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There’s more to MEMS than meets the iPhone

By **R. Colin Johnson < https://www.eetimes.com/author/r-colin-johnson/>** 07.09.2007 0

Score microelectromechanical systems a big assist on the iPhone. That's because Apple couldn't have rotated its Web pages from portrait (vertical) to landscape (horizontal) to match the orientation of an iPhone without using MEMS.

The STMicroelectronics accelerometer used in the iPhone supplies **analog < http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=analog&x=&y=>** acceleration values for all three directions, covering a range of ±2 g's. That makes it suitable not only for sensing orientation but also for applications that Apple could add at any time.

Apple had many accelerometer vendors to choose from, and may have alternative sources already in place, from other MEMS suppliers such as Analog Devices, Freescale, Infineon, Memsic, Bosch Sensortec, Hitachi Metals, Oki Electric Industries and Kionix. Apple, however, chose STMicroelectronics, which also supplies the MEMS accel- erometer used by Nintendo's Wii video-game machine.

“We are breaking the barrier between MEMS and the mobile phone, to make a simpler and more intuitive man-machine interface,” said Benedetto Vigna, general manager of the STMicroelectronics MEMS Business Unit (Geneva). “MEMS enables a user **interface < http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=interface&x=&y=>** that is so intuitive, you don't need a manual to use it.”

STMicroelectronics said it already had cell phone design **wins < http://www.eetimes.com/encyclopedia/defineterm.jhtml?**

http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=GPS&x=&y=> chips to offer a complete navigation solution to OEMs in a multichip package."

All these user interface applications, however, pale in the light of intelligent power consumption, which the oldest accelerometer maker, Analog Devices Inc. (Norwood, Mass.), claims is the hidden gold now being mined by every cell phone maker that has installed an accelerometer.

Fifty percent in five years

"I'm going to go out on a limb here and predict that in five years, 50 percent of the world's **cell phones < http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=cell phones&x=&y=>** will have accelerometers," said Christophe Lemaire, customer marketing manager for consumer products at Analog Devices. "Designers first put an accelerometer into a high-end mobile device to enhance the user interface, but the main **driver < http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=driver&x=&y=>** for its adoption in lower-end handsets becomes the other functions enabled by the accelerometer, such as intelligent power management."

According to Lemaire, intelligent power management harnesses an accelerometer to shut down circuitry that is currently not needed, greatly extending the battery life of portable devices.

"For example, when [the portable device] is being carried in a bag or sitting on a table, you turn the vibrator off, or when it's being held to the ear you turn off the backlight on the display, said Lemaire. "Together, these intelligent power management functions can greatly extend battery life."

Analog Devices said that it has already sold millions of accelerometers to cell phone customers for specific user interface enhancements, but that those same customers are now reaping the benefits of intelligent power management. Apple will likely mimic this development cycle by adding accelerometer-controlled intelligent power management capabilities in software upgrades for the iPhone.

Software upgrades

Besides intelligent power management, there are about a dozen other applications of consumer devices that make full use of a MEMS accelerometer's capabilities, according to Freescale Semiconductor Inc. (Austin, Texas), whose three-axis accelerometers have the built-in

can take that a step further and recognize any orientation that its is in. For instance, tilting it could scroll a Web page, or putting it face down could activate a speakerphone on the back.

Games on handsets

Freescale, too, has had cell phone design wins for its accelerometers for more than a year, mostly with Chinese mobile-phone makers that have added an accelerometer to enable gaming applications.

“We have cell phone makers in China using our accelerometers to enable games on its handsets,” said Rick Rohrkemper, inertial sensor product line manager at Freescale. “One game lets you roll dice by shaking the handset; another lets you shake it to [activate] a fortune teller.”

Freescale has also landed Samsung as a customer for an **MP3 < http://www.eetimes.com/encyclopedia/defineterm.jhtml?term=MP3&x=&y=>** player that uses its three-axis accelerometer to control both the direction and the speed of scrolling through a playlist by tilting the unit forward or backward to change direction, with the scrolling speed determined by the angle of the tilt.

 ***See related image***

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