Intel Making Inroads in Automotive—Again

Intel, the world’s number-one semiconductor maker, has put out a slew of press releases since February suggesting that, despite a long history of on-and-off relationships with the auto industry, it expects to become a player in automotive semiconductors again.

According to Intel, the connected car is the third fastest-growing technological device, following smartphones and tablets. Today, Intel’s share of these markets is insignificant, but over the last few years it has been aggressively pushing its Atom processor into all three mobile-device markets.

Intel’s Atom processor platform runs a new infotainment system installed in BMW’s 7 Series facelift released this summer, following in the coming months by implementations in the 5 and 3 Series. Nissan will deploy the Atom chip in a new vehicle coming out late this year or early 2013. According to a top engineer at Nissan, Atom was selected because of its flexibility in handling telematics functions. The Atom processor was initially designed for netbooks, so it supports Internet access and the need for low power consumption.

Hyundai/Kia is also developing Atom-based in-vehicle infotainment (IVI) systems with Intel; the first one launched on the 2012 Kia K9, now available in Korea. Several Chinese OEMs including Geely, Hawtai and GAIG are also using Atom chips in infotainment systems.

Intel is doing joint infotainment system research with other major automotive players, notably Toyota and Denso. The research work involves machine-to-machine communications, driver-machine interfaces and connected-vehicle applications and services.

Open Source Drumbeat Getting Louder

Linux Foundation Is Leading Advocate

Linux and the open source development model have been around since 1991, when Linus Torvalds offered downloads of his Linux operating system from a university Internet site for free, with only one stipulation—any changes, new features or improvements must be shared with everyone else at no cost.

Since 1991, the development and use of Linux source code has mushroomed to astonishing proportions. According to the Linux Foundation, most TVs today run Linux. Google, Twitter, Facebook and Amazon are all powered by Linux. Nine out of ten of the world’s supercomputers run Linux. Every day 850,000 Android smart phones are activated, compared with just 30,000 Windows phones. Linux is the largest collaborative development project in the history of computing.

By comparison, the auto industry’s uptake of Linux and the open source collaborative development process has moved at a glacial pace until the last few years. Among the three operating systems that power automotive infotainment and telematics, QNX, a proprietary operating system platform, has been around the longest. QNX shipped in nine million vehicles in 2011 and is on track for 11 million in 2012. Also proprietary, Microsoft Windows Embedded Automotive is the number-two operating system platform, in use by Fiat, Ford, Kia and BMW.

MontaVista Software’s Automotive Business Unit. MontaVista sells commercial versions of Linux and has developed a GENIVI-compliant Automotive Technology Platform, which supports multiple automotive-specific architectures from Freescale, Renesas, Texas Instruments and Intel. “Most of the tier ones are engaging in or plan to engage in Linux projects,” he said. “We are also seeing OEMs either adopting real production projects or doing proof of concept.”

Glenn Perry, general manager of Mentor Graphics’ Embedded Systems division, sees a similar level of interest among both tier ones and automotive OEMs. “It seems inevitable that Linux and Android will dominate the infotainment platform,” he said. “People are moving to open source platforms for infotainment first, and GENIVI has helped to a certain extent with that, but people are doing it outside GENIVI as well.” Mr. Perry also sees Linux and Android moving beyond
Intel...

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In February 2012, the company announced the Intel Capital Connected Car investment fund, which over the next four to five years plans to invest $100 million in hardware, software and service companies working on innovative technologies that link vehicles and their sensors with other vehicles, mobile devices and the cloud.

More than a year ago, Intel established the Automotive Solutions division, a stand-alone P&L unit within the Intelligent Systems Group. Intelligent Systems aims to make Intel silicon part of an expected explosion in demand for cloud-connected devices, not only in automotive applications but also in retail, communications, healthcare, manufacturing, energy and military/aerospace.

In February, Intel widely publicized its new Automotive Innovation and Product Development Center. The new facility, located in Karlsruhe, Germany, will take advantage of its proximity to German automakers, who for years have pioneered innovative high-end infotainment systems. Part of the Automotive Solutions division, the Karlsruhe center will eventually employ more than 100 engineers. “Karlsruhe is where most of our engineers reside,” said Natalie Nielsen, Automotive Solutions’ director of marketing.

