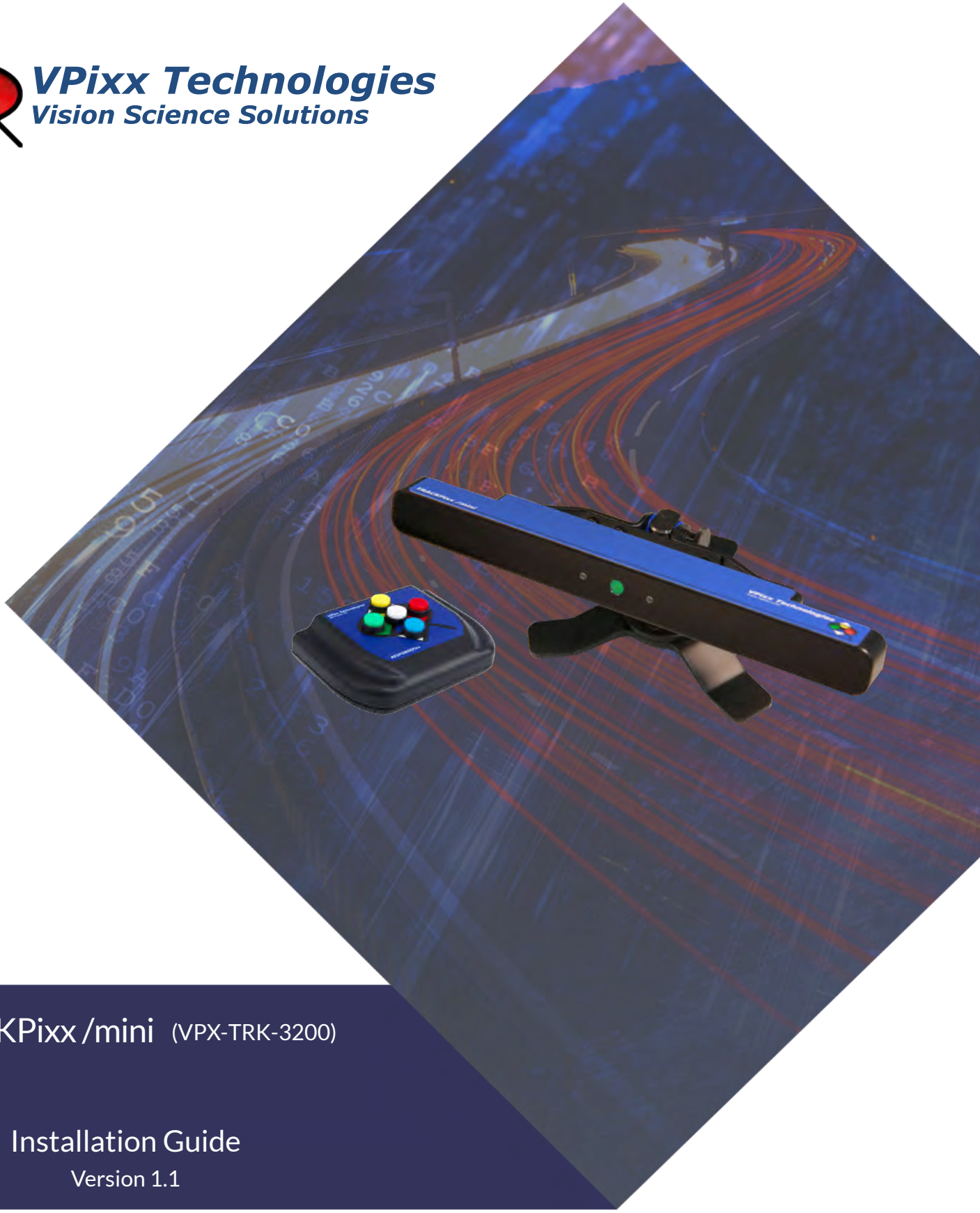
VPixx Technologies
Vision Science Solutions



TRACKPixx /mini (VPX-TRK-3200)

Installation Guide

Version 1.1

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IMPORTANT

VPixx Technologies Inc. reserves the right to modify or otherwise update this document without notice as required by a constantly evolving marketplace, client requests or to adapt to new progress or constraints in engineering or manufacturing technology. The information contained in this document may change without prior notice.

