Silicon Valley Still an Auto Industry Draw


While the center of gravity of the automotive electronics industry has shifted, especially over the last decade, away from Detroit toward Germany and Japan, carmakers worldwide continue to be drawn to Silicon Valley, home to some of the world's most innovative electronics and Internet companies such as Intel, Apple, Google and Facebook. Renault-Nissan, which opened an office in Mountain View this summer, now joins a growing list of carmakers-including BMW, Mercedes, Volkswagen, General Motors and Honda—with R&D facilities in Silicon Valley, the Santa Clara Valley south of San Francisco, California. Ford just announced plans to open a new R&D office in the first quarter of 2012. Bosch and Leoni also have offices in the area.

During a visit to Silicon Valley in December, I asked Dirk Rossberg, who heads the BMW Group Technology Office USA in Mountain View, what he likes about the area. “Not only are there a lot of great companies but there are a lot of start-ups; we try to adapt their ideas to automotive solutions,” he said. “And there is the culture of having a melting pot of nations here and great universities like UC Berkeley, UC Davis and Stanford. There is generally a high level of education and a spirit of free thinking. Even the climate here in the valley makes a positive impact to creative thinking.” About 30 people work at BMW’s Mountain View facility, focusing mainly on infotainment, connectivity, smartphone apps, electrification and driver assistance systems.

Powertrain Electrical Engineering Update

With GM's Kent Helfrich and Ford's Craig Stephens

Several weeks ago I interviewed two of the world's top electrical engineers about the state of powertrain engineering. Kent Helfrich is executive director for electronic controls and software at General Motors. Craig Stephens is assistant chief engineer for global powertrain control systems at Ford. We talked about sensors, actuators, controls, electronics hardware and software.

Sensors

The internal combustion engine will continue to be the dominant source of traction energy and electrical energy for decades to come, so the market for engine control sensors, while mature, will not soon go away. But with tougher standards looming for emissions from diesel engines, diesel exhaust after-treatment sensors are receiving a fair amount of attention. “Working with our suppliers we are going to be looking for ways to get better control of emissions, better diagnostics, and try to reduce the cost of some of these after-treatment systems,” said Ford's Mr. Stephens.

For example, more sophisticated NOx (nitrogen oxide) sensors are in the works for diesel engines. “OEMs require a detailed understanding of how noise, humidity and ammonia may affect the NOx sensor and cause it to give you incorrect information,” said Mr. Stephens. NOx sensors are used to control the exhaust after-treatment process.

Ford and Microsoft Back Together to Fix MyFord Touch

Sometime after Ford Sync 1, “Powered by Microsoft,” according to the tag line, was completed Ford and Microsoft parted ways. Ford brought MyFord Touch (Sync 2) to market using Bsquare, a small ($97 million in 2010 sales) engineering services company and Windows Embedded operating system distributor located in Bellevue, Washington. Bsquare designed the MyFord Touch interface, wrote most of the software, and provided systems integration services.

According to someone close to the Sync developments who was not authorized to talk to The Hansen Report, “Ford put Bsquare into a situation that made it difficult for them to succeed. Bsquare was supposed to be integrating the work of a dozen or more suppliers. They had a contract with Ford but didn’t own any of the contracts with the other suppliers. Ford owned those contracts. People started finding issues with the Microsoft portion of Sync 2, so some senior people at Ford went to talk to senior Microsoft people, and Microsoft agreed to work with them again. Microsoft is the software integrator for the recent upgrade for MyFord Touch and MyLincoln Touch announced in November. Bsquare is still working on the project, but Microsoft is back in the lead.” Microsoft has well over 100 programmers assigned to Sync 2 work, according to the source.

Ford has to be relieved to get Microsoft back on the job. Since August 2010, when MyFord Touch was launched on the Ford
Powertrain...

Diesel exhaust particulate sensing, which monitors when the particulate filter is full, is also receiving some attention. “This is going to be a real challenge, because the particles vary enormously both in size and other physical characteristics, and that makes them very difficult to measure,” noted Mr. Stephens. The particulate filter is typically equipped with a sensor to measure its differential pressure.