Intel Capital is not part of the Automotive Solutions division, nor is Wind River, which Intel acquired in July 2009. Wind River makes VxWorks (real time operating system), commercial Linux (including Wind River Linux Performance Studio for Intel Architecture), and automotive-grade Android software platforms and tools. Wind River’s automotive customers have included Clarion, Magneti Marelli, Continental and Hughes Telematics, recently acquired by Verizon. In 2008, Wind River and Intel were early participants along with BMW in GENIVI, the alliance developing open-source infotainment software.

Hot and Cold on Automotive

In 2009, Intel CEO Paul Otellini announced that Mercedes and BMW would use Atom chips in their new infotainment systems coming to market in 2012. I checked in recently with Peter Haeussermann, head of Daimler’s Electronics and Telematics division, on how things were going with Intel. “Intel’s [hot and cold] relationship with the auto industry is my headache,” he quipped. “Intel has really good silicon, but their commitment to automotive has been sometimes strange and changing. They always claim they are fully committed, but in fact they do not really accept the customer’s view. They do what they want and we have to take it as is. Other silicon suppliers like Nvidia, Renesas and Fujitsu are better at seeing the OEM point of view.”

According to Intel automotive strategist Joel Hoffmann, Intel’s deal with Mercedes is still intact. He described the challenges Intel faces in serving automotive customers this way: “In order to differentiate their products, carmakers want semiconductor companies to customize their offerings, but that kind of differentiation isn’t cost effective anymore. It often makes more sense to use a high-volume part and differentiate with software instead.”

Mercedes is using Atom on its new S Class in an infotainment system built by Harman. Harman will also build BMW’s Atom-equipped infotainment systems.

Lou Brugman, vice president of product planning at Pioneer Automotive Technologies, also wonders about Intel’s commitment. “They’ve had a lot of false starts. They were among the major funders of GENIVI [2009] and then they backed off. They wanted to bring the PC world into the car, where everyone is building the same reference platform, driving down the costs of all infotainment systems. I’ve seen them do this for the last 15 years. They are hot and then they back off. Are they serious this time?” Pioneer is a member of the GENIVI alliance.

Intel is a founding member of GENIVI. Intel’s Mr. Hoffmann is an active board member, who also serves as GENIVI’s marketing director. “Since its founding we have supported the GENIVI alliance with technical and marketing resources,” he said. “A few years ago we stepped up our investment in MeeGo and then in the Tizen IVI projects, so we have not been contributing GENIVI code.” Intel does, however, employ the maintainers of several open source projects that are used within GENIVI, and it was recently recognized by the Linux Foundation as the number-one contributor to the Linux kernel.

Mr. Hoffmann further noted that, “While 95% of GENIVI code already was open source, GENIVI had to create some code that didn’t previously exist in open source, and that has been available only to GENIVI members, not to the public. The auto industry is not as comfortable with open source as the tech community.”

In contrast with GENIVI, Tizen is a free, open source mobile operating system. Like GENIVI, it is based on Linux. Tizen IVI is one of several mobile-device categories supported by Tizen. Tizen uses elements of MeeGo, which fell by the wayside when Nokia withdrew its support for the platform in 2009. Already GENIVI compliant, the Tizen IVI project will be released in Q4 2012. Intel’s partner in Tizen, aimed primarily at the smartphone market, is Samsung.

To broaden participation in the development and maintenance of its code, the GENIVI board has decided to move all of its projects into a public repository and manage them there. GENIVI’s transition to public distribution should be completed by this October.

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GENIVI to Play by Open Source Rules

By this coming October, once it gets a number of details ironed out, the GENIVI Alliance will transition three existing and three new projects into a public repository and manage them there. “We have been urging the automotive guys to do this, because in the end you get the [Linux] community to lend a development hand and help maintain the components. It’s taken an education process inside GENIVI to get them to lean away from the old, proprietary, closed way, which has been the nature of the auto industry,” said Dan Cauchy, a GENIVI board member and vice president and general manager of MontaVista’s Automotive Business Unit. MontaVista’s popular Automotive Technology Platform is GENIVI compliant.

