

Greg Galvin,
President and CEO
of Kionix

Kionix's big plans for the future

Kionix is one of the key players in accelerometers for consumer applications. According to Yole Développement, Kionix's overall market share reached 10-15% in 2010.

Yole Développement: What is your vision of the accelerometer industry? How do you explain Kionix's success in this context?

Greg Galvin: Consumer electronics currently comprises about 90 percent of Kionix's revenues and includes applications such as mobile handsets, game controllers, laptop hard-disk-drive protection and tablets. If you look at our consumer electronics market share in unit volumes, we are one of the top three suppliers in the industry.

In 2010, our accelerometers were designed into a number of popular high-volume applications such as the Microsoft Kinect for Xbox 360, Sony Move controller, Motorola Xoom tablet—which Consumer Reports recently called Apple's most serious contender for the tablet market—and Motorola Droid X smart phone.

The question is: why Kionix? We think there are several reasons.

Technological leadership and focus have helped us to get where we are today. In terms of leadership, we were a pioneer in the development of MEMS devices for consumer-electronics products. We have led the industry in a number of critical areas over the years, such as size reduction and embedded features. And, because MEMS motion sensors are all we do at Kionix, we have a laser-beam focus. Where we've diversified is in evolving a broad product line of accelerometers, which has allowed us to address more customers—a true testament to our processes and production capabilities.

In terms of software, it is fair to say that we have been a leader in this critical area as well. Whether embedded algorithms, firmware or software, we have placed a high priority on developing software assets that help our customers to integrate our inertial sensors into their designs. We allow our customers to quickly and easily achieve the functionality—and the performance—they require. While this has been an important part of our overall product offering to date, it will become even more important going forward as we start to see more complex sensor combinations being adopted by our customers. The need for higher-order software is only going to grow in order to meet the demands of these more complex systems working under several operating systems. Beyond the features and functionality of our products, our customers place a high value on product quality.

We have heard on many occasions that Kionix is viewed as having some of the best product quality in the industry. I believe this is the result of the focus I mentioned earlier. In addition, we have our own fabrication facility in Ithaca, NY, solely dedicated to MEMS sensor fabrication, which gives us control over the key elements of production and, most importantly, quality. We both fabricate our sense elements and conduct 100% final testing in house. Those two things allow us to tightly control two of the most critical elements in the entire process. Plus, having our fab at corporate headquarters means that everyone involved in product design and development, operations, marketing and finance is real-time with the lifeblood of the company. If an issue arises, Tim Davis, our CTO and co-founder, or I—or any other key decision-maker—can simply walk to the production facilities and immediately begin assessing the situation. You'd be amazed at how helpful that can be, especially when we are producing products in the hundreds of millions. We eliminate many of the time and communication challenges that others face when production and testing are all outsourced.

I think another reason for our growth has been our flexibility and responsiveness to our customers' needs. This goes beyond our software assets. It is our willingness to work closely with our customers to help them with their designs and implementations. It means listening to them and understanding what they truly require. The next all-important step is to actually respond in a way that meets their needs. So, whether that response is a new design, new software or unique testing requirements, we have shown our readiness to engage with our customers in a personalized fashion. Many of the consumer devices with which we work are complex, and a one-size-fits-all approach simply will not work. Our customer-centric approach—which generates ongoing customer loyalty—continues to play an important part in our success.

YD: Kionix was acquired by ROHM Semiconductor in late 2009. What was the impact of this acquisition for Kionix? How do you define collaboration between Kionix and ROHM?

GG: The acquisition by ROHM has been very significant. First, it has changed the outside perception of Kionix from a successful and

interesting small company to a major worldwide competitor with strong financial fundamentals. That changes the dynamic with our customers in a very positive way. ROHM has provided us the financial resources we need to expand our business in just about every way. This includes our production capacity, our supply chain, our engineering resources, and our sales and marketing efforts.

One of the exciting synergies to develop through the acquisition is our ability to address our customers' needs for multiple sensors in a way that distinguishes us from much of our competition. Not only can we provide the inertial sensors, accelerometers, gyros and magnetometers, but now, together with ROHM, we can also provide a wide range of other sensors that are critical components in mobile handsets, tablets and other products. Sensors such as hall-effect sensors, temperature sensors, ambient light sensors, proximity sensors, IR LEDs, and even bio-sensors for medical use, comprise the Kionix-ROHM portfolio.

When you combine this array of sensors with the drivers, firmware and software that make them easier to implement, you have a very powerful total sensor solution platform from essentially one source. Over time, we expect this to become increasingly important to our customers, and we expect it will continue to put us in a strong competitive position.

