

# Advanced motion control coming to smartphones and tablets

Chad Lucien, Senior Vice President – Sales & Marketing, Hillcrest Labs,  
[www.hillcrestlabs.com](http://www.hillcrestlabs.com)



The introduction of more capable smartphones and tablets has led to more advanced processors, high definition screens and a variety of sensors, designed to make these devices “smarter.” Notably, smartphones and tablets now universally include some combination of an accelerometer, magnetometer and gyroscope, to enable a wide range of motion aware and motion controlled applications, and this trend is expected to grow dramatically.

For years, advanced motion control technology has been used in other specialized vertical markets, such as video game consoles, Smart TVs, and PCs, as well as industrial and military applications. Now, however, this technology is breaking into the smartphone and tablet markets in a major way. According to information and analytics provider IHS, shipments of motion sensors in cell phones and media tablets will rise to 4.2 billion units in 2015, up from 1.5 billion in 2011<sup>1</sup>.

The Android, Apple iOS, and Windows 8 operating systems have each created standard API's for developers to leverage the unique functionality of these sensors. However, unlocking the full potential of the sensors to create advanced applications will require better sensor fusion and calibration to improve accuracy, reduce drift, and diminish the impact of external magnetic fields. Device manufacturers, platform vendors and application developers are seeking ways to solve these complex issues in ways that are compatible with today's mobile platforms and ecosystems. The solution must therefore be a combination of sensor requirements, including the need to work with a variety of sensor suppliers and processors across multiple mobile operating systems, maintain low costs, minimize battery usage, and extract the maximum performance out of the available sensors.



For these reasons, Hillcrest Labs recently announced that the company has brought its award-winning Freespace MotionEngine software to the smartphone and tablet markets for the first time. Hillcrest is well known in the motion control field for having sold or licensed its technology to companies such as LG Electronics, Roku, Sony Computer Entertainment Inc., Logitech, Kopin, and many others. Freespace MotionEngine for Mobile is a new embedded software solution that manages and enhances the combined performance of motion sensors commonly found in smartphones and tablets – accelerometers, magnetometers, and gyroscopes. The MotionEngine software enables OEMs to achieve the highest performance in smartphones and tablets when using any combination of motion sensors from a variety of sensor suppliers together with Android or Windows 8. The solution is flexible to run in an application processor or on a separate MCU or sensor hub, enabling solutions to meet each manufacturer’s unique needs. In the end, it will be forward-thinking application developers that will create new and unexpected applications, but here are several examples which should see rapid innovation in the years ahead.

## **Context Awareness**

**In-Car Services:** With advanced motion software, your phone could perceive a car accident, query you with a beep, and send a distress message or an emergency call if you do not respond in a timely manner.

**Personal Assistant:** Advanced motion detects the context of your phone – in your hand, in your pocket, on a table, on a car seat or anywhere else. Your phone can then use this information to change sound profiles, manage battery life and more.

## **Pedestrian Navigation**

## **Advanced motion control coming to smartphones and tablets**

Published on Electronic Component News (<http://www.ecnmag.com>)

---

**Virtual Tour Guide:** By tracking your position in a museum or art gallery, your phone could provide interesting information on what you were looking at, be it a painting in The Met or Elvis' jumpsuit in Memphis. Equally, your phone could guide you to your seat at a sports stadium, or to your train at a busy train station.

**Mall Navigation:** By calculating your exact position and the direction you are facing in a mall, your phone could guide you to your favorite store, or deliver instant-use coupons as you approach a store.

### **Augmented Reality**

**Virtual Golf:** Accurate motion data can turn your phone into a virtual club, tracking club speed, swing rotation, and arc to generate a precise, simulated golf shot. When combined with augmented reality, you could turn any environment – such as the streets around your house or the hills of San Francisco – into your own personalized golf course.

