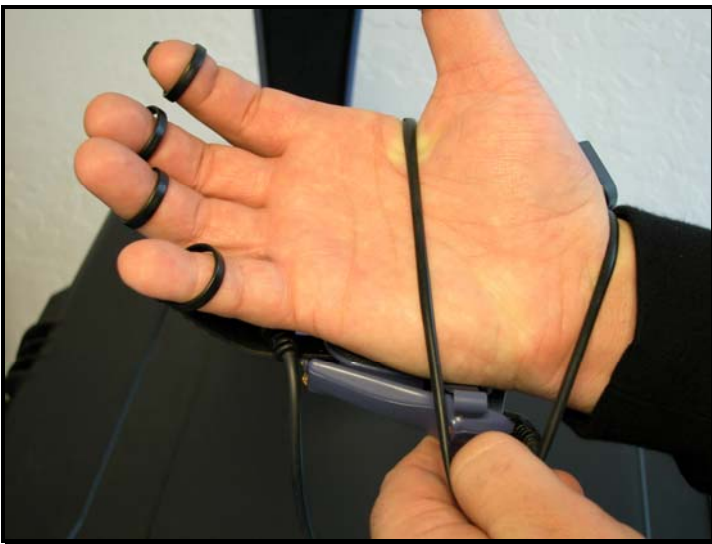
Remember: Always plug the glove's connector into the front of the receptor before plugging the USB cable into the USB port. Place the receptor to the right of your monitor or computer, facing you, about 1 1/2 – 2 feet away from where you will be resting your hand. (The red LED on the receptor should face you.)

Step 2: Put On the Glove

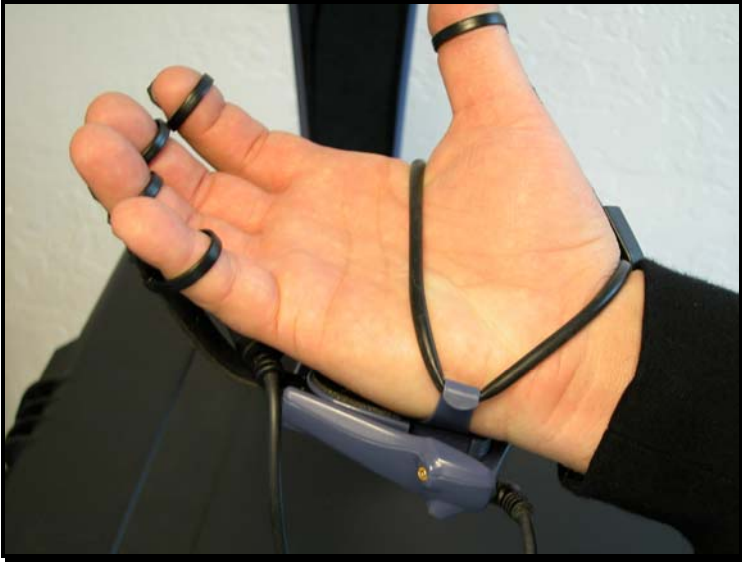
1. Put the glove on according to the directions below.
 - Place your fingers in the finger rings with the glove resting on the back of your hand. When putting in your thumb, pull the strap out of the way.



- After all fingers are in, pull the strap around your thumb and across your palm to the other side. The strap should be across your wrist as well as your palm.



- Connect the strap to the hook next to your pinky finger. If the strap is too loose on your hand, twist the end of the strap before placing it on the hook. The strap does not have to be tight to hold the glove in place. With most hand sizes it is fine without the twist.



Important: Make sure that the rings are around the top third of your thumb and each finger. You can easily slide the rings to adjust them. The rings will expand to fit your fingers; however, if you need larger rings, slide the existing rings off the glove and replace them with the larger rings provided. (For more information, see the PC only CD Tutorial.)

2. Move your hand. The LED on the front of the receptor should be solid red. If the LED blinks, the glove is out of view from the receptor (see “Troubleshooting”).



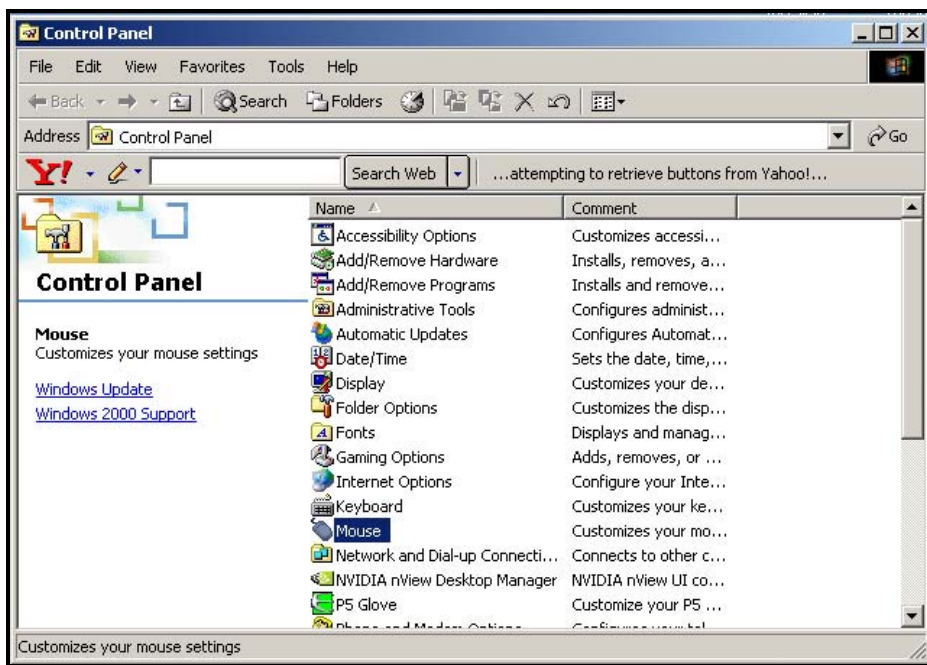
Ring Placement

Important: Make sure your hand at all times stays above the desktop. The receptor has a viewing angle of 45 degrees side-to-side and top-to-bottom.

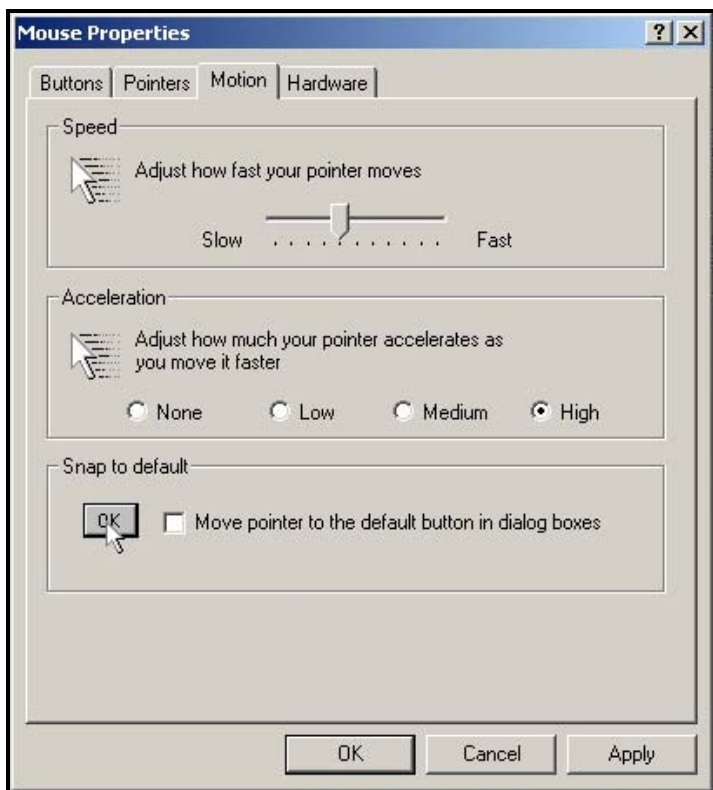
The glove must be within line of sight of the receptor. When it isn't, the light on the front of the receptor will blink.

Step 3: Adjust Control Panel Settings (On a PC only)

1. Double-click the Control Panel on your desktop (or click **Start > Settings > Control Panel**). *To double-click wearing the glove, you must bend your index finger twice in quick succession.*



2. In your Mouse Controls, make sure that acceleration is set to high, and that speed is just below the middle of the scale.