The problem of particulates is not confined only to diesel engines; gasoline direct injection (GDI) engines also can generate particulates, especially during cold starts. Port-injected engines generate particulates too, but not as much as GDIs. Rather than adding sensors and expensive exhaust after-treatment solutions, Ford will first try to manage combustion by using the engine control system to minimize the generation of particulates.

The idea to use in-cylinder pressure sensors as part of a feedback control loop to manage the combustion event has been talked about for decades. “A cylinder pressure sensor would give you a direct measure of combustion torque, from which it is easy to derive engine out torque,” suggested Mr. Stephens. “Ask any powertrain engineer, combustion sensing is always the Holy Grail.”

Cylinder pressure sensors to monitor diesel engine combustion are in limited use at Ford. General Motors uses them in some diesel engines in Europe. “We use them when we really have to have strong control of the combustion process, so the fuel can burn cleanly over the lifetime of the vehicle,” said GM’s Mr. Helfrich. “I think you will see more exotic combustion control regimes and in-cylinder pressure sensing in diesel engines in order to meet future emissions requirements.”

Cylinder pressure sensors are expensive and have not yet proven durable enough for use in gasoline engines. “At GM, we strive for simple elegance. If they’re not necessary [in gas engines] we’re not going to put them in,” said Mr. Helfrich.

Rather than adding new sensors to meet each new engine control challenge, Mr. Helfrich would prefer to use better electronics and better signal processing to wring more information from the well-proven, robust sensors already in wide use.

“Our knock sensor used to give us an analog output; now we do digital signal processing on the same knock sensor. With more advanced electronics and software we are able to get higher fidelity information.”

Mr. Stephens agreed: “If there is any trend around sensors it is ‘how can we infer other useful information from the sensors we already have?’”

Actuators

The transition from port injection to direct injection is already well underway. With individual injectors much closer to the combustion chamber, control of when and how much fuel is delivered is much more precise. All of GM’s four cylinder and six cylinder vehicles have it. And the company has announced that all of its next-generation small block V8s will be direct injection as well.

In gasoline engines the big trend continues to be downsizing and boosting. Between 2010 and 2011, GM quadrupled sales of turbocharged engines, largely due to Chevy Cruze customers, 70% of whom opted for the boosted engine. Buick Regal customers choose the turbocharger option 30% of the time.

Turbocharged engines are also hot at Ford, whose EcoBoost engines are selling very well. In 2013 Ford expects to produce 1.3 million EcoBoost engines for use in a number of vehicles, from small cars to trucks. Mr. Stephens expects that in the future turbochargers will have more control elements. “Control over the turbocharger waste gate will certainly come for gasoline engines. And in diesel engines where temperatures are lower, we will see variable nozzle and variable geometry turbochargers.”

Another trend, according to Mr. Stephens, is smart actuators. Carmakers have the choice of locating the power semiconductors that drive high-current actuators such as the ignition coil or EGR valve either within the powertrain ECU or as part of the actuator. Packaging the driver with the actuator reduces the heat generated within the ECU and potentially shortens the high-current cable lengths, saving cost and weight while minimizing electrical noise.

Dual-Core Micros Coming

Mr. Stephens and Mr. Helfrich agree that dual-core microprocessors are in their plans for the future. “It’s the same for any new microprocessor: as soon as they are available engineers will rush off and figure out how to utilize every last ounce of its capability,” pointed out Mr. Stephens.

“The pace of adoption of dual-core micros will be determined by the availability of tools and processes that can manage the additional capability.”

Managing Complexity

The number of data exchanges and the interdependency among vehicle systems has grown exponentially in recent years, and that has hugely complicated the engineering process. If a single system performs badly, the rest of the vehicle could be affected. Much more can go wrong.

Start-stop will be available in every Ford car line by the end of 2012. “Previously, when you turned a car engine off, the vehicle assumed the engine has stopped, that the key will soon come out and the customer will leave the vehicle,” said Mr. Stephens. “With start-stop you now have a new state where the engine is continued on page 8
Silicon Valley...

“With so many early adopters, Priuses and Nissan Leaf are very common here in the Valley,” said Dr. Rossberg. According to National Public Radio, the San Francisco Bay area leads all other regions of the United States with the highest ratio of hybrid and electric vehicles: 5.4% of all cars sold, compared with the national average of less than 3%. The electric vehicle manufacturer Tesla is nearby, and BMW cooperates with them as it shops for technology that might be helpful to BMW. Toyota and Mercedes own equity stakes in Tesla but BMW does not.