**The Purple Crayon:** Remember the kids' book where a kid had the power to create a world of his own just by drawing on it? With a phone equipped with advanced motion and augmented reality, you could do just that. Imagine virtually drawing on a city wall and having your phone track and upload the drawings. You would then be able to share it socially on the Internet, opening a geocaching type opportunity with friends or even strangers.

### **Health and Fitness**

**Activity Tracker:** Advanced motion allows your phone to track your every move during the day – running, walking, sitting, climbing stairs, and so forth. This means your phone can provide a record of calories burned, helping with weight loss or other fitness goals. Advanced motion is also sufficiently precise to track a runner's gait, noticing changes that may be precursors to possible injury.

**Rehab Monitor:** Phones equipped with advanced motion can provide a precise record of position, angle and movement. For example, physical therapy patients could track their daily rehab routine at home with their phone, measuring increasing flexibility. The results could then be uploaded and shared with doctors and physical therapists, in order to track progress.

### **Gesture Control**

Today, motion-based gesture controls are implemented (in basic forms) on some of the latest smartphones. However, advanced motion makes gesture recognition more accurate, easier to use and allows for a greater range of gestures to be used. The benefits are clear: being able to advance to the next music track without having to unlock, swipe and prod the screen by simply twisting the phone to the side, or moving your phone to 'draw' your signature in the air as your phone-unlocking password for enhanced security and peace of mind. are just a couple of examples.

### **Advanced Gaming**

## Advanced motion control coming to smartphones and tablets

Published on Electronic Component News (<http://www.ecnmag.com>)

---

Advanced motion brings a new level of precision and accuracy to gaming applications. Current tilt-based gaming uses only the accelerometer, resulting in an imprecise record of motion, which while still fun, is noticeably coarse in the level of control afforded. However, with the addition of a gyroscope together with high-precision sensor fusion and calibration, games can be controlled in a more precise and granular fashion, enabling more advanced tilt- and twist-based games. This has proved popular with both advanced and casual golfers, as advanced motion can track the speed and arc of your swing, as well as the angle of the club face, and is therefore able to provide a very accurate replication of your golf shot, with distance, elevation hook and slice all accounted for accurately. In addition, advanced motion technology can enable your phone to be used to control game consoles and other gaming devices.

Between competitive OEMs and app developers, the mobile industry is a hotbed for innovation, and this overview only scratches the surface of the possibilities enabled by advanced motion features on smartphones and tablets. Do you have any thoughts on how else advanced motion could be applied on phones? If so, leave them in the comments below.

### References

Source<sup>1</sup>: IHS iSuppli H2 2011 Consumer & Mobile MEMS Market Tracker:  
<http://www.isuppli.com/MEMS-and-Sensors/Pages/Consumer-MEMS-Continue-to-Thrive-on-Smartphones-Tablets-and-Ultrabooks.aspx> [1]

### About the Author

Chad Lucien is responsible for Hillcrest Labs' worldwide sales, marketing and business development activities. Since joining Hillcrest in 2004, Chad has held a variety of executive level positions encompassing corporate strategy, business development, and general management of the Freespace motion product line. During his tenure, he has licensed Freespace solutions to global consumer electronics companies, developed a wide variety of strategic partnerships, and led numerous product launches in the Freespace product line. Chad has over 15 years of experience in corporate strategy, business development, venture consulting, and investment banking. Prior to Hillcrest, Chad held leadership positions at an interactive TV startup, a venture consulting company, and an investment bank. Chad earned a bachelor of science in commerce with distinction from the University of Virginia, with concentrations in finance and marketing.

### Source URL (retrieved on 10/20/2014 - 2:13pm):

<http://www.ecnmag.com/blogs/2012/03/advanced-motion-control-coming-smartphones-and-tablets>

### Links:

[1] <http://www.isuppli.com/MEMS-and-Sensors/Pages/Consumer-MEMS-Continue-to-Thrive-on-Smartphones-Tablets-and-Ultrabooks.aspx>