3. Make sure that your Display or Monitor setting is set to 1024 X 768 or below.

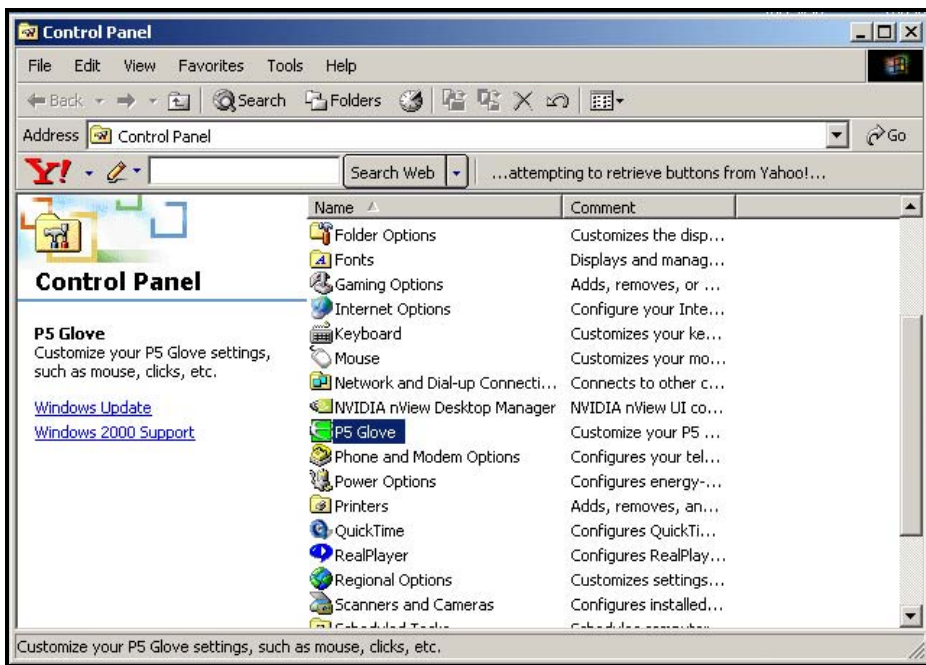
Step 4: Install the Software (For Presentation on a PC only)

To install the software, exit any programs you may be running, and insert the P5 Software Installation CD into your CD-ROM drive. Follow the instructions on your screen. (If your computer does not automatically display instructions, go to the Windows Task bar and click **Start > Run.**)

Step 5: Calibrate the Glove (For Presentation on a PC only)

Access the P5 Glove Control Panel

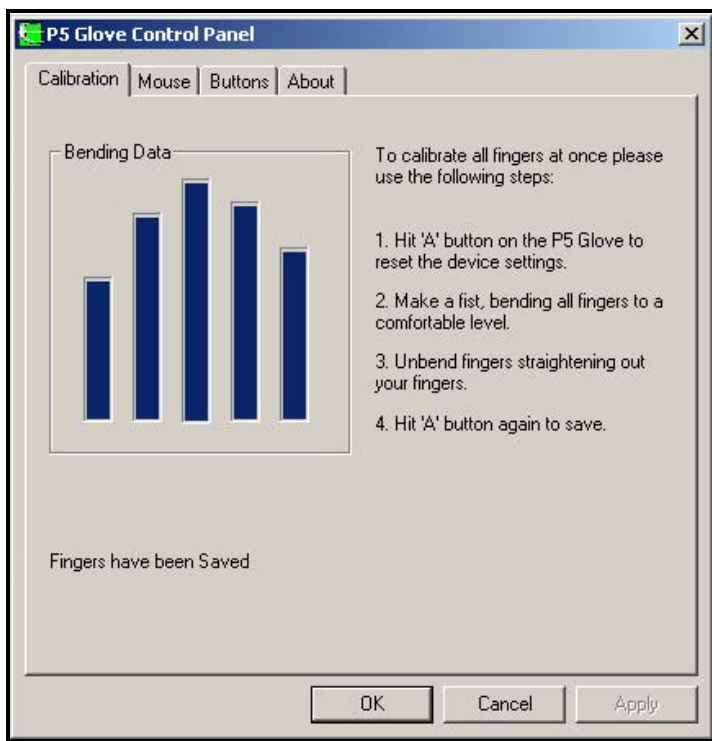
1. Double-click the Control Panel on your desktop (or click **Start > Settings > Control Panel**).
2. Double Click on the P5 Glove icon.



Remember, to double-click wearing the glove, you must bend your index finger twice in quick succession.

Calibrate Finger Bend

1. With your gloved hand open, press the **A** button on the P5 Glove. (This is the button closest to the fingers.) Pressing the **A** button will reset the device settings, causing the blue bars on the *Calibration tab* to disappear.

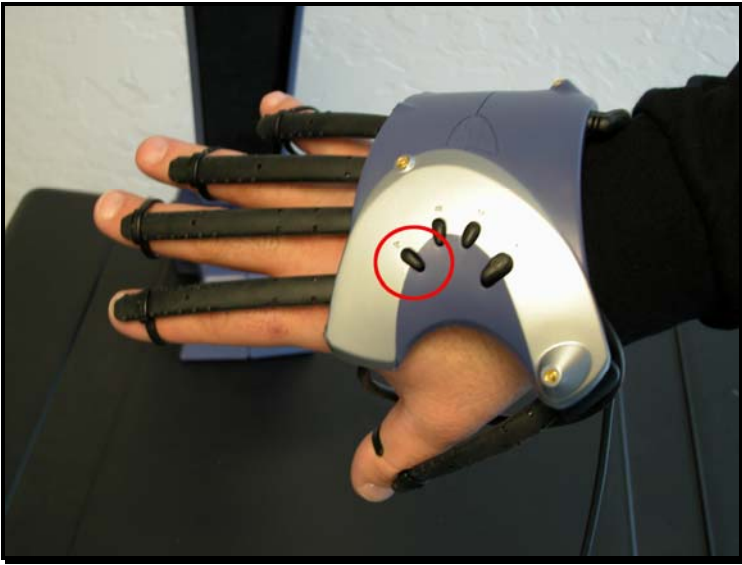


2. Make a loose fist, bending all fingers in a comfortable fashion. The blue bars on the *Calibration Tab* will become visible, but remain small.



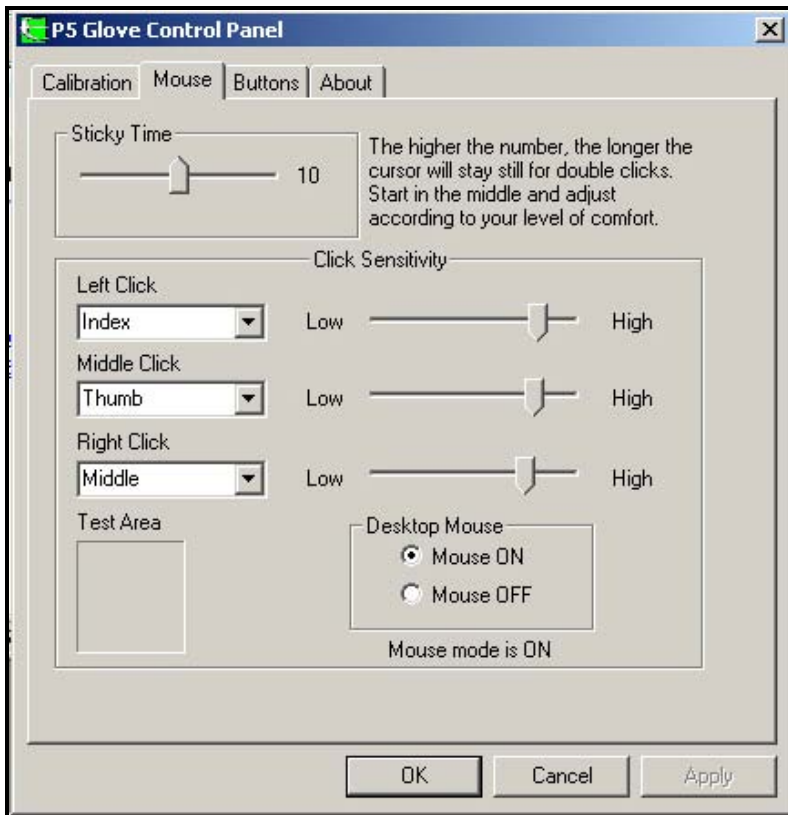
3. Now release your fist, opening your fingers to the degree that feels comfortable. This will activate the bend sensors on the glove and cause the blue bars on the *Calibration Tab* to rise.

4. Holding your gloved hand steady in the open position, press the **A** button on the glove to calibrate finger bend.



Calibrate Your Mouse Settings

1. Click on the Mouse tab and use the drop-down window to assign which finger does left, right, and middle clicks. (The middle click capability is available only if you have a 3-button mouse.)



2. With the slide bars, adjust each finger's click sensitivity to your liking. This setting adjusts the amount of bend in your finger that will activate a click. To make the software more sensitive to a mouse click for a finger, move the slide bar to a higher setting. To make the software less sensitive to a mouse click, move the slide bar to a lower setting. (The finger you use for double-clicks should be the most sensitive setting.)