Among some of the earliest technologies BMW sourced in Silicon Valley is its iPod adapter, introduced in 2004, which allowed you to operate an iPod using the car’s controls. Another was Google Local Search, which uses Google’s database and search capability to locate and recommend nearby services, restaurants for example, and send the location information back to the car’s navigation system. BMW also worked with Google to develop its Send to Car feature. Send to Car allows you to research a destination on Google Maps at home or elsewhere and send the results wirelessly to the onboard navigation system in the car, which provides the turn-by-turn route guidance.

I also visited the Mercedes-Benz Group Research and Advanced Engineering center in Palo Alto, home to about 60 employees plus approximately 20 interns and contract workers. “Not only does Silicon Valley have many companies from startups to big players that can influence car buyers and the automotive industry, it is also a unique place where there is more of a willingness to take on risk, to try things that are new,” said Luca Delgrossi, director of driver assistance and chassis systems for the United States. Focused on research and predevelopment, Dr. Delgrossi’s group develops and optimizes driver assistance systems for the U.S. market. For example, camera-based automatic sign recognition is already available in Europe, where road signage is standardized, but not yet in the U.S. where traffic and speed limit signs are much less uniform. His group also participates in various U.S. government-funded research activities such as the Department of Transportation’s V2V Safety Pilot.

Mercedes is on a measured, one-step-at-a-time path that decades from now will lead to fully autonomous vehicles. Toward that end, Dr. Delgrossi appreciates the proximity in Silicon Valley to knowledgeable 3D-map providers such as Google and Earthmine, and to suppliers “capable of producing cameras so tiny you could use them in a camera array, each one with a different purpose, for example one for night and one for daytime use.” While not in Silicon Valley, Dr. Delgrossi also has a good working relationship with Denso Wireless Systems in southern California, which produces V2V transceivers. “Denso is an excellent company whose equipment we use a lot,” he said.

Dr. Delgrossi and two of his team members took me for a ride in a CLS-550 Mercedes equipped with a prototype 6D Vision system, which uses stereo cameras and proprietary algorithms to identify pedestrians and obstacles ahead of the vehicle in real time. The system estimates the location in three dimensions and absolute velocity in three dimensions of potential obstacles and pedestrians by tracking characteristic feature points in the digital image captured by the cameras. Limiting the number of points in the 400k-pixel digital image that need to be tracked, together with new hardware and highly optimized algorithms, provided the breakthrough necessary for the computer to process the data in real time. Invented by a team in Germany led by Mercedes researcher Uwe Franke, the system was one of three finalists for the prestigious German Future Prize for technology and innovation awarded in 2011.

Dr. Delgrossi’s team in Palo Alto is developing solutions based on the technology for the U.S. market. “Stereo vision systems are expected to be the next big step in driver assistance systems leading to autonomous driving,” said Dr. Delgrossi.

When visiting Silicon Valley facilities there is no need to pack a suit, tie or dress shoes. Most of the executives I met with were comfortably dressed in sneakers and jeans. Project manager Bill Allan could easily have been mistaken for a young college professor. Mr. Allan works on infotainment and telematics research and engineering at Mercedes’ Palo Alto facility. He explained why he likes what he is doing: “We get the culture and forward thinking of Silicon Valley with the stability, momentum and backing of a large successful corporation; it is a perfect mix. We try to push the envelope and be open to new ideas and concepts and we are careful not to reject ideas too quickly.

“Our charter is to form business relationships with local companies. That’s why we’re here, to absorb this start-up culture. We keep an eye on new software services, new apps providers, even the start-ups doing things like material science. We are constantly evaluating any technologies that might fit into our cars. When we see something promising, we wave a flag or go meet with Germany and let them know there might be some opportunity here.” Mr. Allan also works closely with Apple.

Executives from Mercedes are active in the venture capital community in Silicon Valley. For example, they attend some of the sessions engineered by the Plug and Play Tech Center, a technology incubator that brings startups and VC firms together. GM, NAVTEQ and Volkswagen are listed among the Center’s corporate partners. The Plug and Play Tech Center has offices in Sunnyvale, Redwood City and Palo Alto.

