Open Source Software Moving into Infotainment

HTML5, Linux and Genivi

Open source software—software that users can run, change and redistribute royalty-free—has energized the Internet along with the computer, mobile phone and other industries. And while it is moving more slowly in the conservative automotive industry, open source software products such as Linux, Genivi and HTML5 are beginning to have an impact there as well. “In infotainment there has definitely been a massive shift toward open source embedded software,” observed Glenn Perry, general manager of Mentor Graphics’ Embedded Systems division.

Open source software won’t be embedded in automotive applications for free, however. Tom Blackie, vice president of the Mobile business for Cambridge, U.K.-based RealVNC, offered his perspective on how the automotive industry currently values open source software: “Open source is great for setting standards and sharing best practices. But more often than not, the actual implementations [of open source software] that tier ones and OEMs use are commercial solutions, because they want to know that someone is on the hook when problems come up. They will pay for support and maintenance, for protection of the IP they add and for warranty back up.”

RealVNC produces a connectivity software development kit called Mobile Solution for Automotive that allows a range of mobile devices to be detected and controlled through the infotainment head unit. The software supports other connectivity protocols including Terminal Mode and iPod Out.

HTML5

HTML5, the newest generation of Hypertext Markup Language, is widely used for presenting multimedia content on the Web, which is why it is used in Web browsers and why it is finding its way into connected vehicles with embedded infotainment systems linked to smartphones and to the Internet.

“I know of multiple carmakers who are specifying HTML5 in their 2013 to 2016 model-year programs,” said Andrew Poliak, director of automotive business development at QNX. “HTML5 is a common open source platform. It’s used in the Apple Safari Web browser, by Android for their browser, in Google Chrome, and by TomTom in its next-generation platform. HTML5 gives carmakers the flexibility of being able to work with lots of different application and user-interface developers, and different software and hardware development companies. We are very bullish on it.”

Standards-based HTML5 software will work across multiple computing platforms regardless of operating system. Infotainment systems will increasingly use Web browsers to retrieve data, content and services from public and private servers on the Internet. HTML5 will also be used to program cockpit displays.

“You’ll see a big move to HTML5 in the industry,” agreed former OnStar CEO, Chris Preuss. “You could put an HTML5 browser on anybody’s platform, whether it’s based on Android, Microsoft, Linux or QNX. Apps written in a common environment like HTML5 will work.”

“Web developers are moving into a more standards-based approach for serving up graphics and video,” said MontaVista director of marketing, Dan Cauchy. “Apps and code written in HTML5 are guaranteed to work across platforms, including iPads and other tablets and in infotainment. Since it’s nonproprietary, it gets people away from the licensing issues associated with Adobe Flash. The other

Turn to Software, page 3
Body Control Module Update

A collection of everything electronic that isn’t part of the powertrain, chassis or safety system, instrument cluster or center stack—body electronics modules control many different vehicle functions, from interior lighting and keyless entry to tire pressure monitoring and voltage stabilization. As the name implies, body control modules are located within the vehicle’s body; some are located in the engine compartment. “The main functions of a body controller are distributing and monitoring signals and energy management,” said Winfried Menge, vice president of marketing for Hella Electronics.

Every car has at least one, and some cars have ten or more body electronics control modules, which range in price from $21 to $114 each, according to Continental. Taken together, all body control modules (BCMs), including those in the doors to control windows and door locks, add up to a very big market of roughly $10 billion annually. BCM market growth is being driven not only by ever-increasing feature content in mature markets, but also the increasing penetration of functions in emerging markets.

Each body controller consists of a connector, housing, microcontroller with memory, power supply, and solid-state relays or mechanical relays if over 20 amps. And each BCM has a printed circuit board, which at $4 to $21 each, is one of the most expensive parts.

Over the years as body controllers have taken on more functions, the number of microcontroller I/Os (input-outputs) has grown—from 120 ten years ago to as high as 176 to 208 today, according to Stephan Lehmann, Freescale’s director of automotive marketing. And the microcontrollers used in BCMs have gotten more powerful.