Use the test area to test any adjustments you make.

Step 5 (cont'd): Calibrate the Glove (For Presentation on a PC only)

3. The sticky time slide bar sets the amount of time the cursor will stay at a particular spot to allow a double-click even if your hand slightly moves. The default is comfortable for most, but if your hand is un-steady you may want to increase the setting. *Use the test area to test your adjustments.*

4. When you're finished calibrating your glove, click **Apply** to save.

Creating Yaw, Pitch and Roll

Yaw: With your palm parallel to the ground, move your hand sideways back and forth along the x-axis. Hold your arm perfectly steady. Only your hand should move at the wrist.

Pitch: With your palm parallel to the ground, move your hand up and down along the y-axis, as though waving— but again, hold your arm perfectly steady.

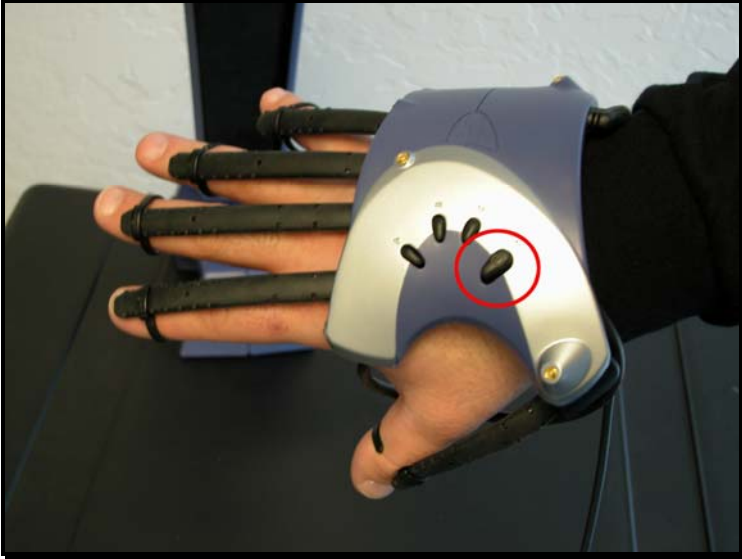
Roll: With your palm parallel to the ground, turn your hand around so that your palm faces the ceiling. Your arm will turn with your hand.

Re-Centering Your Hand

When you get to the edge of your desk using a regular mouse you physically pick the mouse up and move it back on the desk. When using the glove as your mouse, this function is accomplished by bending your last two fingers (ring finger and pinky finger). When you bend these fingers simultaneously, you can move your hand to the center of the receptor's field of vision and your cursor will not move. Once in position, straighten your fingers and resume operation.

Turning the P5 On and Off

To turn the P5 off, press the “D” button (the largest button on the glove). Press the button again to turn the P5 back on. The glove will remember the last state it was in, even if unplugged from the receptor.



Troubleshooting

Problem: Light on front is blinking

Reason: The glove is outside the receptor's field of vision.

Solution: Make sure that there are no obstructions between the glove and receptor.
(Even if the receptor's view is only partially blocked, the glove will not be visible.)

Problem: Jittery pointer (cursor)

Reason: Glove is on the edge of visibility, or external bright lights are interfering.

Solution 1: Try reducing the light and/or facing the receptor away from the light source.

Solution 2: Change to a higher monitor resolution (1024 x 768).

Solution 3: Adjust your mouse speed to a lower setting.

Problem: No light on front when USB plugged in

Reason 1: Bad connection.

Solution: Check the connection between the glove and the receptor. Make sure the plug is all the way in.

Reason 2: "D" button has been depressed on the glove.

Solution: Press the "D" button on the glove.

Reason 3: The Operating System turned the P5 device off (did not enumerate the device).

Solution: Unplug the USB plug and reinsert it in the socket. Then, check the Device Manager to see if there are problems with the HID-compliant devices that are listed. You may need to reboot the system. If using a laptop, plug in the AC adapter (so that you're not running off the battery).

Problem: Pointer (cursor) suddenly jumps

Reason: This can be caused by external shadows or reflections.

Solution 1: Isolated incidents can be ignored. If the problem persists, make sure that there are no objects close to the receptor that can reflect the glove's LED (soda cans, mirrors, etc.).

Solution 2: Change to a higher monitor resolution (1024 x 768).

Solution 3: Adjust your mouse speed to a lower setting.

Problem: Have to Move Hand Too Far to Move Across Screen

Reason: The speed and acceleration parameters are too low.

Solution: Adjust the speed and acceleration parameters for the Mouse Settings. (The Mouse settings are in the Control Panel. Click Start > Settings > Control Panel.)

Problem: Have to Constantly Re-Center Hand

Reason: The speed and acceleration settings are too low.

Solution: Adjust the speed and acceleration parameters for the Mouse Settings in the Control Panel.

HELPFUL HINTS FOR USING THE P5

Optimum P5 performance is achieved when:

1. Your hand is positioned slightly to the left of the receptor's center point at the level of the LED on the receptor.
2. Your elbow is on the armrest of your chair (if possible) and your arm in a natural position.
3. The receptor is placed approximately 6" from the edge of your table or desk.
4. Your monitor is not obstructing the viewing plane of the P5.

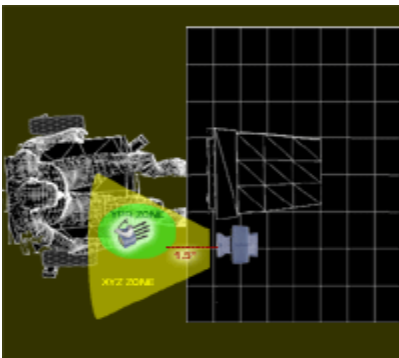
Note: To achieve effective vertical motion, keep your palm facing the floor at all times and move your hand up and down (ceiling to floor).

The product has some limitations in hand motion. It cannot track effectively if:

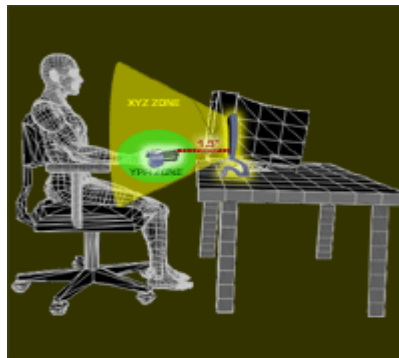
- Your palm is facing the receptor, as your hand will hide the glove.
- Your fingers are pointing towards you (glove facing away from receptor)

OPTIMAL BODY POSITIONING

Aerial View



Side View



UNDERSTANDING THE CALIBRATION ROUTINE

When you hit the "A" button the first time with an open hand, the software starts recording. When you hit the "A" button again, the recording stops. During this time, the highest open position and lowest closed position will be recorded. If you have over extended your hand or closed your fist too tightly during this recording time, then you need to do the calibration routine again as the values saved will not match your comfortable and natural hand position.

Technical Support

For Technical Support on the CyberGlove or to contact us, please go to our website –

www.essentialreality.com.

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Limited Product Warranty

Essential Reality (ER) expressly warrants that the hardware accompanying this documentation shall be free from significant defects in material and workmanship for a period of sixty (60) days from the date of purchase. ER also warrants that the software accompanying this documentation will perform substantially in accordance with the documentation for a period of sixty (60) days from the date of purchase. ER's hardware and software warranty is nontransferable and is limited to the original purchaser. ER's entire liability and the Licensee's exclusive remedy for any breach of warranty shall be at ER's option, either (a) return of the price paid or (b) repair or replacement of the hardware or software, provided that the hardware or software is returned to the point of purchase with the sales receipt. Any replacement hardware or software shall be warranted for the remainder of the original warranty period or 30 days, whichever is longer. These remedies are void if failure of the hardware or software has resulted from accident, modification, abuse, or misapplication.

For product registration, please visit www.essentialreality.com.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of 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 manufacturer's instruction manual, may cause interference with radio communications. 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, you are encouraged to try to correct the interference using one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Place the device AC power connection on a circuit or in an outlet different from that to which the receiver is connected. The following information is provided on the device or device(s) covered in this document in compliance with FCC regulations:
 - Model Number: 100 Series p5
 - Company Name: Essential Reality, Inc.
49 West 27th Street
Suite 7 East
New York, NY 10001

Health Advisory

Long periods of repetitive motions at an improperly set-up workspace, with an incorrect body position may be associated with physical discomfort and/or injury to nerves, tendons or muscles. If you feel pain, numbness, weakness, cramping, or stiffness in your hands, wrists, arms, shoulders, neck, or back, see a qualified health professional.

LED Compliance Statement: LEDs are Class 1 per IEC 60825-1-am2 (2001-01).