BMW also works closely with the venture capital community. “On Sand Hill and Page Mill Roads you will find 80% of the venture capital firms working in the United States,” said Dr. Rossberg. They often show up here at the office with a new company asking us to evaluate their technologies and ideas.” BMW has close ties with established Silicon Valley companies as well, for example Google, Apple, Facebook, Nvidia (graphics processors) and Qualcomm.

We Want to Hear from You

If there is a company that you’d like to see profiled in The Hansen Report—whether it’s an established global market leader or an up-and-coming player with promising new technology—we want to know about it. Have an idea for a story we should develop? Let us know. Contact Paul Hansen at phansen@hansenreport.com or 603-431-5859.
The Hansen Report on Automotive Electronics, Portsmouth, NH USA  www.hansenreport.com

Page 4, December 2011/January 2012

The Company Profile

Lear Corporation

Electric Power Management Systems

Lear Corporation

2010 Sales: $11,954 million
Interest Expense: $55.4 million
R&D: $83 million or 0.7% of sales
Capital Spending: $193 million
Operating Income: $538.4 million or 4.5% of sales
Net Income: $461.4 million or 3.9% of sales
Cash Flow from Operations: $621.9 million

This profile focuses on Lear’s $2.6 billion Electrical Power Management Systems (EPMS) business segment, which makes electrical distribution systems and body electronics.

Background

Lear Corporation’s history began in 1917 with the founding of American Metal Products, a seat frame supplier to the automotive and aircraft industries. By 1941 the company was serving seven automotive OEMs including GM, Ford, with 18%; BMW, with 11%

With the acquisition of United Technologies Automotive in 1999 and the terminal and connector supplier Grote & Hartmann in 2004, Lear expanded its product line to include complete automotive electrical distribution systems and electronics. The company today operates two primary business segments: Seating and Electrical Power Management Systems (EPMS). EPMS today accounts for 21.4% of Lear’s sales.

Lear’s balance sheet is strong, showing good liquidity following its emergence from bankruptcy in November 2009 and recapitalization. On October 1, 2011, Lear had $1.7 billion in cash and just $695 million in long-term debt, half of which is not due until 2018. The other half is due in 2020. Interest payments declined in 2011 to $40 million from $55.4 million in 2010.

Still, Standard and Poor’s gives Lear a corporate credit rating of BB/stable, which reflects the rating agency’s view that Lear is not vulnerable in the near term but faces major ongoing uncertainties to adverse business, financial and economic conditions. BB is two rungs below investment grade.

Lear expects to continue its sales growth in emerging markets. Sales in the BRIC markets have grown from $800 million in 2006 to about $2.4 billion in 2011, a 24.6% annual growth rate. By 2011 China alone will account for $1.3 billion of Lear sales.

Lear spent just $83 million on R&D in 2010, or 0.7% of sales, less than competitors Johnson Controls’ 2.1% of sales, Faurecia’s 5.0% and Toyota Boshoku’s 3.3% of sales for R&D.

The Company Profile Continued

**Major U.S. Seat Manufacturers 2011 Quality Survey**

The quality of Lear seats sold in the U.S. market has improved from 10.3 problems per hundred vehicles in 1999 to 4.7 per hundred in 2011.

<table>
<thead>
<tr>
<th>Seat Manufacturer</th>
<th>Problems per hundred vehicles</th>
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<tbody>
<tr>
<td>Lear</td>
<td>4.7</td>
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<tr>
<td>Johnson Controls</td>
<td>6.0</td>
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<tr>
<td>Toyota Boshoku</td>
<td>6.0</td>
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<tr>
<td>Magna</td>
<td>6.4</td>
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<tr>
<td>Faurecia</td>
<td>8.7</td>
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Source: 2011 J.D. Power and Associates' U.S. Seat Quality and Satisfaction Study

**Lear EPMS Engineering Centers of Excellence**

While engineering for some of these product areas is done in multiple locations, each of the centers provides global leadership.