Features Handled in BCMs

| Door- and window-lift control | Park assist |
| Electric vehicle sound generator | Passive entry |
| Horn | Rear defogger |
| Immobilizer | Remote keyless entry |
| Interior and exterior lighting control | Seat control |
| Keyless starter | Sunroof control |
| Mirror control | Tire pressure monitor |
| Network gateways | Vehicle security/alarm |
| | Voltage stabilization |
| | Wiper and washer |

“Body Control Module Parameters

A typical European mid-sized or premium vehicle has two body control modules. Each BCM includes:
- A 32-bit microprocessor with one to two megabytes of program memory
- More than half a million lines of C code
- One to two CAN interfaces
- Up to seven LIN interfaces
- 80-120 discrete input channels
- 150-250 discrete output channels

Source: Hella Electronics

“In 2000 we were using the 16-bit S12 family micro, which had 256 kilobytes of memory. Now we are selling our new Bolero 32-bit family typically with 768 kilobytes to 1.5 megabytes of flash [memory] into body control applications,” he said.

Autosar

One of the reasons body control modules are getting more capable is the Autosar software standard. While Autosar increases the memory and computing footprint, it lets carmakers apply their own functional software or software from third parties in body control modules, even BCMs from different suppliers. Most new BCMs designed today use Autosar.

“Eventually, all carmakers in all regions will want Autosar,” said Mr. Lehmann. “We are even seeing a demand for Autosar from Korea.” To limit the number of product variations it must support, Continental supplies Autosar body control modules even to customers who don’t specify it.

The market for body-control software applications from third parties has just begun. Continental is supplying its tire pressure sensors along with algorithms that are being integrated into a body control module produced by another supplier. And Delphi, who claims the number-one global share of ultrasonic anti-theft alarm systems, could sell its sensors and detection software to carmakers that can run it in a body control module from another supplier. “One of the reasons we’ve invested heavily in Autosar is we see a market not just for the hardware, but also the software,” said Mike Thoeny, Delphi’s global director of engineering.

Mr. Thoeny noted that Autosar solutions might be too expensive for the low end of the market today. “For that segment we offer a variation that meets the intention of Autosar but without the overhead that Autosar requires,” he said.

Integration

“Where there have been as many as 15 control units doing body functions, we are now seeing a migration; [body] computing power and capability is becoming more centralized,” said Tim Frasier, president of Bosch Automotive Electronics, North America. “We are seeing carmakers move to either a single body control module or to two, one in the front and one in the back of the vehicle. ... We are also seeing intelligence added to the switch inputs and actuators that communicate with the BCM, so more mechatronics as well.”

Another impetus to integrate comes as more features once available only in option packages become standard. OEMs need fewer feature-dependent separate boxes that may only be used in low volumes.

The number of body controllers and their placement greatly affects the cost and weight of the vehicle’s wiring harness.

Turn to Body Control, page 8
benefit is its performance. It runs quite well on underpowered ARM chips, which is something that Flash couldn’t do.”

An open-source software specialist, MontaVista is a leading commercial supplier of embedded Linux solutions.

Later this year QNX will make an HTML5 environment part of its QNX CAR application platform. The platform already had a Web browser, but not all of the HTML5 extensions.

“We’ve added a lot of functionality that would matter to an OEM,” said QNX’s Mr. Poliak. “HTML5 tags like Canvas and Geolocate, along with WebGL [Graphics Library], will allow them to do things such as 3D maps in an HTML environment. In addition, OEMs will like the way they will be able to integrate native functions such as buttons, touch panel inputs, GPS and gyro information with the HTML5 environment.”

While many other software companies are taking advantage of HTML5, QNX believes its particular approach sets it apart from the competition. “Our ability to take HTML5 and make it relevant in automotive applications is going to distinguish us,” said Mr. Poliak. “We are moving the conversation beyond the operating system, whether it’s QNX, Windows, Android, T-Kernel or µITRON.”

QNX’s Composition Manager allows infotainment system engineers to blend HTML5 code with other graphics environments such as Adobe AIR and Flash, OpenGL and Java to create a customized, seamless human machine interface. “Composition Manager is our secret sauce,” said Mr. Poliak.

Linux

Linux, the widely applied open source operating system used in telecommunication and on smart phones, laptops, TVs, printers, even the Kindle, is finally making its way into the automobile. “In the next five years you are going to see huge uptakes of Linux in automotive,” said Dan Cauchy of MontaVista, a company that’s been in the Linux business for 12 years and claims to be the first to embrace Linux for embedded devices.