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Rotator

AFCE8NP5000 Adaptor Ring



Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring



Contents of Pack

Aluminium adaptor ring for connecting Nikon Coolpix P5000 to FCE8 Fish-eye converter. The ring is sold in a kit with the following accessories:

- 1 - Adaptor Ring
- 2 - "Light Stopper" screws
- 3 - "Flare Controller" circle
- 4 - Download notification

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Assembly



Fig. 1



Fig. 2



Fig. 3

In order to mount the ring on the P5000 the thread cover attached to the front ring of the lens needs to be unscrewed. (Fig.1)

Fig. 1 Screw the ring onto this thread and tighten, but not too much in order to avoid possible jamming. (Fig.2)

Screw the FCE8 Converter onto the front thread of the ring and tighten, but not too much in order to avoid possible jamming. (Fig.3)

Set the camera zoom onto Wide (maximum setting) (Fig.4)



Fig. 4

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

"Light Stopper" Specifications

The kit is supplied with a set of black Nylon light-tight screws. (Fig.1)
Although they are not essential for the normal operation of the ring, there are situations where their use may become necessary. Photos shot in environments full of dust (deserts) or with extremely intense light and in all those situations where you wish to isolate the entire ring. Tighten the nylon screws with your fingers and if necessary use a coin to help tighten them, be sure never to exert too much pressure in order to avoid jamming and/or breakages. (Fig.2)



Fig. 1



Fig. 2

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

“Flare Controller” Specifications

Lens flare occurs when a flare of light diffused onto an optical surface inside the lens provokes a degradation in quality with repercussions on the sharpness of the image. This normally occurs with uncontrolled reflections inside the optical camera (lens).

In the case in point we have two optical systems working in combination, the main lens of the

P5000, and the FCE8, which is an “additional” optical system - when this is added to the main system it changes the optical characteristics of the former.

In this particular combination there is a disturbance: the front ring of the main lens, in other words the circular area with the name of the brand and model of the lens written on it, which under normal use of the camera does not create any problems but when used in this context generates a flare on the last lens of the converter. This happens because when the light, having passed through the converter, exits it to enter into the main lens of the camera; it illuminates the front ring too and this reflects that light directly onto the last lens creating the flare.

In order to rectify this problem we have included in the kit these adhesive anti-reflective circles (Fig.1) to be attached directly to the front ring of the main lens. They are made of sateen velvet, the same material that has always been used in photography, as reflection absorbers and/or light-tight seals, for example, in film cartridge slots



Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

“Flare Controller” Assembly

Mounting the Flare controller is easy but requires a little care in centring. We recommend the following procedure:

- 1) Turn the camera on in order to get the lens out into an operative position and lay the camera on a flat surface with the lens pointing upwards. (Fig.1)
- 2) Remove the plastic protective backing from the adhesive on the circle and position and centre it on the front part of the lens. (Fig.2)
- 3) Press the surface of the circle lightly with your finger to make it stick to the front of the camera. Use two fingers to balance the pressing motion and try not to press down too hard on the motorised drive of the lens. (Fig.3)
- 4) Check that there are no hairs or fibres on the optical surfaces. The Flare controller is designed to have the same dimensions as the front ring so it creates no interference when the camera is used on its own nor does it interfere with the mechanical operation of the lens, not least with the motorised opening and closing movement. We therefore recommend you leave it mounted on the camera. (Fig.4)



Fig. 1

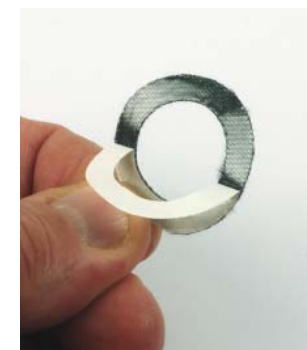


Fig. 2



Fig. 3



Fig. 4

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Panoramic Bracket Specifications

A panoramic bracket, which can be mounted with the supplied screws directly onto the ring, is available. Its dimensions have been calculated so that the NPP (No Parallax Point) falls exactly onto the centre of rotation which can be found in the middle of the three lower fastening screws.



Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Panoramic Bracket Assembly

The panoramic bracket is designed so that the FCE8 can be positioned in the best possible spot for taking shots which are to be subsequently joined together.

1) Mount the ring and lay the camera onto a flat surface. Position the bracket and insert the supplied screws into the holes visible within the slots, without tightening them (Fig.1)

*Do not use the "Light Stopper" screws to attach the bracket to the ring, use only the steel screws supplied with the bracket.

2) Rotate the bracket positioning it vertical to the optical axis. Tighten the screws. (Fig.2 - 3)



Fig. 1



Fig. 2



Fig. 3

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Panoramic Bracket Assembly

The panoramic bracket has our standard attachment with 3 120° holes and so can be used with the entire Agnos system.

1) Connect the bracket to the rotator of your choice:

THREE38
Rotator "M"
Rotator "T"
(Fig. 1)

2) Fit the FCE8 converter onto the ring. You can work with the camera in a horizontal or vertical position (Fig. 2)



THREE38

Fig. 1



Rotator "M"



Rotator "T"



Fig. 2

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Shooting instructions

In order to obtain high quality pictures using the set-up described above a few simple yet indispensable procedures should be followed.

Installation of hardware:

- 1) Unscrew the thread cover on the front ring*
- 2) Apply the "Flare Control"*
- 3) Screw on the AFCE8NP5000 ring*
- 4) Position the panoramic bracket (when taking pano pictures)*
- 5) Screw on the FCE8 Converter*

*instructions in previous pages

P5000 Setup:

Turn the top dial to "SETUP" mode (fig. 1)

- a) Disable the "VR" function
- b) Disable the "AF" illuminator
- c) Disable the Digital Zoom
- d) Disable Noise Reduction



Fig. 1



Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Shooting instructions

P5000 Setup:

Turn the top dial to "M,A,T,P" modes (fig. 2) choosing the mode according to the characteristics and requirements of the shot

Press the "MENU" button (fig. 3)

- Set image quality to "FINE"
- Put ISO setting on 64 or 100 (no higher)
- Set metering mode to "CENTRE-WEIGHTED"
- Set Autofocus area to "CENTRAL" From the right circular selector select Flash mode and disable the flash



Fig. 2



Fig. 3

Instruction and Maintenance Manual

AFCE8NP5000 Adaptor Ring

Shooting instructions

P5000 Setup:

From the right circular selector select Flash mode and disable the flash

In order to obtain high quality images it is best to use the camera on a "M" manual mode or "A" automatic with aperture priority mode selecting the smallest possible aperture (7,6). In more unfavourable lighting conditions this will increase your exposure time thus making it necessary to fix the camera onto a tripod to avoid camera "shake".

Setting the focusing mode onto infinity (icon of a mountain) will give you a shorter focusing time.

Never use the flash because it can't cover the converter's field of angle (183°) and it is partly physically covered by the converter itself.

Pay careful attention to the camera setup and to the operating modes suggested in order to get the best out of your system.

Taking test shots contributes to and increases your experience and reduces errors made during the shooting in the field phase.



Instruction and Maintenance Manual

Mrotator Spherical

Correct procedure for levelling the
Mrotator panoramic head

Instruction Manual



Mrotator Spherical



Fig. 1

In order to achieve a correct levelling position of the Mrotator series heads, it is essential to follow the procedure described below.

Unlike the other heads on the market, where the spirit level is positioned on a fixed part of the equipment and therefore is not affected by rotation, our spirit level is on top of the head and rotates together with it.

It is therefore necessary to carefully take some small precautions in using it. After levelling as described in Fig. 1, the bubble will clearly move away from the centre (Fig. 2) – in the example shown in Fig. 3 and 4, by 180°.



Fig. 2

Instruction Manual

Mrotator Spherical

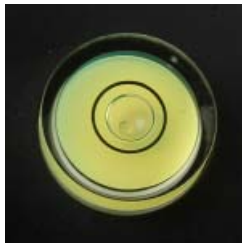


Fig. 2a

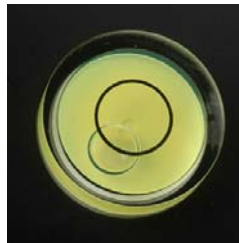


Fig. 2b



Fig. 3



Fig. 4

This is not a position defect, the bubble only records the instrument error typical of toroidal levels during rotation; the error of the spirit level we use is a 30th of a degree.

In order to correctly evaluate the error, you must consider that there is about half a degree of inclination between the position shown in Fig. 2a and the one shown in Fig. 2b, which is a value that cannot be perceived by the human eye and even less by the leveling of out panoramic image.