YD: The solutions provided by MEMS manufacturers have become more and more intelligent and now, rather than a "device," we speak about "module of solutions." What is your vision of the MEMS market evolution? Is Kionix working on such developments?

GG: The need for MEMS sensor suppliers to provide integrated solutions for mobile platforms is vital, so, yes absolutely, we are working on these kinds of developments. Sensors continue to penetrate the mobile-electronics world in innovative ways. Consumer electronics has driven the broad adoption of sensors for functions ranging from gaming and user-interface control to personal navigation. Sensors have become the fundamental building blocks for electronic systems specific to the consumer, industrial, health care and automotive markets.

Recent examples such as Apple's iPhone, Google's Android OS, Microsoft's Windows 7-based tablet PC's, Nintendo Wii, and Sony



MEMS accelerometers can help turn a smartphone into a universal multimedia device that lets users make on-screen selections, download files or play motion-based games. (Courtesy of Kionix)

Move illustrate how sensors have become integral to the design and operation of an electronic device. However, each platform carries its own unique set of sensor integration challenges that must be overcome in order to maximize functionality and user experience. Because of this, we don't believe there will be a universal solution.

There will be many different platform solutions required by the market. However, we have always felt sensor integration will follow an evolutionary path. First are the embedded solutions, which is where specific, fairly simple functions are performed at the sensor level. This is fairly common today. The next level comprises embedded intelligence in which the sensor is coupled with some type of MCU core; that MCU processor might perform more complex functions that require higher sampling rates but minimize bus traffic, for example. The third level describes integrated sensing with multiple inertial sensors combined in a single package with an MCU or DSP core. We refer to this as "sensor hub" or "sensor fusion." While all three levels offer their own respective advantages and disadvantages, they have a common goal, which is to achieve the highest performance for the task at hand with the lowest current draw and the easiest implementation.

While sensor integration, combination sensors, sensor fusion and the like attract a lot of attention and are of true importance to the market, we must not lose sight of the fact that the vast majority of sensors being consumed are single sensors. Price and power consumption are critical factors in

most consumer electronics, which suggests that individual sensors for specific functions will continue to be a major portion of the marketplace for some time to come.

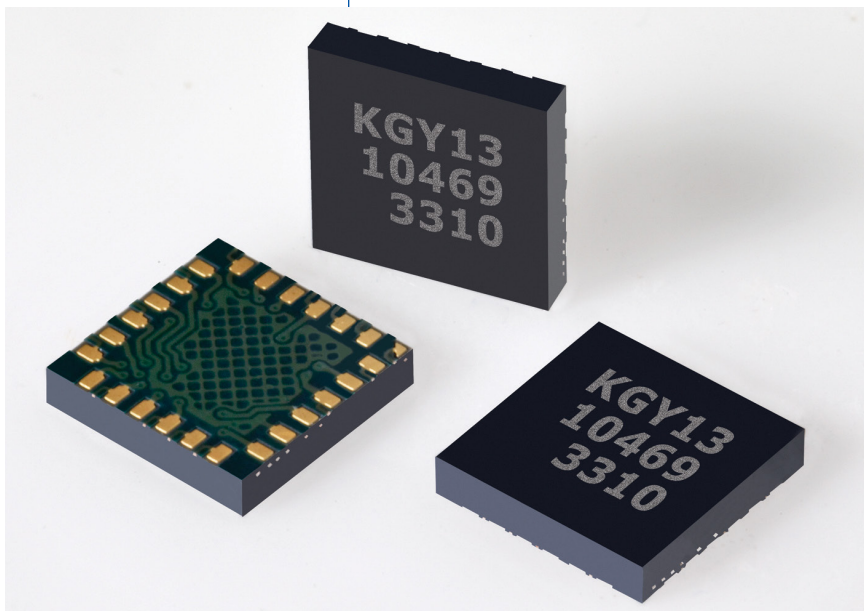
YD: What are Kionix's expectations for 2011? We've heard about a new 8" fab in the US. Can you tell us more about it?

GG: We expect 2011 to be another year of solid growth for the company in terms of revenue and profit as well as strategic advancement. We have been investing in every aspect of our company, and I expect those investments to pay off this year. We have everything in place to grow to the number-two accelerometer supplier this year and also to begin our entry into the consumer gyro market.