<table>
<thead>
<tr>
<th>Product Line</th>
<th>Location</th>
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<tbody>
<tr>
<td>Audio</td>
<td>Kronach, Germany</td>
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<td>Body electronics</td>
<td>Valls, Spain</td>
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<tr>
<td>Gateways</td>
<td>Kronach, Germany</td>
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<td>Hybrid</td>
<td>Southfield, Michigan</td>
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<tr>
<td>Lighting</td>
<td>Kronach, Germany</td>
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<td>Smart junction boxes</td>
<td>Valls, Spain</td>
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<td>Terminals and connectors</td>
<td>Remscheid, Germany</td>
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<td>Wireless</td>
<td>Southfield, Michigan</td>
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<td>Wiring</td>
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**Lear Corp. Major OEM Customers Ranked by Sales**

GM, 21%
Ford, 18%
BMW, 11%
Volkswagen/Audi
Fiat
Renault-Nissan
PSA Group
Mercedes-Benz
Hyundai
Jaguar/Land Rover
Volvo
Chrysler

**EPMS**

Formerly known as the Electrical and Electronics Division, the Electrical Power Management Systems business segment of Lear produces wiring, connectors and terminals, which together account for about 70% of sales. Despite the segment’s name, Lear produces wiring for the whole vehicle—wiring for power but also for signals. In a typical vehicle, 75% to 80% of the wire circuits carry signals. Electronics, mostly body electronics modules including smart junction boxes, accounts for the remainder of EPMS sales, about 30%.

Lear is presently searching for a permanent successor to Raymond Scott, who left his job as president of EPMS to become senior vice president of Lear and president of the Seating segment. Frank Orsini is serving as interim president of EPMS.

**15% Near-Term Annual Growth**

With the company’s costs restructured post-bankruptcy, Lear is anticipating its EPMS business will grow considerably faster than the market. The company predicts EPMS sales growth of 15.4% per year, from $2.6 billion in sales in 2010 to $4 billion in 2013. It expects to hit $5 billion in sales by mid-decade. Further, Lear expects to increase EPMS operating margin from 4.7% in 2010 to 7% or 8% by 2013. EPMS had an operating margin of 5.7% in the first nine months of 2011.

Lear is interested in acquisitions but only small ones, for example companies with similar product lines, but with access to customers and business that Lear isn’t presently winning. To meet its near term goals, Lear is relying on increased electrical/electronics content per vehicle, including electric and hybrid vehicles, and a more competitive cost structure.

Ninety percent of EPMS employees are located in 14 low labor-cost countries. The EPMS segment employs 220 engineers in India, 200 people in China and 300 people in the Philippines. According to the Philippine Department of Labor and Employment, engineers there earn between $2 and $4 per hour.

Mike Fawaz, vice president of global electrical and electronics engineering, noted three key components of EPMS growth strategy: “First, Asia is a strong market for Lear; we are growing fastest there. Two, we continue to improve our manufacturing footprint, improving our cost competitiveness. And on the engineering side, we continue to provide competitive and innovative products to our customers.”

Lear is counting on strong growth in what it calls Advanced Efficiency Systems, its product category that encompasses any EPMS products associated with hybrid or electric vehicles or with improving efficiencies in conventional vehicles. (See High Power Products in the products listing on page 6.) Lear anticipates shipping $250 million worth of these high power products in 2013 and $500 million by mid-decade.

The market for wiring, terminals and connectors in all types of vehicles, which accounts for 70% of EPMS sales, continues to grow faster than global vehicle production. “We continue to see more [wire] circuits in the vehicle,” said Mr. Fawaz. Complete automotive wiring harnesses have anywhere from 300 to 1,800 circuits and are sold to carmakers at prices that range from $300 to $2,000 per vehicle.

One important factor in EPMS’ favor is its closeness to BMW, one of its largest customers. Because BMW often pioneers new electrical and electronics technology well ahead of other carmakers, serving BMW has put Lear at the forefront of some technology developments, for example gateways, adaptive headlights and Ethernet video networks.

**Strengths**

According to Lear, two important capabilities set it apart from other wiring companies. First, unlike some of the wiring suppliers it competes with, Lear manufactures both electronics and wiring. “Knowing electronics and knowing wiring, terminals and connectors, we can optimize the whole distribution system architecture to reduce cost, weight, size, all while improving quality,” said Mr. Fawaz. “We can think through the tradeoffs between module integration, multiplexing and hard-wiring to give our customers the best value.”