Instruction Manual

Mrotator Spherical

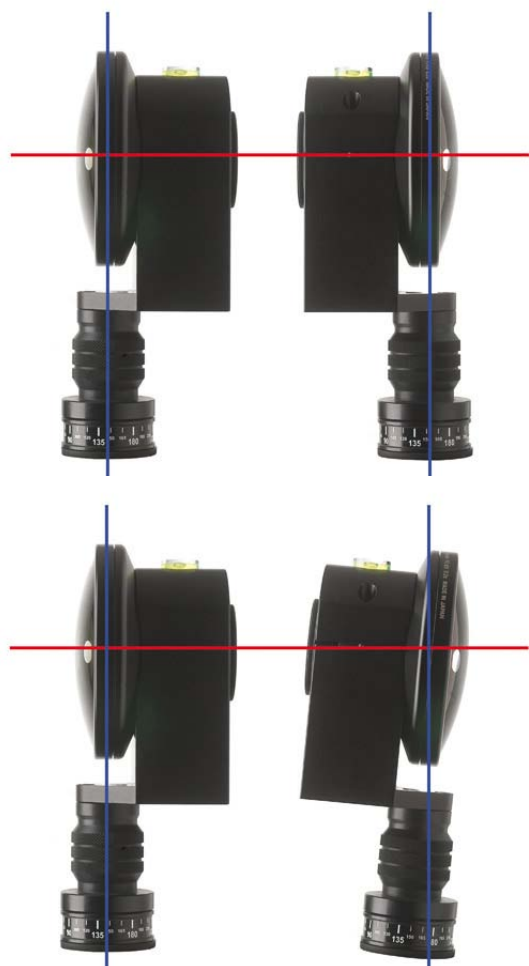


Fig. 5

It is essential that you **DO NOT MAKE A NEW LEVELLING** of the head in order to prevent the misalignment of the two hemispheres, as described in fig. 5.

Infact, the main feature of the Mrotator is to rotate the Fish-eye by blocking its body and, therefore, get a mechanical precision rotation. If you make a new levelling, you will misalign the orientation of the two hemispheres causing a fatal error and you will not be able to take a spherical image.

Instruction Manual

Video Capture

Video Capture & Conversion

Your Nikon P6100 is equipped with a video camera as well. All you have to do to record, transfer, encode and attach to your VR tour will be explained below.

- 1.) First make sure your cameras SD Memory Card is free and clear of all images so that there is enough memory available to record videos.
- 2.) Next turn the camera on via the on/off button on top of the camera
- 3.) Now turn the dial on top of the camera to the video camera TV icon. It is between the Scene and Set-up.
- 4.) Once there you can choose the quality of your movies via the menu button. I would also make sure the volume is set at the highest level. You will have to make sure people speak loudly when recording to capture the right audio levels.
- 5.) Press the same button you take photos with to record. Press the button again to stop recording.
- 6.) Once you have finished you can check the recording by hitting the blue play button on the left side of the camera and then hitting OK on the right dial pad button. (Check audio and video)
- 7.) After you have completed the recordings that you wanted you need to get the movies from the camera to the computer and place them in a folder called Videos or Video Movies. (See manual on all the different ways to get information from the SD card or camera to the computers folder)
- 8.) Since VISTA SHOW cannot read the movie straight from the camera you first will need to convert it to a format that VISTA SHOW can read and play.
- 9.) You will now need to install or go to www.Apple.com and get the latest version of QuickTime. It does not matter whether it is with I-Tunes or not.
- 10.) Once downloaded you will need to PURCHASE....yes I am sorry, PURCHASE QUICKTIME PRO from Apple. This cost is only \$29.99 and will be needed for the conversions of the videos.
- 11.) Once installed and upgraded you can open up your movies with QuickTime or open up QuickTime and then open your movies via the file open on the top left of the QuickTime screen.
- 12.) Once one of the movies that you recorded with your camera is opened in QuickTime Pro go to FILE and then to EXPORT
- 13.) What we are trying to Export is a AVI with no compression
- 14.) Make sure the bottom box which says EXPORT is set to: Movie to AVI
- 15.) Next click the OPTIONS button on the bottom right of the screen
- 16.) On this next window you will see Video Setting and Audio Settings
- 17.) All you care about is the Video Settings so click Settings
- 18.) On the first drop down that says Compression Type choose: NONE
- 19.) Next make sure you have at least: Thousands of Colors selected and BEST for Frames per second.
- 20.) Now you are ready to convert so hit OK on this screen and then save on the next screen.
- 21.) Your video is now ready to be used inside of VISTA SHOW and connected or used as HOT SPOT inside a virtual tour.

NOTE: Make sure when you rename your file please include no spaces in the title but be descriptive so you remember what the file is. (i.e. CoachInterview.AVI)

NOTE: Also save the file a directory that you can remember

Camera Setup

NIKON P6100

Please note you will be using the Manual setting on the camera not the Auto.

Nikon P6100: Setup for Taking VR Fish Eye Photographs

Setup Menu:

<u>Option</u>	<u>Set to</u>
Vibration Reduction:	Off
AF Assist:	Off
Digital Zoom:	Off
Auto Off:	Off
FUNC Button:	White Balance

Shooting Menu:

<u>Option</u>	<u>Set to</u>
Image Quality	Fine
Image Size	10 Meg or higher
Optimize Image	Normal (Can be set to Vivid)
White Balance	Set as required (not auto)
ISO Sensitivity	100 (64 if bright lighting conditions)
Metering	Center Weighted
Continuous	Off
BSS	Off
Fixed Aperture	Off
Noise Reduction	Off
Converter	Wide Angle Converter
	Distortion control Off

(Settings omitted here can be left at factory default)

Continued process for a great VR Fish Eye photo:

- You will use the shutter speed (more or less light) and Aperture (depth of focus) to control the exposure.
- To maintain sharpness in the seam areas set the Aperture up to f7.6
- Then adjust the shutter speed (higher lets less light in and lower lets more light in) until the exposure is acceptable. Not too light and not too dark (This is adjusted by the dial)
- Press the display button on the camera so that you can see the following information on display or in the view finder. (The view finder has a LCD inside and is either on or off)
No flash symbol
F7.6
“ (Shutter Speed)
M (For Manual)

HINT: As you adjust the shutter speed up and down (the light meter setting that has the stops or “ next to it.

Keep adjusting until your image has the right exposure. If you take a photo at it is either too dark or too light spin the dial (left or right) on the top right hand side until the brackets on the LCD show a balance of white on both sides and the center is yellow. If you don't see any change spin the dial the other direction.

Virtual Reality Development Lab 2007-2008



Rotator/Hardware Setup Overview:

NOTE: Lens, adapter and rotator come attached at the factory.

- 1.) Screw Camera Assembly (with Fish Eye and Rotator) on to Tripod.
(Make sure it is secure and don't let go)





- 2.) Level the Tripod via the bubble level and make sure that your tripod legs are extended and not loose.

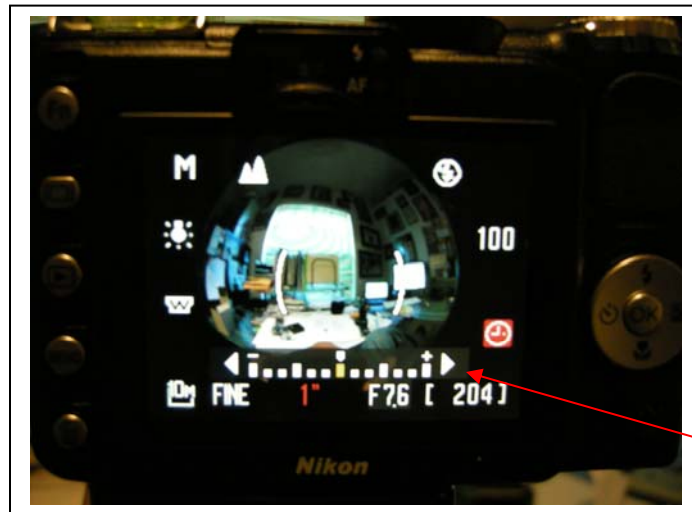
Step By Step Process for Taking VR Fish Eye Photos:

There is a laminated reference card for you in your kit for this same information and settings on your camera..

- 1.) Turn camera on by pressing the on/off button on top of the camera
- 2.) Make sure your camera is in Manual Mode (M) on the main dial in the center on top of the camera.
- 3.) While looking at the LCD adjust the white balance so that the environment color is correct. A camera sees sunlight, fluorescent or incandescent as different colors of white. This is done by holding the Fn button and rotating the command wheel until you see the right white.
- 4.) Use the cameras light meter to determine an aperture/shutter speed combination that provides the correct exposure for the scene. Using the command dial on the top right hand side of the camera rotate the dial to

the left or right and you will see information that will help you take the right photograph on the LCD. This information disappears after a few seconds so double check by rotating the dial again.

To adjust for the right shutter speed and exposure you will need to turn the dial on the command dial on the top right of the camera left or right. You will see numbers like 1/2000, 1/500, 1/30, 1/2, 1", 2", 4" etc..on the LCD monitor.