The code that will soon be taken into the open source community represents just five percent of the total GENIVI standard; the rest is already open source, noted Mentor Graphics’ John Lehmann, also a GENIVI board member: “Eighty percent of the code has been drawn from existing open source projects. When Mentor Graphics builds a GENIVI-compliant platform, we go to 115 different open source projects and draw that code together. Another fifteen percent is code that needs to be modified for automotive use. For this GENIVI members have gone out to already existing open source projects and said ‘we would like to contribute some automotive expertise to those projects.’ The remaining five percent [that will soon go to open source] GENIVI initially planned to maintain ourselves inside our firewall.” Mentor’s Embedded Linux IVI-based platform is also GENIVI compliant.

Among the details still to be decided by the board between now and the fall are who will be the maintainers of the projects, which server the projects will be hosted on and how developers will link to the server. GENIVI board members also hope to decide whether it will go beyond just open-sourcing the projects and move to a full open source distribution, which would include the build integration and test platform comprised in part of support for various semiconductor architectures, compiler and tool chain.

The open source initiative started by Intel and BMW which led to the GENIVI Alliance (founded in March 2009) was begun in 2006. Since then GENIVI developers have been using open source code without making everything done on behalf of the development truly open, which severely limits the number of collaborative developers and defeats the main benefit of the open source development process.

BMW had hoped to bring an infotainment system to market based on GENIVI by 2011, but organizational difficulties and lack of support by developers and other carmakers forced it to delay the introduction until 2013. In a year or more, PSA and GM will likely follow with GENIVI-based infotainment systems. Ford, Fiat/Chrysler and Volkswagen/Audi have not joined the GENIVI Alliance. According to Peter Haeussermann, director of E/E and telematics, Mercedes-Benz, the carmaker will definitely use open source software in future infotainment systems, but not GENIVI.

Open Source...

infotainment in the future to other non-safety-critical applications, starting with instrument clusters. “These new hardware platforms, the R-Car device from Renesas for example, are really capable platforms, so there is an interest in consolidation. ... I definitely see a trend toward consolidation of the cluster,” he noted.

The rewards of the Linux open source development model are well known. Fifteen million lines of Linux code have already been developed, some of which is readily applicable to infotainment, telematics and the human machine interface. Linux supports most microprocessor architectures including ARM, PowerPC, MIPS, SuperH, H8, x86 and Atom. Since 2005, 8,000 developers from 800 companies have contributed to the Linux kernel, so there is plenty of support available for automotive projects.

Some Carmakers Still Wary

Despite the remarkable success of Linux, a number of carmakers remain unconvinced that the software and the open source development model are a good fit for them. One top infotainment executive from a carmaker expressed his objections this way: “Open source promises many efficiencies, but we have rules and requirements that are unique. For example, we must limit driver distraction. While we may want to use a computing core that’s open and common, we still have to build a wall around it. You can’t allow anybody to come in and mess with your car.”

I mentioned this comment to Jim Zemlin, executive director of the Linux Foundation. Mr. Zemlin, who describes himself as an evangelist on behalf of open source software development, has been making himself available to automotive industry players around the world. “I’ve been working with members of the Linux foundation such as Toyota but also with members of the GENIVI alliance, essentially to educate them on how to consume and deploy open source software.”

Mr. Zemlin noted that a decade ago the enterprise IT industry went through a process almost identical to what the automotive industry is going through now. Enterprise IT, the server infrastructure that runs large companies, is now dominated by Linux.

“What is ironic,” he said, “is that probably most of the back-end infrastructure at these Carmakers is already running on Linux.”

According to Mr. Zemlin, “Every question around intellectual property, software licensing, security, stability, every form of reluctance you are hearing from the automotive industry today, we heard from the enterprise IT industry ten years ago.”

One of the hang-ups some automotive people have with open source development and Linux is the belief that since it is developed publicly, it is not as reliable as proprietary software and certainly not applicable to safety applications.

“There is nothing unique about being open source that makes Linux any less... continued on page 8
Alpine Electronics

Background

In 1967 Alps Electric and Motorola formed a joint venture to produce eight-track and cassette tape players for the automotive market. Motorola sold its equity in the joint venture, Alps-Motorola, in 1978, and the business became Alpine Electronics, a consolidated subsidiary of Alps Electric. The Alpine brand was first used on a cassette deck in 1978. Alpine Electronics stock is traded on the Tokyo Stock Exchange, but Alps Electric remains the major stockholder with 40.4% of common shares.