For more information about our company and products, visit our website at ***www.vpixx.com***

For information, comments or suggestions, please contact us by e-mail at ***support@vpixx.com***

Our offices are located at:

630 Clairevue West suite 301
Saint-Bruno, Qc
Canada, J3V 6B4

Version History of this document

Table 1 – Version history

Version Updated to	Date	Author	Reason
1.0	2018/08/27	P. Kakos	v1.0 release
1.1	2019/04/12	P. Kakos	Removed software sections (and placed them in the VPixx Products Application Guide)

Document Icons

The use of icons emphasizes helpful, caution or warning notes. Below is a list of the available icons.

Table 2 – Document icons

Icon	Type	Description
	Helpful Hint	*Information to help out during assembly, installation or usage*
	Caution Notice	*Important Information to prevent misuse and/or damage to equipment*
	Warning	***Critical information to prevent damage to equipment and/or personnel***

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Overview

This installation guide provides conformity, safety, hardware, installation and maintenance information for VPixx Technologies Inc.'s TRACKPixx /mini.

The TRACKPixx /mini is a versatile eye/gaze-tracking solution. It does not require a dedicated PC to process eye images and generate gaze information; all image processing is performed within the TRACKPixx /mini hardware.

For technical questions or product support information, do not hesitate to contact the VPixx support team by phone or by sending an E-mail to support@vpixx.com

	By creating your *MyVPixx* account on the VPixx Technologies website, you will have access to additional product documentation, demos, source code examples and the latest firmware and software drivers.

	The TRACKPixx /mini device is suitable only for research and is not designed for medical applications or for diagnostic purposes.

Compliance information

For the United States of America

This device complies with part 15 subpart B of FCC rules. Its operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 subpart B of the FCC rules.

For Canada

This Class A digital apparatus complies with Canadian ICES-003.

For European Countries

DECLARATION OF CONFORMITY

Manufacturer's Name: VPixx Technologies Inc.
Manufacturer's Address: 630 Clairevue West suite 301
Saint-Bruno, Qc
Canada, J3V 6B4

Product Name: TRACKPixx /mini
Part Numbers: VPX-TRK-3200
Product Options : All
Application of Council Directive:

2004/108/EEC	-Electromagnetic Compatibility directive
2011/65/EU	-Restriction of Hazardous Substances Directive
2012/19/EU	-Waste Electrical and Electronic Equipment directive

Supplementary Information:
To remain CE compliant, only CE compliant parts should be used with this product. Maintaining CE compliance also requires proper cable and cabling techniques. VPixx Technologies will not retest systems or components that have been modified by customers.

Signature: _____

Printed name: Jean-François Hamelin, Eng Title: Vice President

The following information is only for EU member states:

The mark shown to the left is in compliance with the Waste Electrical and Electronic Equipment directive 2012/19/EU (WEEE).

The mark indicates the requirement NOT to dispose of the equipment as unsorted municipal waste. For more information call VPixx Technologies Inc. or email us at support@vpixx.com

Declaration of RoHS Compliance

RoHS This product has been designed and manufactured in compliance with Directive 2011/65/EU of the European Parliament and the Council on restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS Directive).

WARNINGS AND SAFETY INFORMATION

WARNINGS – GENERAL

	The TRACKPixx /mini system is suitable only for research and not for medical applications or for diagnostic purposes.

	PHOTOSENSITIVE EPILEPSY (PSE) ***Eye-tracking equipment may expose subjects with optical stimuli capable of provoking a seizure. Subjects that have never had any epileptic event may have a seizure when subjected to eye-tracking procedures.*** ***Consequently, it is very important to monitor subject reactions and well-being constantly during experiments.***

	Any modification and/or unauthorized (previously approved in writing by VPIXX TECHNOLOGIES Inc.) or improper use of the equipment contained in this product package may void the warranty and may result in injury to users or damage to equipment. This includes the opening of electronic equipment and connectors. There are no user-serviceable parts inside.

	Use of controls or procedures other than those specified herein may result in hazardous infrared radiation exposure.

SAFETY INFORMATION

As a Class 1 LED device, the TRACKPixx /mini (VPX-TRK-3200) is compliant with the IEC-62471 LED safety standard, which regulates LED and laser eye and skin safety. Class 1 LED devices are safe under most operational and testing conditions. As the system may be used in test and laboratory conditions where a subject may be exposed to its infrared emissions for protracted periods, precautions must be taken, mainly to ensure maximum subject comfort.