There will also be a light meter bar in the center bottom. This light meter bar has white and yellow markings on the LCD monitor which change as you turn the dial left or right. The object is to get the yellow bars centered in the middle of the meter so you have a balance of white on both sides. Turn the dial slowly and if it does not change try turning the dial the opposite way.

To maintain the image sharpness in the seam areas, adjust the aperture to f7.6 (this should already be done at the factory and you should see this on the bottom right hand side of the LCD as a f7.6).

With darker areas the exposure might be a second or two compared to outside with good lighting at a 1/250 or less for your shutter speed.

NOTE: While it is possible to shoot with lower apertures in scenes with low light or moving subjects (for shutter speeds), keep in mind that doing so will decrease sharpness near the seam. Also with a longer shutter speed objects that are moving will be blurred.

-
- 5.) Level your tripod and set up your first shot by finding the dimple in the rotator as you spin it.
 - 6.) Make sure there is never a flash when you are taking VR photos.
 - 7.) Press your shutter release all the way down and wait for the image to save to the SD card. (Be careful not to move or jiggle the camera) Then swivel the camera on the rotator 180 degrees to the next dimple point and press the shutter release button all the way down again for your second shot of the scene. **MAKE SURE NOT TO CHANGE THE SETTINGS ON YOUR CAMERA ONCE YOU HAVE TAKEN THE FIRST SHOT. THE 2 SHOTS NEED THE EXACT SAME SETTINGS TO STITCH RIGHT.**
 - 8.) Once you have captured the 2 shots then get ready to move to your next location.
 - 9.) Make sure to adjust your settings for shutter speed and or white balance if you are changing environments.

Side Notes and Hints:

- 1.) It is always easier to scale down the quality of your shots. So make sure you are taking your shots at Fine or Normal.
- 2.) Write down and log your shots as you are taking them.

Remember the more care you put into setting up your shot and making sure your settings are correct the less time you will have fixing your shots later. It is easier to double check your settings and get the right set of shots the first time.

Overview

Imagine exploring the ruins of Machu Picchu, or climbing down the strata of the Grand Canyon, or even exploring the vast reaches of space, without ever leaving your seat! Virtual reality allows kids of all ages to explore places - both real and imaginary - that they might not be able to see in real life, and that they could certainly never see in the classroom.



The Virtual Reality Development Lab represents the next step in bringing education and technology together. With the VRDL, students can not only explore the world of virtual reality, they can create their own "virtual worlds" while learning to use the cutting edge tools that they'll need in an increasingly techno-savvy society.

Helping Students Learn *How* to Learn

At a time when knowledge continues to increase faster than our ability to absorb and update curriculum, it has become increasingly important for educators to teach, not just who, what, when, where, and why, but also how - how to learn. Students must be equipped with the ability to seek out and explore knowledge; to make well-grounded judgments about the quality of information available; to plan projects and to practice time management; to work as a team, cooperating to achieve a common goal. These are the skills that will enable students to continue lifelong learning - and to work in a world of ever-expanding knowledge and ever-changing technology.



The Virtual Reality Development Lab gives students the tools they need to learn how to learn, how to plan, and how to work in a group. In terms of the U.S. Department of Education's Mission Statement: it addresses "technology as a critical skill in preparing students for the future."

Making Technology Fun, Not Frightening

The VRDL has been designed to teach students that technology is fun, not frightening. It opens a door to possibilities and opportunities that are limited only by the students' own imaginations, and it does so by engaging them in the process of "active learning." It places them in a position where they are driven to create, to research, to analyze, and to think independently about a subject rather than just "listen and absorb." It reaches out to students with a wide range of learning styles and abilities.



This manual is intended to serve as an instructional guide, a reference, and even a source of ideas while your class explores the capabilities of the VR Development Lab. It has been designed to teach you how to use the tools at your disposal - what you do with them is entirely up to you. In many ways, think of the steps outlined in this manual as the bones in a skeleton - they form a framework that you will use to create all of your projects, but the appearance and personality of each project is as unique as each person in your class.

Digital Manual

You will find a digital copy of the manual on the VRDL Utilities and Manuals disk that ships with the VRDL Kit. It is in **.PDF** format. You will need to have the latest version of Adobe Acrobat Reader to view the documentation. If you do not have Acrobat Reader, it can be downloaded at www.Adobe.com.

This chapter provides a general idea of the steps involved in a VR Development Lab project, from start to finish, and offers a few tips regarding what both students and teachers can do to make sure that each project is a success. *Each of these steps is discussed in greater detail later on in the manual.*

Essentially, each project involves four essential steps: photographing a particular location, transforming those digital photos into a 3-D virtual reality environment, linking those environments together into a "virtual tour" that tells some sort of story, and then presenting your project to your target audience.

For example, one project might involve a virtual tour of your school. Different stops on the tour might include the trophy room with a voiceover explaining the school's academic and athletic achievements, a statue of the school's founder with a brief explanation of the school's history; and perhaps even a stop at the cafeteria where you can listen to interviews of both students and teachers as they give their take on what it means to be a part of your educational community.



Another group might choose to take its audience on a virtual hike. Different stops on the hike might explain particular aspects of the area's geology and biology or even potential threats posed by nearby development or pollution.

Yet another group might choose to take you on a tour through time rather than space. If there is an area in your community where rapid change is taking place, such as a building being constructed or a road being built, students could shoot the same area over time such that the project records the development. They could research the potential impact of the new structure on the community and even interview community leaders to find out why and how the development came to pass.

Getting Started

Initially, the class as a whole will need to be broken up into smaller groups. This will ensure that every student is engaged in the hands-on learning of his or her own VR project. Once groups have been formed, each group member should be assigned a key role as a writer, director, producer, researcher or photographer. While the project is a group effort, each student will have a realm in which he or she is in charge. For example, a writer would be responsible for drafting any text or narration included in the tour; a photographer would be in charge of "shooting the set;" a director would be responsible for the overall progression of the tour from one node to the next; a researcher would handle the fact-finding portion; and a producer would be responsible for obtaining any materials needed to create the project, permission to film a particular area or permission to use other copyrighted material in the project. The teacher's role is that of the Project Manager; he or she will oversee the entire process.



Once roles have been assigned, team members should share ideas regarding what their project should be about. While there are few limits to what you can do, the setting for any "virtual tour" should be a place that is easily photographed. The tour does not necessarily need to be about the place itself. For example, a group might film

a nearby cave, but the emphasis of the project might be on how caves form or the importance of preserving cave environments.

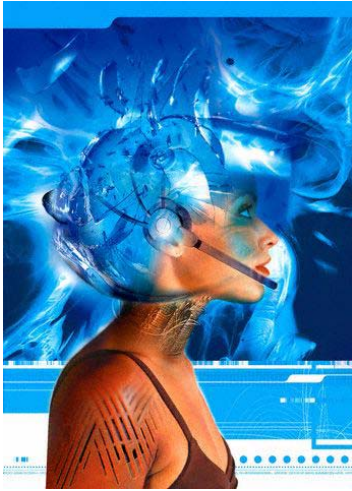
After the group has decided upon a general topic and location, it's time to lay out - from start to finish - the nodes of your virtual reality movie, or the stops on your virtual reality tour. This is done with the use of the **Project Node Worksheet** that will help you outline the plot of what is going to happen, where it will happen and when it will happen. This plan allows the group to gather everyone's ideas and incorporate them into a logical format, determine where and how things like graphics, animation, text, and voiceovers will be included in the presentation, identify areas that need to be developed, list the tools needed to present the information, and organize the overall content.

Lights...Camera...Action!



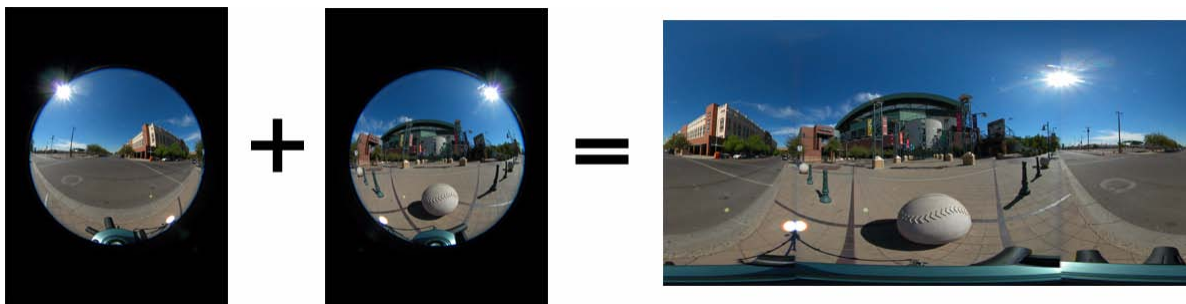
Next comes the *Capture* phase of the project during which students will actually visit their location and photograph it with a digital camera. The digital camera comes equipped with a special lens, called a fish-eye lens, which allows the photographer to take a panoramic picture that captures a 185° view of the area. By setting the camera up in a central location of the environment you wish to photograph, you can take a panoramic picture of one half of the environment, turn the camera 180° and take another photograph of the other half. In this way, it is possible to record a 360° view with only two pictures! These two pictures, collectively known as a *pano pair*, are what groups will work with later on the computer to create virtual reality environments. Groups will need to capture a pano pair for each node outlined on their Project Node Worksheet A “node” is simply one stop or location in your virtual tour.