Alpine was listed on the second section of the Tokyo Stock Exchange in FY 1988 and graduated to the first section in 1991. The company declared a ¥20 ($0.25) per share dividend in FY 2011; it issued no dividend the prior year.

While Alpine's administrative base is in Tokyo, its headquarters are in Iwaki City in Fukushima Prefecture, and the company was directly affected by the Great East Japan Earthquake in March 2011. Production in Iwaki was shut down for two weeks due to structural and infrastructure damage and Alpine incurred approximately ¥1.5 billion ($18.8 million) in losses related to the event.

Alpine also had to work around parts shortages as a result of severe flooding in Thailand later in 2011, but was able to maintain product deliveries on time, according to the company.

Risk Averse

Working with Honda R&D, Alpine introduced the world's first navigation system in 1981, and since then has made a lot of money from its navigation intellectual property. Alpine helped to pioneer the global navigation industry, which got its start in Japan, and has evolved into today's infotainment market, which combines audio, navigation and telematics. Strategy Analytics ranked Alpine #4 in infotainment market share in 2011. But Alpine's navigation-focused strategy is not likely to serve the company well in the rapidly evolving infotainment industry. As portable navigation devices became popular and companies like Google began offering smartphone-based navigation and traffic information for free, the unit price of embedded navigation has greatly declined.
Alpine Electronics is a company that has demonstrated strong development and manufacturing capability, but it is so risk averse that it has not invested sufficiently in the future—and that is limiting the OEM side of the business. Four years ago Alpine was developing cloud-based navigation, but it didn’t aggressively invest in the technology because it didn’t have an OEM customer willing to sign an order. Industry thinkers have now concluded that in five years, more than half of infotainment content and services will come not from what is embedded in the vehicle, but from the cloud. It doesn’t appear that Alpine will soon profit from that trend. With much catching up to do, Alpine opened a small office in Silicon Valley in April 2012 to do research in the field of cloud computing. There are currently seven employees working at the facility.

Alpine Will Be Challenged
Alpine is in a difficult position. It serves a market that already has too many competitors with more on the way. Not only must the company compete against at least nineteen infotainment suppliers (see OEM Infotainment Market Shares, above) but it is being buffeted by numerous unfriendly market trends.

In a presentation in May 2012 outlining the company’s mid-term business strategy, president and CEO Toru Usami announced Alpine’s plan to aggressively grow sales to ¥250 billion ($3.1 billion) by fiscal 2014, a growth rate of 7.2% per year. Seven years ago, Alpine unveiled a less aggressive plan: ¥300 billion in sales by 2010. Alpine missed that mark by ¥100 billion. It will likely miss the ¥250 billion mark as well. Here’s why:

- The yen’s high value against the euro and the dollar makes products manufactured in Japan more expensive compared with products manufactured elsewhere.
- The low- to mid-priced market for infotainment systems is growing faster than the high end of the market. Alpine hasn’t yet demonstrated an affinity for the low end of the market.
- One-fourth of Alpine’s sales come from the aftermarket, a market that has slowed as carmakers have learned to bring new technology and affordable features more quickly to market.
- The Japanese won a dominant position in the infotainment industry because of their competence in electronics development, packaging and manufacturing and because the navigation market first took off in Japan. The game is changing as competencies in software development, collaborative open source development, the Internet and cloud computing become critical to success.
- To save development costs and maintain ownership of intellectual property for later reuse, carmakers including Audi and Ford are taking infotainment systems integration in house. If this trend continues it will force infotainment system tier ones to become more flexible and change the way they do business. Alpine is not known for its flexibility.

### OEM Infotainment Market Shares

- **2011 Total Market:** $23,560 million
- **Continental:** 11.2%
- **Harman:** 10.4%
- **Fujitsu Ten:** 8.2%
- **Alpine:** 6.1%
- **Panasonic (including Sanyo):** 6.0%
- **Others: 58.0%**

- Harman is #1 in OEM head unit revenue.
- Japanese suppliers control 48% of the infotainment market.

Source: Strategy Analytics

*Others, according to The Hansen Report (alphabetically): Aisin Seiki, Bose, Bosch, Clarion, Delphi, Denso, Garmin, Hyundai Mobis, Magneti Marelli, Mitsubishi Electric, Pioneer, $1nn, Sony, TomTom, Visteon

Navigation has been a core Alpine competence, but the technology is being commoditized as open computing platforms are developed that are capable of accommodating navigation software from a variety of suppliers.