According to Bill Presley, EPMS director of global wire engineering and responsible for wiring architecture, Lear is one of four wiring harness suppliers capable of optimizing distribution system architecture, including the makeup and level of...
integration of body control modules and junction boxes. The other suppliers who can optimize are Delphi, Yazaki and Sumitomo. “Leoni and AFL provide wire harnesses but they are not architecture designers; Bosch and Continental provide boxes, but not the wires,” he said.

The second distinction, according to the company, is the way Lear is able to handle the multiple changes that are typical with automotive wiring projects. “In automotive wiring, a customer can have 10,000 changes per year. We do them faster and more reliably than any of our competitors,” said Mr. Fawaz.

“We can take input from any of our customers regardless of which tools they use. We process changes the same way every time. Everyone in the plant gets the information, as does purchasing, management and engineering.” Lear uses a combination of off-the-shelf and internally developed computer tools to rapidly and effectively implement wiring design changes.

Promising New Products
◆ Solid-State Smart Junction Boxes

Mr. Fawaz expects strong sales for Lear's solid-state smart junction boxes (S^3JB), which, like other smart junction boxes, combine power distribution with a number of body electronics functions, but use smart MOSFET circuits in place of fuses and relays. “We use FETs as circuit protection or fuses,” said Mr. Fawaz, “so the [junction] box can be configured for different vehicles just by changing the software. And you can control the loads with on-off or pulse width modulation.”

Since MOSFETs are far more precise than fuses, carmakers no longer have to overrate the wiring, which was typically rated at 135% of the rating of the fuse. “You can eliminate about 30% of the wire because of that,” pointed out Mr. Fawaz. Lear uses MOSFETs from Infineon, Freescale and STMicroelectronics.

Lear is already shipping S^3JBs to the electric vehicle maker Fisker Automotive, who plans to build 5,000 cars in 2012. Additionally, Lear has won contracts to develop S^3JBs for two large carmakers, one in North America and one in Europe. Those contracts could lead to high-vol-
Application, three of the engine mounts wanted vibrations. In the German form like audio speakers, counter the unmounts, which are transducers that perform like audio speakers, counter the unwanted vibrations. In the German application, three of the engine mounts are active. The Lear controller takes input from engine sensors via the CAN bus and drives the active mounts. Production will begin in the spring of 2012.

**Active Engine-Mount Controller**

With a German carmaker, Lear is helping to pioneer active engine mounts in vehicles with six- and eight-cylinder engines with cylinder deactivation. To save fuel—up to 8% on a V8 engine—at highway cruising speeds and at other times when the engine is operated under partial throttle conditions, two or four cylinders are deactivated. But this can cause the engine to become unbalanced, which creates noise and vibration that can diminish the driving experience. Active engine mounts, which are transducers that perform like audio speakers, counter the unwanted vibrations. In the German application, three of the engine mounts are active. The Lear controller takes input from engine sensors via the CAN bus and drives the active mounts. Production will begin in the spring of 2012.

**RKE**

Lear has been producing remote keyless entry products for more than 20 years and now also makes passive entry and passive start systems, as well as two-way RKE. Next year Lear will launch a two-way RKE system with an Asian carmaker.

A pioneer in wireless RF communications, Lear is working on passive entry systems that would operate in the 3 to 6 gigahertz band. Today's systems operate at 433 megahertz.

“Today's systems, which must detect transmissions from inside or outside the vehicle, require as many as four antennas, one in each door, one in the interior and one in the trunk,” said Mr. Fawaz. “The higher bandwidth will let carmakers get rid of three antennas leaving only the one in the interior.”

**Integrated Power Module (IPM) for Electric Vehicles**

Lear has developed a lab prototype for its patented integrated power module that integrates four stand-alone modules into one. “Today you have separate boxes for the inverter, the charger, the DC-to-DC converter and power distribution,” said Mr. Khan. “With the IPM all the interconnects between those four boxes go away. You are eliminating part of your harness. And you are eliminating cold plates, which require plumbing to a coolant reservoir. With the IPM you need only one cold plate,” he said. Integration yields more than 20% improvement in cost and weight and significantly higher efficiencies. The integrated power module will be ready for production in 2014.

**Hybrid and Electric Vehicle Sound Generator**

Electric and hybrid vehicles make very little noise at low speeds so Lear has developed a sound generator to alert pedestrians that a vehicle is approaching. “Our unit can generate whatever sound the customer requires, whether they want to simulate a four, six or eight-cylinder engine or some other sound,” said Mr. Khan.
Powertrain...