Exploring the World of Virtual Reality



Once the field work is finished, it's time to move into the world of virtual reality by downloading pictures onto the computer and converting them into virtual environments. Hence, this stage of the project is known as the *Conversion* stage. There's one thing to keep in mind about this stage: Relax and have fun with it! For the most part, the computer does all the work. Think of yourself as the creative consultant. You tell the computer software - using your keyboard and your mouse - what you want to see happen to your image, and it does the rest. Like most well-designed technology, the only real trick lies in learning the commands the computer uses to execute your requests, and that's what this manual has been designed to teach you.

Stitching Your Panoramic Pictures Together



Throughout this process, there will be a variety of techniques and software programs at your disposal that will enable you to edit your images in order to make each node in your movie as realistic and seamless as possible. Each of the panoramic pictures captures one half, or one *hemisphere*, of an environment. Therefore, the first thing you'll need to do, before you even think about creating a three-dimensional image, is to see how well these two photographs line up with one another. In order to do this, you will *stitch* the two hemispheres together to form a single image of the entire environment, called an *equirectangular* image. The

equirectangular image will be distorted because it is showing you the entire 360° view of your environment as a flat surface, much like countries on a globe are distorted in size and shape when depicted on a flat world map.

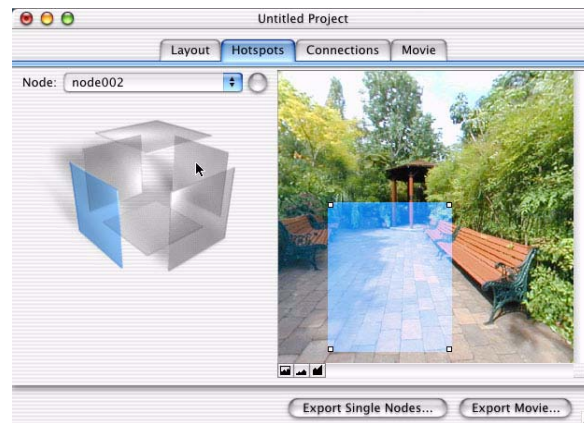
Creating Virtual Environments



The next step involves converting your equirectangular image into a much more realistic three-dimensional image. This is accomplished by projecting the flat equirectangular image onto a three-dimensional cubic surface. Think of this cubic image as an actual room. The top of the cube is the ceiling, the bottom the floor, and the sides are the walls. But here's the best part: when your audience views the 3-D image, the vantage point will be that of the camera at the time the pictures were taken - right in the center of the environment! Therefore, when you open your 3-D image on the computer, the image you see will be that of the cube walls in your field of vision. As you drag your mouse left and right or up and down, your view will change just as if you had turned your head in that direction.

Connecting the Nodes of Your Tour with Hotspots

Once you have created your first 3-D image, you'll need to do the same thing for the rest of the stops on your tour. Each stop on your tour is called a *node*; you can connect one node to the next (or even to other media sources such as PowerPoint presentations, Web pages or still photos) with *hotspots*. Hotspots are areas within your nodes that your audience can click on with their mouse. By clicking on a hotspot, the audience can move to the next stop, or node, on the tour, or find out more information about a particular aspect of a node. At this point, you can also incorporate the sounds, voiceovers, text boxes, movies, arrows or boxes, or files from other applications to highlight specific aspects of your tour.



Using the example of the virtual hike described above, a group might add the sound of a nearby stream or waterfall, a gush of water that actually gets louder as you move towards it and fainter as you move away! Or, as an individual meanders along the virtual hike, he or she could click his or her mouse on the image of a tree or a rock formation in order to learn about an aspect of the area's ecosystem or geologic history, either by reading a bit of text or listening to a brief narrative. In addition, you could superimpose an arrow onto the trail that points the way forward; by clicking on the arrow with the mouse, the viewer can move on to the next node on the tour.



In short, there is no limit to where the VR Development Lab can take you as a class. As it introduces students to cutting-edge tools in the field of technology, it also challenges them to use these tools to learn more about the world around them.

Italicized items are defined in the Glossary (See Appendix A).

A Note to Teachers

It might be worthwhile for you to experiment with both the equipment and the software prior to introducing the VRDL to your class. While this manual makes every attempt to make the entire process as user-friendly as

possible, nothing replaces the know-how that comes with hands-on practice. Also, as you work through the process yourself, you will develop a better idea of the best way to break a project up into more manageable chunks that students can tackle one class period at a time.



In addition, by experimenting on your own, you have the opportunity get some really good panoramic pictures of your school or community that your students can then use to experiment with the software before beginning their own projects. If their first exposure to the software is with the pictures that they themselves have taken, the ease with which they master the lab work might be hampered by poor quality photos.



Alternatively, the Virtual Reality Development Lab offers several tutorials that you may use to introduce your students to the software, but none of these offers the familiarity of photos taken in places they will recognize and with which they will identify.

Keep in mind that the VR Development Lab has been designed to do more than teach your students how to use a computer; it may be applied to any number of disciplines or even interdisciplinary studies that combine subjects such as art, science, history -- even public speaking.

Also, as with any assignment you give your students, you might want to plan out a timeline with deadlines for each phase of the project. It's a good idea to constrain the scope of the project according to the total amount of time that they will have to work on it -- especially if they are using the VR Development Lab for the first time.

For example, if you would like your students to complete their projects in a relatively short period of time (e.g., 2-4 weeks), you might want to constrain the number of nodes that they may include in their virtual tour to two or three. However, if students have an entire semester to work on the lab, they might be able to incorporate 10 or more different areas.

The following section contains a sample timeline complete with minimum criteria for each phase of the project. As you experiment with the VR Development Lab, you may want to tweak this timeline to suit the pace of your class as a whole.

VR Development Lab -- Sample Timeline (Total Project Time: 4-6 weeks)

Phase I -- Organizing the Group (1 week)



The group should fill out the **Project Planning Worksheet** shown in Table 2-1 on page 24 (blank forms are provided in Appendix A). To do this, the group should do some preliminary research to be sure that the project may be completed successfully and in the time allotted. In addition, each group member should decide which role he or she would like to play and provide a brief description of which aspects of the project for which he or she will be responsible. Depending upon the number of people in each group, students may have the opportunity to take on more than one role.

Phase II -- Project Planning (1 week)



In this phase of the project, students should complete the **Project Node Worksheet** shown in Table 2-1 on page 24 (blank forms are provided in Appendix A). Here, they'll need to describe the setting for each node in the tour as well as incorporate any additional features they may wish to add, such as hotspots; voiceovers; or links to Web pages, still photographs, or other types of files (e.g., PowerPoint presentations). Be sure to communicate to your students that each node should tell a piece of the overall story, and that the nodes should be organized in a logical fashion. You may want to have the group submit a written summary explaining the general concept and progression of their tour if you don't think it will be apparent from the worksheet.

Phase III -- Capture (1 week)



At this point, students will need to use the digital camera. It might be wise to create a sign-up sheet so that each group is guaranteed some time with the camera during the week. This also ensures that the entire class won't wait until the day before this portion of the project is complete to take their photos. It is probably a good idea for students to capture any still pictures they may want to include as a part of their final projects so that they do not have to "check out" the camera equipment a second time. You might also want to suggest that your students do more than just "capture" the environments for each node in this phase; if they have the time, it would be worthwhile for them to open the photos on the computer and get a general idea of how well they will stitch together. If any of their pictures are of poor quality, this will give them the chance to reshoot them.

Phase IV -- Conversion/Editing/Connection (1-3 weeks)

This is the final phase of the project (except, of course, for the presentation), and also the one that allows for the most creativity. However, if your students leave this portion of the project to the last minute, they are likely to get frustrated and cheat themselves out of some very real fun with virtual reality. Therefore, you might want to break this phase down into even smaller chunks as follows:

- *Phase IVa -- Convert Pano Pairs to Virtual Environments (1 week)*
- Phase IVb -- Add hotspots, links, voiceovers, etc.(1 week)
- Phase IVc -- Connect nodes and assemble VR movie (1 week)

Phase V -- Presentation!



While this is perhaps the least time-consuming portion of the VR Development Lab, it is where all of your students' hard work will pay off. Be sure to give each group enough time to present their project to the class - they've worked hard for that moment in the spotlight! Again, a sign-up sheet might prove invaluable here.