USAGE NOTES

- Use only the provided cables and equipment.
- Do not expose any component of the TRACKPixx /mini to adverse weather conditions such as rain, water, heat, cold or abnormally high levels of humidity.
- Unplug the system before cleaning, and refer to the appropriate cleaning procedure in the maintenance section of this document to clean any component.
- Handle the power cable carefully. Never use a damaged power cable.

	In the event of failure, the TRACKPixx /mini *should be replaced. There are no user-serviceable/adjustable parts inside. Contact VPixx Technologies Inc. for repair or replacement as required.*

Installation

The TRACKPixx /mini system constitutes the core component of your eye-tracking solution. To connect the TRACKPixx /mini using the provided USB cable, locate the USB connector to the side and rear of the system.

Figure 1 – USB connector

The following illustration details the ideal distance the subject should be from the TRACKPixx /mini system, whether the TRACKPixx /mini is mounted on the Arm support or directly on the display monitor.

<u>Note that the TRACKPixx /mini can only be used with display monitors of 24'' or less.</u>

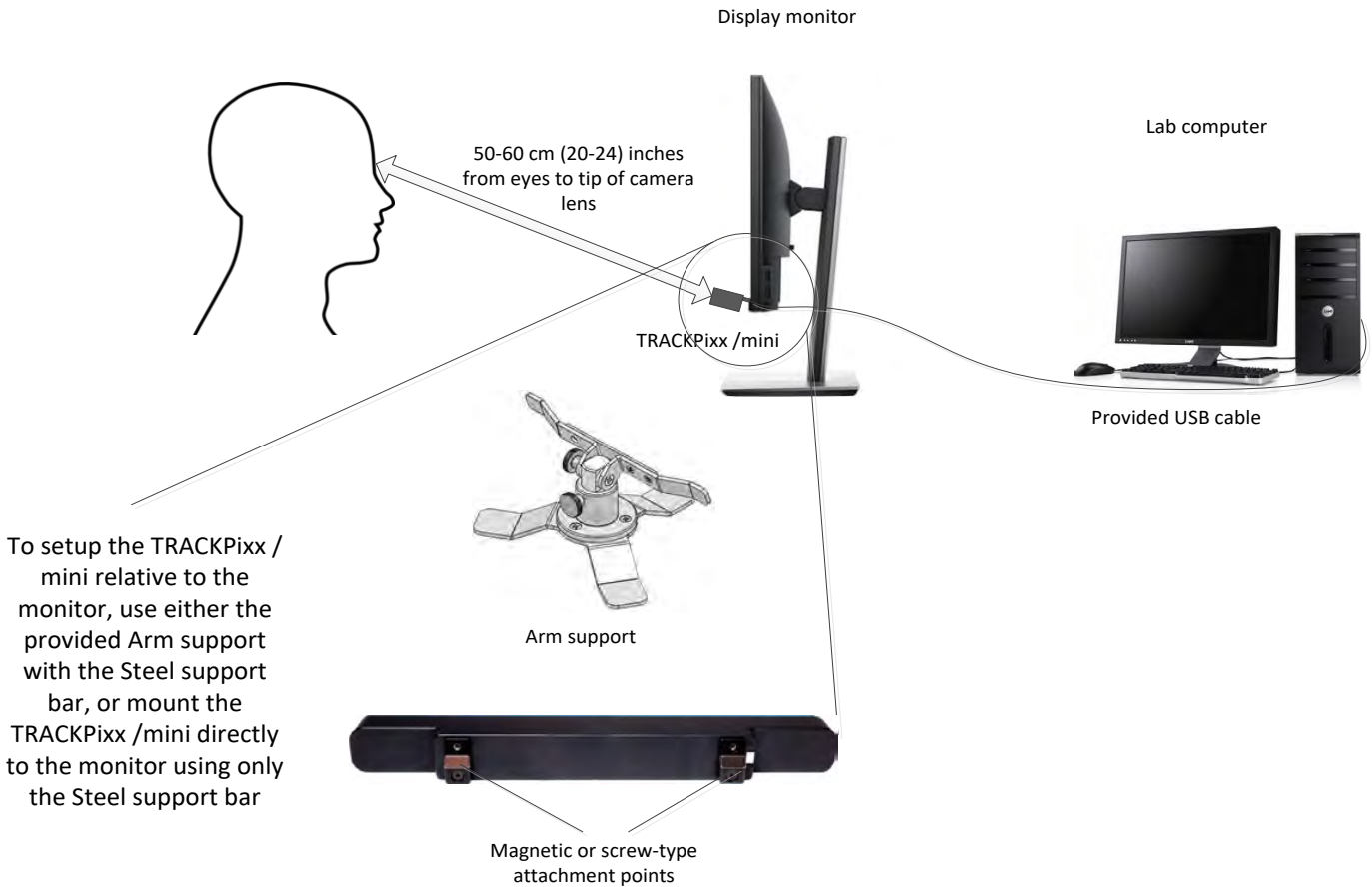

Figure 2 - Typical subject placement for TRACKPixx /mini System using screen mount

	To use the TRACKPixx /mini's Steel support bar, simply remove the paper from both adhesive strips and mount the bar either to the Arm support or directly to your display monitor. In the latter case, ALWAYS position the Steel support bar to the bottom of the monitor, never the top. To heighten the position of the TRACKPixx /mini when using the Arm support, you may place the USB I/O HUB under the Arm support.

Useful Installation Tips

POSITION

To maximize subject comfort during the experiment and to ensure the most accurate eye-tracking data, the subject's eyes should be level with the top third of the display monitor and well within the line of sight of the TRACKPixx /mini.

DISTANCE

The subject's eyes should be at a distance of 50-60 cm (20-24'') from the green LEDs visible on the front panel of the TRACKPixx /mini.

EYEWEAR

Certain eyewear may impede eye-tracking equipment. If the TRACKING INDICATOR LEDs on the front panel of the TRACKPixx /mini are not constantly ON, try tilting the subject's head (or eyewear) up or down until the LEDs stop shutting down.

Setup

By using the provided USB I/O HUB, the TRACKPixx /mini can be used in conjunction with the RESPONSEPixx 5-button box to record subject responses to various experimental stimuli. The following figure shows how to connect the various equipment for such a setup.