New control algorithm into production, powertrain engineers must not only test and validate the code and ensure its interoperability with existing code, but they also need to consider the efficiency of the code, and how much silicon it requires.

“The efficiency of the auto-coding process has improved enormously,” said Mr. Stephens. “I’ve been hearing most people talk about 10% or even zero code growth. We have a number of pieces of code in production that were fully auto-coded. We’re excited about what that’s been able to save us in terms of money and time.”

Mr. Stephens also thinks that Autosar is part of the answer to rising complexity. “With different suppliers [working] on different subsystems, Autosar tools will help us manage all of the data. Autosar has reached a critical mass where enough people can see its benefit and want to adopt it.”

“Autosar is a big deal,” Mr. Helfrich concurred. “We are refactoring the software in our vehicles to be Autosar compliant and that will be helpful to our tool chain and our processes.”

In the future, carmakers will take advantage of not only the multitude of interconnections between the systems aboard the vehicle but also connections to other vehicles and to the cloud. “If there is information available that will help a system do a better job, people will be expecting us to make those connections,” said Mr. Stephens. “That will continue to advance for the foreseeable future.”

Ford...

Explorer and MyLincoln Touch on the MKX, the touch-screen, voice-activated driver interface system has been fraught with problems. The system has been buggy, subject to screen freezers and reboots. Numerous Ford customers have found the interface difficult and even distracting to use. Consumer Reports had a long list of complaints with MyFord Touch: “Many on-screen fonts and buttons are small, and the screens are cluttered. There are also performance issues, including slow-to-update screens. Some owners, including us, have had the system completely crash and reboot.”

More bad publicity linked to MyFord Touch and MyLincoln Touch came from J.D. Power and Associates’ 2011 U.S. Initial Quality Study, which dropped Ford’s quality ranking from fifth to twentieth place, and Lincoln’s from eighth place to seventeenth.

Since the August 2010 introduction there have been four software updates to MyFord Touch. The fifth and most comprehensive, what Ford is calling an upgrade, will be sent in a thumb drive to 250,000 MyFord Touch and MyLincoln Touch customers in the U.S. An additional 150,000 owners of vehicles exported to Canada, Mexico and the Middle East also qualify for the upgrade, but these will likely be done through dealers.

The upgrade includes a number of improvements in the Microsoft platform. A lot of customers wanted faster touch and faster voice response times, and initial testing shows that response times for both is at least two times faster. “The upgrade takes better advantage of the graphics hardware onboard the IMX51 processor by diverting more of the graphics rendering task to the hardware processor,” said Sync product development manager Gary Jablonski. “Less of it is done in software. The side effect was everything got better when we did that.” The IMX51 ARM processor is supplied by Freescale.

The upgrade was a very large effort, at least half the effort of developing the original product, according to Mr. Jablonski. “The team size was probably larger than for the original MyFord Touch, but the time frame was dramatically shorter. The upgrade took less than a year,” he said.

Much of the effort was aimed at simplifying the touch screen interface, making it less imposing and less distracting to operate while driving and easier to see at a glance. “There are more than 1,000 primary screens, not including the various iterations, and every one of them has been changed,” said Mr. Jablonski. Continued from page 1

Fawaz. The sound varies according to engine and vehicle speed.

Seat Massage Controller

EPMS works closely with Lear’s Seating division to integrate electronics in seats for applications like heating and cooling. Lear will begin shipping seats equipped with a seat massage function to a North American carmaker for a Q2 2013 launch. EPMS will supply the controller. Located in the seat, the massage controller, which includes drivers and solenoid valves, individually inflates and deflates eleven air bladders.

Ford offered an optional multi-contour seat with active motion for drivers and front-seat passengers in the 2010 Taurus.

Audio

A legacy of its mid-1990s acquisition of the automotive audio business of German radio- and TV-maker, Loewe Opta, Lear has produced audio amplifiers for Bentley, BMW, Audi, Porsche, Jaguar and Volvo. Lear makes THX-branded amplifiers for Ford, which are installed in Lincoln vehicles. Lear maintains a 1,400 square-meter sound lab in Kronach, Germany, dedicated to audio hardware and software development. Continued from page 2