

Freespace® FAQ

1 General

1.1 What motion data does the Freespace MotionEngine provide?

The Freespace MotionEngine provides several different data types to users that enable a variety of applications. These include the following:

- Cursor motion
- Linear acceleration (X, Y, Z)
- Angular velocity (X, Y, Z)
- Angular position

1.2 How do I incorporate Freespace motion technology into my product?

Freespace motion technology can be incorporated into customers' products via two main methods. Contact Hillcrest Sales at <http://hillcrestlabs.com/products/freespace-sales-support.php> for more information.

- **Freespace Module** - You can embed a Freespace module directly into your product. These modules integrate off-the-shelf MEMS inertial sensors and the Freespace MotionEngine to offer customers a fully functional, ultra-compact, and ready-to-use module that is easy to integrate into in-air pointing and motion control products. The module interfaces with your product via an industry standard SPI bus.
- **Freespace MotionEngine** – Customers can license Freespace technology from Hillcrest and embed the Freespace MotionEngine directly into their product.

1.3 What sensors does Freespace technology use?

Freespace motion technology supports MEMS inertial sensors from a wide range of vendors with various performance characteristics. A Hillcrest sales representative can provide options that are appropriate for your application.

1.4 What is the difference between Relative and Absolute pointing?

Absolute pointing is a type of control scheme where the user must aim the device directly at the screen in order to produce cursor motion. The cursor follows the aiming point of the device and when pointed off screen the cursor disappears. This forces the user to constantly hold the device up and pointed directly at the screen which can be fatiguing and is not ideal for casual interaction with a TV. Absolute pointing also requires line-of-sight and restricts users to certain viewing angles.

Relative pointing, which Freespace motion technology uses, tracks the relative motion of the device to produce cursor motion. What this means is that the user can hold the remote in a relaxed position at their side or even under a blanket and continue to

accurately navigate with the cursor. When you rotate your hand up the cursor goes up regardless of the orientation or position of the device. This is perfect for a user-friendly and relaxed TV browsing experience. Freespace® enabled devices have no need for line of sight with the TV or a sensor bar like absolute pointing devices. Relative pointing also allows for a dynamic gain setting which increases accuracy when clicking on small targets. A Hillcrest sales representative can provide further details about the differences between these two pointing styles.

1.5 I understand the value of pointing on TV, but how do I get engaging pointer-based applications on my TV?

Hillcrest has extensive development experience in motion and interactive application software. Hillcrest offers applications such as the Kylo™ TV Browser as well as training and development services to enable your products with the best pointer-based applications available. To gain hands-on experience with an application designed by Hillcrest, please download the free Kylo TV Browser from <http://www.kylo.tv>.

1.6 Can I use a Freespace enabled remote for gaming?

Freespace technology offers a unique combination of advanced user interface interaction along with support for a full-featured motion gaming experience that will enable your product to rival controllers in today's leading game consoles. By taking advantage of the various data modes that the Freespace MotionEngine offers, platform developers can add a wide range of games to their product including: casual point-and-click games, motion-based sports games, interactive flying and driving games, and first person shooters. The ease-of-use, accuracy, and advanced motion recognition enabled by Freespace motion technology ensure a high quality and engaging user experience.

1.7 Where can I obtain Freespace demos?

Hillcrest offers Freespace Reference Kits (FSRK) that allow for easy evaluation of Freespace motion technology for “in-air” pointing and motion control applications. You can use these with the demonstration apps included in the Freespace MotionStudio. The reference kits are available for purchase here <http://www.hillcrestlabs.com/products/freespace-store.php>. In addition, Hillcrest's Kylo TV Browser when used with a Loop™ pointer, also from Hillcrest, offers an ideal way to demonstrate the power of Freespace motion technology for television applications. The Kylo TV Browser is available for free at www.kylo.tv and Hillcrest's Loop pointer is available at www.hillcrestlabs.com/loop. For more information contact Hillcrest Sales at <http://hillcrestlabs.com/products/freespace-sales-support.php>.

1.8 How can I contact Hillcrest Labs?

Hillcrest Sales and Support can be contacted at <http://hillcrestlabs.com/products/freespace-sales-support.php>

2 Freespace® Reference Kits (FSRK) and Freespace Modules

2.1 Can I directly insert the Freespace Reference Kit (FSRK) circuit board into my prototype?

The FSRKs were designed to be easily inserted into customers' prototypes. If you are using the FSRK-USB-1, then you can simply insert the PCB into your prototype and connect it via USB. Alternatively, you can use the built-in industry standard SPI bus that is included on the FSRK-USB-1.