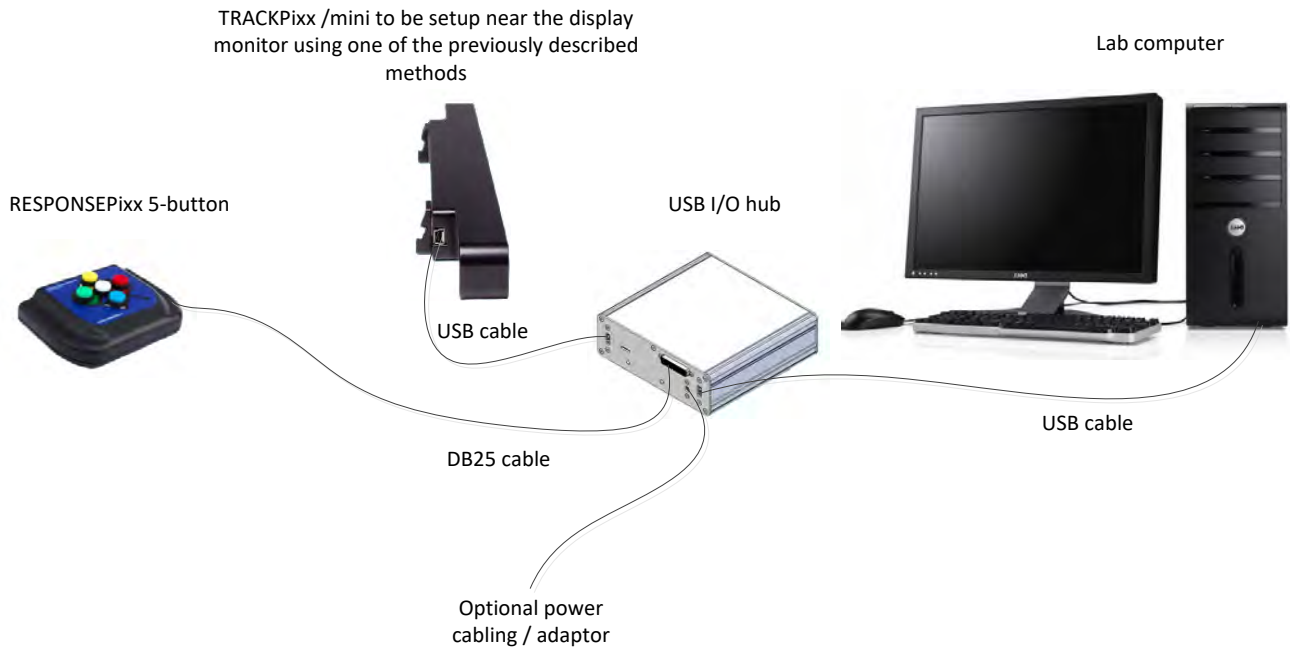

Figure 3 - TRACKPixx /mini System connections using RESPONSEPixx 5-button box

If the lab computer is incapable of supplying the approximately 900 mA of power required by the USB I/O HUB, simply plug the HUB's provided power cable into one of your facility's power outlets.

	If necessary, the USB I/O HUB can be placed under the Arm support if you find it necessary for your experimental setup.

The USB I/O HUB integrates a high-speed USB hub and an event detection and capture module. A VPixx RESPONSEPixx can be connected to the hub through the DB25 input port. The hub connects to a PC and enumerates as a USB composite device. For modern operating systems (Windows 10, Linux, Mac), no drivers are required in order to use the hub.

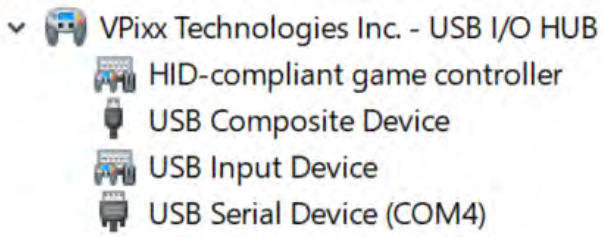

Figure 4 - USB I/O HUB devices as enumerated on Windows 10

Two devices are installed: a game controller and a serial port. The game controller will generate keypress events with a connected RESPONSEPixx box. Whenever an event is generated, it is recorded with a timestamp in the internal memory of the hub. The user can eventually read the event(s) through the serial port. The I/O HUB can also configure RESPONSEPixx LEDs and get the current system time.

Possible commands, listed in the following table, are sent through the serial communication port which can be accessed by a terminal application (such as *Hyperterminal*) or through programming applications (such as *Python* or *E-Prime*).

Table 3 – USB I/O Hub commands through serial communication port

Serial Command	Description	Example of return string
GetEventTime	Returns the recorded time for a button press. The time is captured on a falling edge event.	'0' (ms)
GetReleaseTime	Returns the recorded time for a button release. The time is captured on a rising edge event.	'457' (ms)
GetCurrentTime	Returns the current system time of the module. This is the time since boot up (in milliseconds).	'303775' (ms)
SetLedAllOn	Turns ON all button LEDs.	N/A
SetLedAllOff	Turns OFF all button LEDs.	N/A
SetLed{0..4}{0..100}	Turns ON the LED denoted by the first field to the percentage illumination given by the second field.	N/A
GetVersion	Returns the current version of the I/O HUB firmware.	V0001

Table 4 – LED Color / button identification

	LED ID - Used with SetLed function	BUTTON - Used with game controller API. E.g. _joystick.get_button
RED	0	0
YELLOW	1	1
GREEN	2	2
BLUE	3	3
WHITE	4	4

Communication with the host computer USB serial port is handled exactly as for a generic serial device. Commands are sent as strings ending with a carriage return. Responses from the USB I/O HUB are sent as an ASCII string terminated by a carriage return. Under normal usage, the host PC USB port can generally power the USB I/O HUB and all of its USB ports since it can supply up to 500 mA when a USB 2.0 device is connected. If this is not the case, the user can connect an external 5 V power adaptor.

Figure 5 shows a potential use case of the USB I/O HUB.