The accelerometer industry will continue to be very competitive in 2011. We see the size of accelerometers shrinking as our customers' devices become increasingly smaller; at the same time, they are challenged to find space for bigger batteries. Where 3x3x0.9mm packages are standard today, 2x2x0.9mm packages will be more prevalent a year from now.

Price, power consumption, performance and size will remain the most important competitive metrics in 2011.

Regarding our sensor fabrication, we are well into the transition to 8" in Ithaca in addition to an equivalent facility in Kyoto, Japan. But as you know, wafer size is only one element of achieving and maintaining world-class cost levels. Many other factors enter the equation, and we are intelligently addressing all of them with the support of ROHM.



Gyro Group (Courtesy of Kionix)

"The acquisition by ROHM has changed the outside perception of Kionix from a successful and interesting small company to a major worldwide competitor with strong financial fundamentals," explains Greg Galvin.

We are continuing to expand our test capability in Ithaca in 2011. As part of those plans, we also intend to add between one and two ROHM facilities to our supply chain over the next 12 to 18 months. The duplicate 8" facility built by ROHM in Kyoto will enter production early in 2012. This will make us one of the very few companies in the MEMS industry with dual captive 8" fabs. Combined with everything else we are doing, this will more than double our capacity year-over-year for the next three years.

YD: What is Kionix's vision regarding combo sensors development? SoC? SiP? Do you think that combo sensors will have long- or short-term impact?

GG: We are driving our combo sensor strategy to address both the 3-axis accelerometer and 3-axis magnetometer (e-compass) devices as well as the 3-axis gyroscope and 3-axis accelerometer combo chip, as well as so called "9-axis" devices that combine accelerometer, gyroscope and magnetometer. We plan to leverage highly integrated SoC mixed-signal technologies to manage the MEMS and magnetic sensors while combining them in SiPs. While the demand for combo sensors will start this year with initial designs, it will ultimately become the primary solution for handsets. We believe the likely sweet spot for these sensors in smartphones is a gyro/accel combo with an external magnetometer for maximizing placement flexibility. Feature phones will most likely maintain an accel-only configuration for portrait and landscape screen rotation and for tap and device position-awareness. We envision supporting the sensor-fusion processing in these devices in a number of ways, as I described earlier. Given the considerable forecast from firms such as Yole Développement on the market size for smartphones, gaming, and soon, smart TV remote controllers, the industry should certainly be large enough to support

several suppliers, including Kionix.

Also as mentioned earlier, combination sensors attract a great deal of attention but are inherently larger, more expensive and consume more power than their individual components. As such, there will have to be strong driving forces from the customer side for them to achieve widespread adoption. Gyroscopes are a hot commodity that have generated a great deal of excitement in our industry. At the same time, we are not yet seeing applications for which only a gyroscope will fit the bill. We're waiting to see the advent of some "killer" end-user feature that takes full advantage of gyroscope functionality to power the market in a significant way. Combo-sensors and gyros may one day begin to drive the industry as vigorously as accelerometers—but the jury is still out as to when or if this will occur.

YD: What are some of the new ways that MEMS inertial sensors will advance the user experience with consumer devices?

GG: Context awareness—a device "knowing" how it is being used—is a key benefit of sensor technology, and it's something we will see continuing to grow in the near future. A mobile handset might "tell" you if it is in use, reveal its orientation, indicate if it is moving, and, with the addition of location-based services, identify where it is located.

Context awareness is one of many new feature-sets that we will see commercialized for cell phones. Video games will support even more immersive game-play for people of all ages. And, the somewhat neglected remote controller will morph into a universal multimedia device that lets users accurately make selections on a screen, download files or play a motion-based game. These very-sophisticated capabilities can often be accomplished by embedding algorithms directly in the sensor's firmware. With extensive experience in the interpretation of motion, sensor suppliers like Kionix will increasingly leverage embedded efficiencies that complement our hardware to meet demand for new motion-sensing features.

www.kionix.com

Dr. Greg Galvin is President and CEO of Kionix, a wholly owned subsidiary of ROHM Co., Ltd. and one of the world's top three suppliers of silicon-micromachined inertial sensors. He founded Kionix in 1993 to commercialize a novel micromechanical technology pioneered by researchers at Cornell University. Prior to this, he served Cornell for nine years, first as Deputy Director of the Cornell Nanofabrication Facility in which micromechanical research was conducted and later as Director of Corporate Research Relations, focusing on technology transfer. Dr. Galvin has a B.S. in Electrical Engineering from the California Institute of Technology, a Ph.D. in Materials Science and an M.B.A. from Cornell University, and is a leading authority on MEMS product innovation.