- Infotainment system prices are coming down in the face of competition from smartphones with their much more affordable navigation, traffic and Internet radio applications.
- The GENIVI alliance of carmakers and suppliers is developing infotainment standards and software that should bring down the cost of infotainment development while increasing the number of suppliers that can contribute software and hardware components. That will hold down unit prices for infotainment systems.

### Strong Balance Sheet/Weak Market Valuation
Despite declining sales, Alpine Electronics’ balance sheet is quite strong. It has zero long-term debt and a debt-to-total-capital ratio of 5.15%, making it one of the least leveraged companies in the household durables industry, according to businessweek.com. Current assets exceed current liabilities (working capital) by ¥60.1 billion ($755 million).

### JPY Appreciation vs. EUR and USD

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Alpine Electronics

Nevertheless, the stock market takes a very dim view of Alpine: it values the company at ¥54.9 billion ($689 million)—just 0.27 times FY 2011 sales. In contrast, Harman International’s market cap is $2.97 billion or 0.8 times sales.

Strangely, Alpine’s market cap exceeds cash and deposits by only ¥18.1 billion ($227 million).

OEM Business

Alpine’s OEM business has not nearly kept pace with the global infotainment market. Since FY 2004, when it delivered ¥167 billion ($2.1 billion) worth of product to OEM customers, Alpine’s OE sales have been declining annually at the rate of 1.3% to ¥152 billion ($1.9 billion) in FY 2011.

Honda

One of Alpine’s defining attributes over the years has been its position as Honda’s top infotainment system supplier. Honda is a high-volume, high-quality carmaker known for delivering reliability and value to its customers. If you can profitably serve Honda, you can almost certainly serve the world.

In FY 2004, Honda/Acura accounted for nearly 30% of Alpine’s OEM sales. But in 2006, Alpine had quality problems and difficulties fulfilling orders from Honda Japan. While Honda remains Alpine’s number one OEM customer, the company no longer discloses what percent of its business is from Honda or other OEMs. Clarion, an infotainment competitor who is close to Nissan, has a significant piece of Honda’s business. And in fiscal 2009, Honda purchased a stake in another Alpine competitor, Pioneer. Honda presently owns 4.57% of Pioneer’s common shares, giving it a strong incentive to increase the business it gives to Pioneer. (Alpine also lost some head unit business it had with Scion to Pioneer.)

Still, Alpine received a Supplier Award from Honda in FY 2011 for quality and delivery.

BMW

Harman and Alpine are both tier ones for BMW’s high-end infotainment head units, with shipments starting this summer for the 7 Series facelift followed soon by the 5 and the 3 Series. With about 30% of the business, Alpine will handle production requirements for China, Japan and the rest of Asia. Harman will cover U.S. and European production, accounting for 70% of the business. Each supplier delivers a full feature set of its own, but there are shared graphics, system software and other elements. Harman and Alpine had a similar arrangement for BMW’s previous generation high-end infotainment.

BMW appreciates that, unlike Aisin Seiki or Denso, Alpine employs its own navigation core, so it can afford to provide a better value, and that Alpine has manufacturing capability in China, a requirement for doing business there. According to BMW, Alpine was one of the first Japanese suppliers to “open its development capability to the West, something that some other Japanese suppliers are now able to do.” Alpine also makes some DVD drives for BMW.

In 2013, BMW will start to transition all of its vehicles to infotainment systems based on the GENIVI platform, which will, at least initially, be produced by Magneti Marelli and Harman.

Chrysler

Chrysler is a major Alpine customer. According to Chrysler, Alpine is “one of its top supplier partners for audio,” and the carmaker has a small amount of low-end infotainment business with Alpine as well. The new 2013 Dodge Dart features an Alpine-branded premium sound system with a 12-channel amplifier and nine speakers.

Mercedes

Alpine’s business with Mercedes has been in decline with just one car line left that is using an Alpine radio head unit, although Alpine is currently in the running to get some additional business. Peter Haeussermann, head of Mercedes’ electronics and telematics division, ranks Alpine among the strongest infotainment suppliers, along with Harman, Mitsubishi Electric and Panasonic. Mr. Haeussermann sees Alpine’s aftermarket experience as a plus in terms of implementing new technologies quickly.