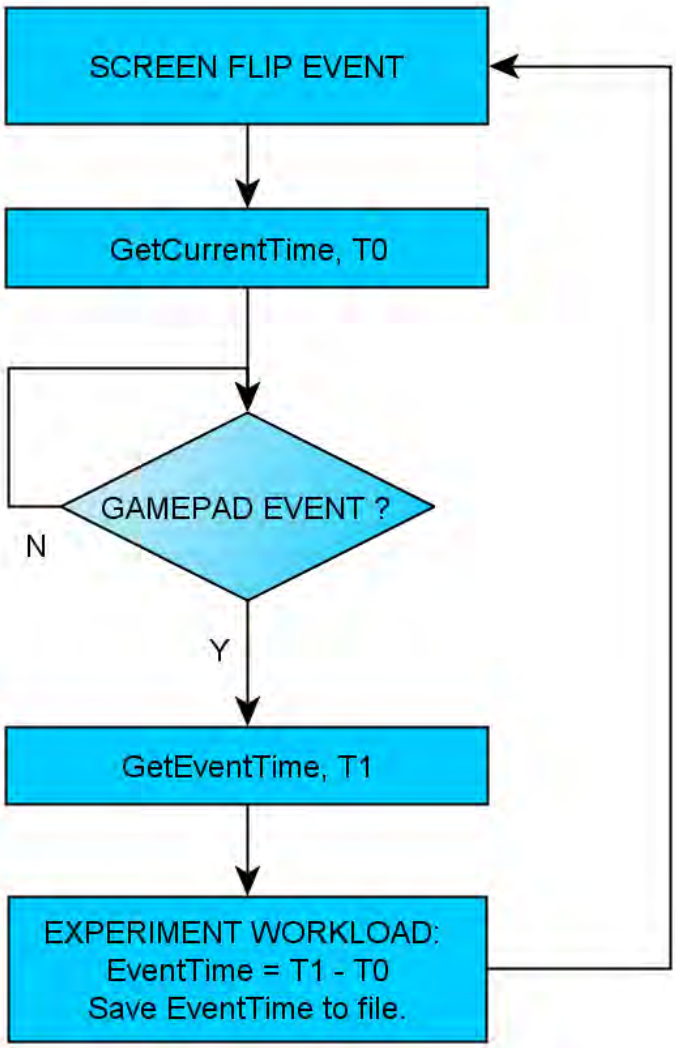

Figure 5 - Typical USB I/O Hub embedded response capture device experiment

The purpose of this experiment is to measure a user's response time and save the result to a file. The first item is a SCREEN FLIP EVENT during which a picture appears on the screen. This example supposes that this picture asks the user to press one of the colored buttons on a RESPONSEPixx. The next item in the sequence is a GetCurrentTime, which returns the current time of the switch box (T0). Following this, the experiment waits for a button press event. When the operating system receives this event it triggers the I/O hub's event capture section which captures the button press and associates a timestamp from the same clock used to obtain T0. The event time is obtained by sending GetEventTime and saving it to T1. The next execution block is the experiment workload used to calculate and save the reaction time of the user. The process is then repeated.

This example experiment can be written in a multitude of languages, such as Python. Since the USB I/O HUB is classified as a generic device on platforms such as Windows, Linux or Mac, the experiment is portable and will work on any of these platforms.

TRACKPixx /mini Software Installation on experiment PC, hardware initialization and adding USB I/O HUB in E-Prime

For this information, please refer to the

Application Guide for VPixx Products

System first power up and front panel LED information

After the TRACKPixx /mini is powered, its front panel **Tracking Indicator LEDs** will light up BLUE to signify that the device is powered.