For the FSRK-2.4G-1 and the FSRK-BT-1, simply remove the PCB from the plastics and insert it into your prototype. The provided battery connections can be removed as well if you want to power the Freespace board from within your device. Contact Hillcrest Labs support for more information at <http://www.hillcrestlabs.com/products/freespace-sales-support.php>.

2.2 How do I get the FSRK-BT-1 into pairing mode or discovery mode?

Hold down the left button and press the right button three times. Then release the left button. Your FSRK-BT-1 is now in pairing mode (also known as discovery mode).

2.3 What type of USB cable is used with the FSRK-USB-1?

The FSRK-USB-1 uses a standard Micro B to A USB cable. Hillcrest also offers them on our online store for purchase.

2.4 I need a replacement USB RF Transceiver for my FSRK-2.4G-1.

Contact Hillcrest Labs Support for assistance at <http://www.hillcrestlabs.com/products/freespace-sales-support.php>.

2.5 Can I customize the behavior of my Freespace Reference Kit (FSRK)?

The button and LED behaviors of the Freespace Reference Kits are highly customizable. The buttons support mouse, keyboard, consumer page, and Freespace mode control commands. The LEDs support different modes, behaviors, and causes. Additionally, the main LED is PWM capable. The Freespace MotionStudio provides an interface to customize these behaviors. The FSRK-2.4G-1 and the FSRK-BT-1 also support up to 9 external buttons and a scroll wheel connected to the board in a customer's prototype.

2.6 What operating systems does my Freespace Reference Kit (FSRK) support?

The FSRK will work as a USB HID device for any host platform with standard USB, HID, and mouse drivers, including Microsoft Windows, Macintosh OS X, and Linux.

2.7 What is the range of my wireless Freespace Reference Kit?

The FSRK-2.4G-1 and FSRK-BT-1 have a range of up to 10m.

2.8 Do I need a special driver for my Freespace® Reference Kit?

For standard cursor motion there is no need for a special driver. The FSRK will appear as a standard HID mouse for any USB HID capable operating system.

If you need access to the alternative data modes such as linear acceleration, rotational velocity, or angular position, then you can either use the Freespace MotionStudio or libFreespace. The MotionStudio allows customers to visualize and explore the different data modes the FSRK provides and enables data mode changes via a simple GUI. For more advanced users, you can add this functionality directly into your software via libFreespace which is an open source API written for C, C++, C#, Java, or Python. For more information about libFreespace, please visit <http://libfreespace.hillcrestlabs.com/>

2.9 What is WiCE™?

The Hillcrest Wireless Consumer Electronics (WiCE) RF link is a proprietary RF protocol in the 2.4 GHz band that Hillcrest developed to meet the demanding requirements for high-quality inexpensive pointing solutions. The protocol is a point-to-point protocol between a handheld device and a host device. The FSRK-2.4G-1 is a reference design that uses this protocol.

2.10 How many WiCE Freespace devices can I have running simultaneously in the same room?

The maximum number of Freespace devices in close proximity is typically limited by the RF environment and the RF protocol. Hillcrest's WiCE 2.4 GHz RF solution can easily support 10 devices within 10 meters under a reasonable RF environment that has a single 802.11n base station in close proximity. Freespace Reference Kits that support a wired USB interface (FSRK-USB-1) and Bluetooth® RF (FSRK-BT-1) are also available. If your application requires more sensors to be closely located, please contact Hillcrest and a sales representative will assist you in determining the optimum solution.

3 Freespace MotionStudio

3.1 What is the Freespace MotionStudio for?

The Freespace MotionStudio accelerates the evaluation and implementation of Freespace motion processing. This free application provides a graphical interface for motion demonstration, configuration of Freespace devices, and developing Freespace-enabled products.

3.2 How do I get the Freespace MotionStudio?

You can download the Freespace MotionStudio from Hillcrest Labs' website at <http://hillcrestlabs.com/products/freespace-toolkit.php>. The MotionStudio requires Java 1.6 or later and some of the demonstrations require an OpenGL capable graphics card.

3.3 What operating systems does the Freespace MotionStudio support?

The MotionStudio is currently compatible with Windows 7, Vista, and XP.

3.4 What are the advanced tools in the Freespace® MotionStudio and how do I enable them?

The Freespace MotionStudio advanced tools allow for special configuration options such as firmware upgrade, device reorientation, button/LED configuration, and data mode control. To enable them, click File -> Configure. Select “Advanced” and click OK.

3.5 The Virtual Object panel in the Freespace MotionStudio is not working properly.

The Virtual Object panel requires an OpenGL capable graphics card. Try updating your PC’s graphics card driver.