Help with presentations requiring a projection screen is provided in Chapter 7 on page ##.

The step-by-step process of creating a VR environment with the Virtual Reality Development Lab is represented in Figure 2-1, "Components of a Virtual Reality Development Lab Project," on page 23.

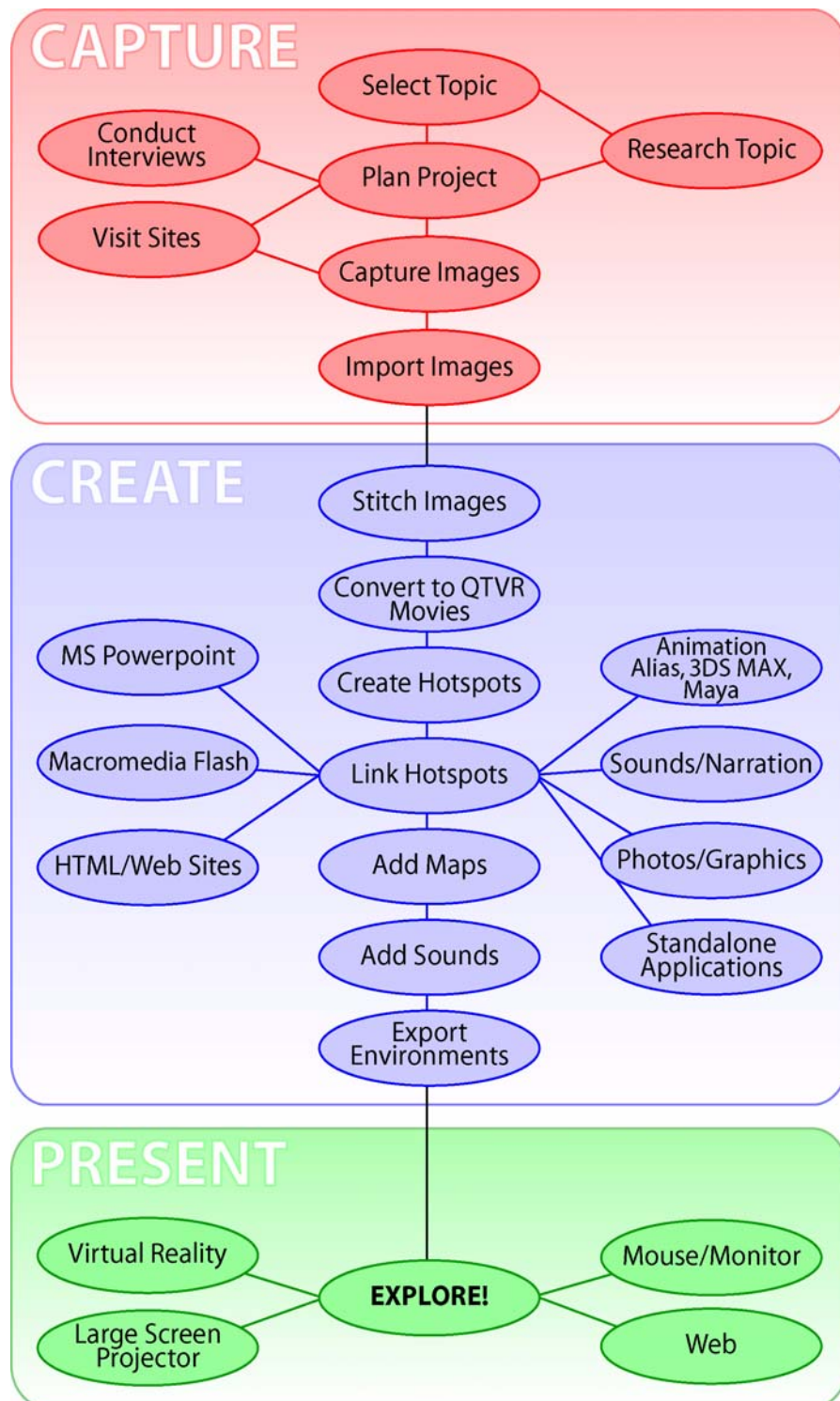


Figure 2-1. Components of a Virtual Reality Development Lab Project

TABLE 2-1 Sample Project Planning Worksheet

Project Title: <i>Shepherd of the Hills Legend and History</i>	
Subject: <i>Language Arts</i>	Date Due: <i>4/29/04</i>
Team Members and Roles: Writer(s): <i>Maria Rodriguez, Paul Jones</i> Photographer(s): <i>Paul Jones, Hee Kwon</i>	Researcher(s): <i>Scott Franklin, Maria Rodriguez</i> Director: <i>Hee Kwon</i> Producer: <i>Scott Franklin</i>
What topic do you want to explore? <i>The history and myth of the Ozark Mountains.</i>	
What story do you want to tell? <i>The romantic legend of the Shepherd of the Hills, which is rooted in the history of the Ozark Mountains.</i>	
What key points do you want to make? <i>The fictional characters in the book are based on real people.</i> <i>The traditional hospitality of the area led author Harold Bell Wright to return every year for seven years -- and to write a novel based on the area.</i> <i>General history of the Ozark Mountains.</i> <i>The economy of the Ozark area in the early 1900s was based largely on agriculture, even though the soil was generally rocky and hard to work.</i> <i>The Shepherd of the Hills book improved the economy of the Ozarks by drawing tourist trade into the area.</i>	
What information needs to be gathered and documented to support your story? <i>The people behind the characters.</i> <i>The history of Harold Bell Wright</i> <i>The history of the Ozarks during the years covered by the novel.</i> <i>How the tourist trade started in the Ozarks and how it affected the economy.</i>	
What elements (objects, text, still photos, movie clips, sound files, etc.) would best illustrate your story? Do you need permission to use any of this material? <i>Photos, history, media clips are available at www.theshepherdofthehills.com, offered in the Press Releases link for the download. Shouldn't need permission to use in this context. Should also watch for elements when visiting the site for the photo shoot.</i>	
Is there a location that could be photographed that would be a focal point, backdrop or illustration of your key points? <i>Shepherd of the Hills Homestead and surrounding area.</i>	
Is this location appropriate for shooting panoramic photos? (limited number of moving objects; accessible while carrying equipment) <i>May want to shoot in off-peak season or after hours.</i>	
Do you need permission to visit the location or to take photos there? Are any of the locations on private property? <i>Contact management at the Shepherd of the Hills in Branson.</i>	

Blank student VRDL Planning worksheets are found in Appendix A.

Project Planning Sheet

Project Title:	
Subject:	Date Due:
Team Members and Roles: Writer(s): Photographer(s):	Researcher(s): Director: Producer:
What topic do you want to explore?	
What story do you want to tell?	
What key points do you want to make?	
What information needs to be gathered and documented to support your story?	
What elements (objects, text, still photos, movie clips, sound files, etc.) would best illustrate your story? Do you need permission to use any of this material?	
Is there a location that could be photographed that would be a focal point, backdrop or illustration of your key points?	
Is this location appropriate for shooting panoramic photos? (limited number of moving objects; accessible while carrying equipment)	
Do you need permission to visit the location or to take photos there? Are any of the locations on private property?	

Misc

VRDL Kit

Your VRDL Kit comes with the following:

- Single Pelican Case: Complete Portable High Resolution VR Camera Capture Studio
- Large VRDL Color Manual and Back Up Discs



Figure 1. The Packed VRDL Camera Capture Kit (Bottom Layer)

Contents:

- Nikon P6100 13.0 Mega Pixel Camera
- 1 Battery (Already in Camera)
- 1 Wall Charger for Battery
- 1 Fish Eye Lens (Attached to Camera)
- 1 Fish Eye Lens Adapter (Attached to Camera)
- 1 Rotator
- 1 Tripod
- 1 Gig SD Card (Already in camera)
- 1 Card Reader
- Nikon Laminated Quick Reference Card
- Misc. Cables, Straps and Manuals
- Cyber Glove with Tower and Manual

TRAINING & HANDS ON DEVELOPMENT

**If you require on-site training which is available in all 50 states
please call 1.888.587.7529 to set up an appointment.**

**The session which takes 1 day will cover all the aspects of the
hardware and software and can be used for beginners to advanced
users.**

A large, semi-transparent VRDL logo is centered over the background image. The letters are in a bold, sans-serif font, with the 'V' and 'R' being significantly larger than the 'D' and 'L'. The background image shows a historic stone building with a clock tower on the left, a paved plaza in the middle, and a white bus parked on the right. In the distance, there are hills and a clear sky with some clouds.

VRDL

DIGITAL
TECH FRONTIER LLC

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Phoenix, Arizona 85048

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AOL Instant Messenger / iChat AV Support: VRDLDev
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