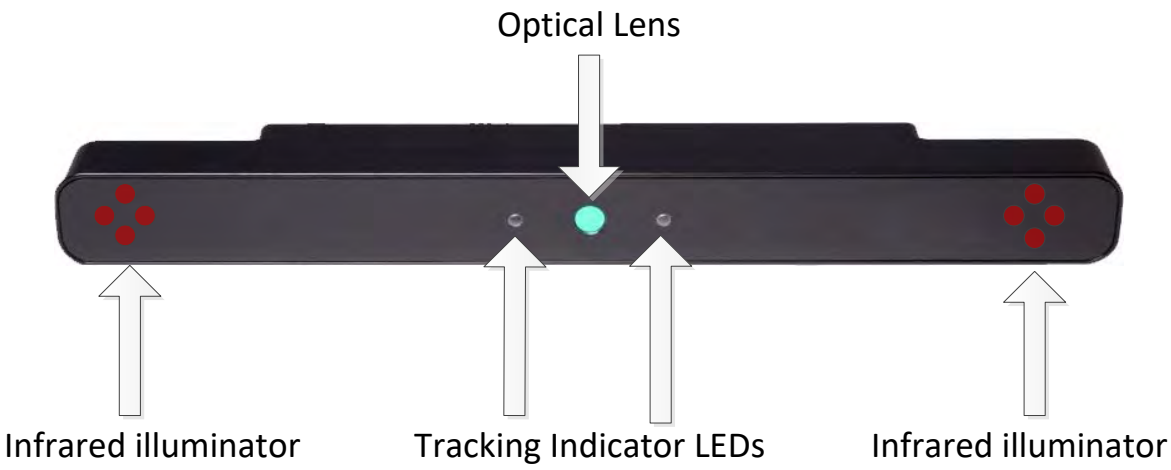

Figure 6 – TRACKPixx /mini front panel

	Ensure that the two **infrared illuminators** at the edges of the TRACKPixx /mini are not blocked by anything (sticker, object, subject's arm(s)) since this would make eye tracking impossible.

The Tracking Indicator LEDs will turn GREEN as soon as an eye-tracking application starts and the TRACKPixx /mini detects the subject's pupils. When a Tracking Indicator LED (left, right or both) does not light up green, it signifies that it is currently incapable of tracking the subject's corresponding pupil.

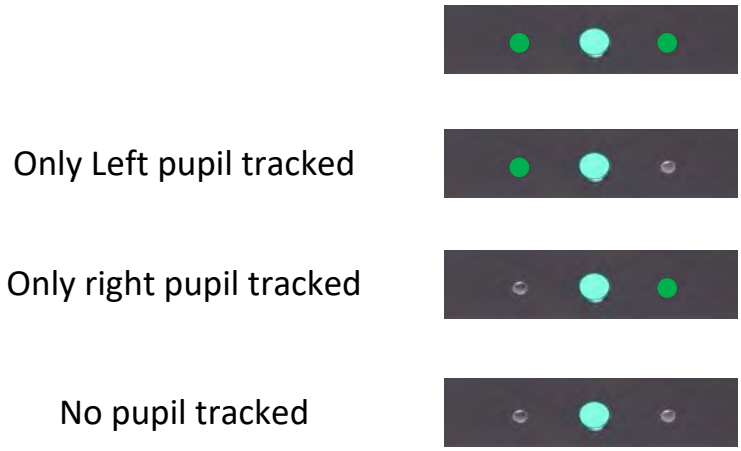

Figure 7 – TRACKPixx /mini front panel Tracking Indicator LEDs

Using the TRACKPixx /mini

The TRACKPixx /mini may be used in one of several ways using one of many different software applications.

	Before setting up your first eye-tracking session, CAREFULLY READ the safety information contained in the WARNINGS AND SAFETY INFORMATION ***section***

For information on how to use your TRACKPixx /mini, please refer to the

Application Guide for VPixx Products

Maintenance

The TRACKPixx /mini system does not require periodic maintenance.

Cleaning the TRACKPixx /mini

Clean your TRACKPixx /mini system as required and depending on usage.

	Do not use cleaners that contain any petroleum-based materials such as benzene, thinner, or any volatile substance

Warranty

The TRACKPixx /mini is warranted against manufacturing defects in materials and workmanship for a period of two years from the date of purchase.

TRACKPixx /mini Specifications

Table 5 – Technical Specifications

Specification	Value
Connection type	mini USB
Dimensions	25.4 x 2.6 x 3.2 cm (10'' x 1'' x 1.26'')
Operating distance	50 - 70 cm (19.7'' - 27.5'')
Head motion box (W x H x D)	31.5 x 22.5 x 20 cm (12.4'' x 8.8'' x 7.9'')
Accuracy	0.5°
Tracking method	Dark pupil, binocular tracking
Weight	0.21 kg (0.46 lb)
Certification	CE and FCC
Speed	120 FPS
Power supply	USB port or external power supply

Table 6 – System Requirements

Specification	Value
Operating system	Microsoft Windows 7, 8, or 10, 32-bit or 64-bit
USB port(s)	1
Maximum monitor display size	24''

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