Leveraging Aftermarket Presence

Instead of speculatively investing in new technology that might down the road lead to OEM business with a carmaker, Alpine has focused development on the aftermarket where investments are expected to find quicker returns. Alpine’s latest aftermarket offerings suggest where Alpine’s OEM products may be headed.

◆ Priced at $1,200 and introduced a year ago, Alpine’s INA-W910 Premium All-In-One Infotainment System, its flagship in-dash double-DIN receiver, features audio, video and navigation in one uncomplicated system. It handles multiple sources including HD Radio, SiriusXM Radio (with pause and rewind capability of up to 30 minutes of content) and Pandora Internet Radio, via separate broadband-connected iPod or iPhone. The system comes with a microphone for wireless hands-free phone calls via Bluetooth. The seven-inch motorized WVGA screen went on sale in the U.S.

◆ First shown at the 2012 Consumer Electronics Show, Alpine’s INE-Z928HD audio/video/navigation unit with 8-inch WVGA screen went on sale in the U.S. in early August at $1,500. The newer system offers all the functionality of the INA-W910 plus a configurable “My Favorites” screen, which allows users to add, delete and arrange up to eight shortcut

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large a display. The 8-inch Big-X navigation system contributed substantially to Alpine's profit in FY 2011, according to the company.

- Priced at $499 Alpine's Active Rear View Camera System Model HCE-C300R alerts the driver to moving and stationary objects behind the vehicle, providing an audible beep and visual highlight of the object on any display with an RCA rear-camera input. Using a single 640 by 480 pixel CMOS image sensor, the system lets drivers toggle between viewing options including panorama (a wider viewing angle), rear (a normal view behind the vehicle), ground (for showing how close objects are to the rear of the vehicle), and corner (for showing the rear corners of the vehicle with a split screen view.)

- ICS-X8 Head Unit with MirrorLink, introduced at the 2011 Frankfurt Motor Show, uses the MirrorLink standard for linking Nokia smartphones with the vehicle's infotainment system. Alpine has also demonstrated MirrorLink head units with Samsung Galaxy phones, but Android phones are not yet supported.

In January 2012, Alpine announced its strategic partnership with Chleon Automotive to develop a next-generation connected-vehicle infotainment platform. Chleon will provide its Application Management platform, which Alpine will integrate into an infotainment system. A startup, Chleon's chairman is Vesa Luiro, who was project lead of Terminal Mode (now known as MirrorLink) when he was director of Nokia's automotive business.

Sony and JVC Kenwood recently announced MirrorLink aftermarket radios that initially support Nokia smartphones only. JVC's will support Samsung's Galaxy S III in the near future, according to the company. It is not yet certain which smartphone makers besides Nokia and Samsung will make MirrorLink part of their phone offerings. MirrorLink is not supported by Apple or Microsoft.

HTML5, the Hypertext Markup Language used widely in Web browsers, is another alternative to MirrorLink, one that is showing promise. Open source software, HTML5 will work across multiple computing platforms regardless of operating system.

Alpine is a charter member of the Car Connectivity Consortium, which has been advocating for MirrorLink. It is also a member of the OPEN Alliance Automotive SIG promoting adoption of Ethernet connectivity in automotive applications.

Alpine Performance in J.D. Power and Associates 2011 U.S. Navigation Usage and Satisfaction Study by Vehicle Model

All but three of Alpine's OE navigation installations fell below the study average.

Alpine's Navigation System Ranking by Vehicle Model
(Based on a 1,000 point scale)

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buttons for the features they use most often.

- Alpine claims it has the world's first 9-inch screen on its new Big-X navigation system, launched this year, following the success of an 8-inch version of Big-X introduced in Japan in 2010. With Big-X, Alpine supplies an installation kit that allows the big screen to fit attractively into spaces not originally designed for that
Open Source...

reliable in safety applications than QNX or Microsoft,” said Mr. Zemlin. He pointed out that combat defense systems for the U.S. military, Lockheed Martin nuclear submarines, the CERN super-collider, German air traffic control systems, Japanese high-speed trains and the world’s largest super computer all run Linux.

Before it’s ready for automotive applications Linux software goes through several concentric circles of validation. “With Linux, you have the largest peer review system in the history of computing where the source code gets validated,” explained Mr. Zemlin. After that, commercial Linux vendors serving the automotive market, such as Mentor Graphics, MontaVista and Wind River, test and validate the Linux software that is developed in the open source community. They also give carmakers and tier ones a place to turn if problems arise.

While several automotive suppliers have joined the Linux Foundation, Toyota is the only carmaker to sign on, so far, and that wasn’t until July 2011. In a keynote address at the first-ever Automotive Linux Summit held last November in Yokohama, Japan, Toyota’s Kenichi Murata, project general manager, Electronics Development Division 1, explained one of the reasons Toyota is committed to Linux. “We need systems that scale all the way from embedded to data processing, to be able to deliver our vision of the connected car.”

According to Rudolf Streif, director of embedded solutions at the Linux Foundation, “[Carmakers] need instrumentation to collect data, network servers to gather and store the data, supercomputers to analyze and process the data, and devices to display and present the data. Linux has already been deployed in many similar applications where huge amounts of data are processed (such as smart electric grids), giving the automotive industry instant value without having to reinvent the wheel.”

It’s hard for people in the auto industry to see how carmakers can make money by using and contributing software to the open source community. But Mr. Zemlin thinks the decision for or against open source software is not a matter of how you can profit from it, but rather how you can keep the consumer electronics industry from stealing high-margin infotainment business from the carmakers.

“Infotainment is the single highest margin component that carmakers sell, and it is being taken away by Apple and others,” he said. “If carmakers want to capture that market they need to create something that is truly unique. In order to do that, they need to very quickly get very good at software. The best way to do that is to leverage the software that is being created every day by tens of thousands of developers all over the world.”

BMW has been the leading force behind the GENIVI alliance’s adoption of Linux code. I asked Michael Würtzberger, senior head of the Connected Drive Infotainment department at BMW, if he thought the open source development model has an automotive future beyond infotainment. “There are some [non-automotive] open source projects dealing with robotics and image processing, the results of which could be applied to R&D projects around autonomous driving. Open source probably has a future in both driver assistance and cloud-based services.”

Another auto industry open-source development is just getting started. Part of the Eclipse Foundation, the Open Source Initiative for Automotive Software Development Tools began its work last year with just four members: Bosch, Continental, BMW and Itemis. (See The Hansen Report, June 2012 for more on this Eclipse working group.)

Make Plans for SAE Convergence 2012

The global automotive electronics industry will come together October 16-17 in Detroit for the SAE International Convergence 2012 conference. Hosted this year by General Motors, the 2012 event is organized around the theme Electronic Innovation Through Leadership, recognizing that effective, forward-looking leadership is crucial as the auto industry learns to adopt new technologies at a faster pace.

Micky Bly, GM’s executive director of global electrical systems, infotainment and electrification, will moderate the Blue Ribbon Panel discussion titled “Chief Technical Officers: Influencing the Future of the Automotive Industry.” Executives from GM, Ford, KPIT Cummins and NHTSA will explore how future vehicle designs will be shaped by factors such as the growing legislative pressure for fuel efficiency, consumer demand for connectivity, and the emerging role of energy and IT companies in automotive.

Technical program chair David Carey, director of body, safety, electronics and chassis controls for GM, has scheduled six technical sessions. These include programs focused on electronics innovation in active safety technology, intelligent vehicles, vehicle propulsion systems and infotainment. Another technical session, “New Business Models and Disruptive Technology,” examines methods that might be employed to help integrate new technologies faster and how disruptive technologies make it into vehicle platforms within an OEM. The final technical session Wednesday will feature industry analysts’ views on “Mega Trends and Their Effect on Automotive Electronics.”

On Wednesday, October 17, Paul Hansen will again be moderating the Carmakers Speak Panel, an informative and candid discussion with top electrical engineers from six global OEMs. These individuals are the decision makers for the new technologies, features and functions the carmakers will adopt and what technical standards their companies will support. Suppliers can gain valuable insights into where they should be making strategic investments.

Participants in the Carmakers Speak Panel this year include:

- Alan Amici, Fiat Group
- Graydon Reitz, Ford
- Ricky Hudi, Audi AG
- Micky Bly, General Motors
- Wayne Powell, Toyota
- John Schnoes, Nissan

For more information and to register, visit www.sae.org/convergence.