“Eight years ago telecom was the first market to adopt Linux,” said Mr. Cauchy. “MontaVista landed deals with Alcatel-Lucent, Ericsson, Cisco, NEC, Fujitsu, all the big guys. It started with just a few projects, then more came along. The next thing you know, Cisco is standardizing all of their future product lines on MontaVista Linux. Every switch, router, IP phone and telepresence system coming out now all run Linux. The evolution was very clear to us. We saw that it was going to happen and it did. I am seeing the same exact thing in automotive. It is a project here, a project there. Most automakers, except for Ford, and all the tier ones are looking at it. There is going to be some adoption in the next two years, and the next thing you know, boom, the industry moves to Linux.”

One of MontaVista’s first car applications will show up in some 2012 Cadillacs, in an infotainment system MontaVista is developing with Bosch. Bosch is producing the hardware and MontaVista is producing not only the Linux operating system, but the entire software stack including navigation, Bluetooth, USB, connectivity and media player. Eventually the software could be used in all Cadillac models. MontaVista also provides the Linux software General Motors uses in the Volt’s instrument cluster.

One of the criticisms of open source Linux is the legal requirement to distribute any modifications made to the source code, which, say the critics, could expose adjacent proprietary code to public view. Not to worry, says Mr. Cauchy. “We only need to distribute the source code that interfaces directly with the Linux kernel, using kernel level function calls. Those have to be open source. If you use a standard GNU Library interface those don’t have to be open source. ... We’ve been managing the Linux legal requirements for our customers for years.”

“The trend toward open source solutions is largely driven by the desire of the OEMs to have more flexibility in terms of updates and maintenance throughout the lifecycle of the vehicle,” said Mentor Graphics’ Glenn Perry. “Since Linux is open source, you have more options for adding features and capabilities over time, and more suppliers who can make a contribution.” Mentor Graphics is working on Linux infotainment projects in every region of the world; one in China and one in Japan involve Android. Very popular in smartphones, Android is an open source software stack that includes a Linux kernel, middleware and some applications. Android-based smartphones account for the largest share, by far, of the worldwide market: nearly 40%, according to IDC.

Genivi

Another open source software stack based on Linux is being developed for infotainment applications by the Genivi Alliance of carmakers and suppliers led by BMW. BMW had planned to have a Genivi infotainment platform ready for a production launch in 2013, but the project has been held up. Some say Genivi’s slow progress is a result of having too many members whose efforts have been disorganized, and not enough engineers to develop the platform.

According to Sachin Lawande, co-president of Harman Automotive, Genivi’s approach of involving many companies that rely on “somebody through their goodwill to port software that will somehow all magically work,” is part of the problem. “Android was successful because one company, Google, took the responsibility to make sure that it worked for everybody,” he said, adding, “I don’t want to give you the impression that we don’t support it. We joined Genivi to fix it.”

Nevertheless, MontaVista’s Dan Cauchy, who sits on the Genivi board of directors, believes that Genivi is now on the right track: “The first year was slow. We are now 134 member companies. Getting all these people mobilized, getting them to do stuff takes a year. Six months ago we changed the organization from a top down to a bottom up approach, where we now have expert groups, each with an area of responsibility. One of the reasons the automakers have been on the sidelines waiting is because Genivi has not yet published a compliance spec. That will come out in early June.”

Mentor Graphics also has a seat on the Genivi board, and Glenn Perry is positive about the alliance: “I actually think it is gaining momentum. I know a certain number of OEMs that are pretty sold on it and want to see it progress, especially some of the Europeans.”

Continued from page 1
The Company Profile...  Elektrobit (EB)

**Elektrobit (EB)**

**EB Sales and Operating Margins**

2006 to 2010 CAGR: 2.8%

2006 2007 2008 2009 2010

181.5 144.3 172.3 153.8 161.8

in € millions

2006 (1.7%) 2007 (14.1%) 2008 (24.4%) 2009 (0.9%) 2010 (4.5%)

**Operating Margin**

2006 2007 2008 2009 2010

**EB Automotive Sales and Operating Margins**

2006 to 2010 CAGR: 19.8%

2010 to 2014 CAGR Forecast: 20%


38.9 52.6 63.3 61.5 80.1 166.1

in € millions

2006 (5.4%) 2007 (1.3%) 2009 (6.2%) 2010 (2.4%) 2008 (19.1%)

**EB Sales by Business Segment**

2010 Total Sales: €161.8 million

Automotive, 49.5%

Wireless, 50%

Other, 0.5%

**EB Sales by Region**

2010 Total Sales: €161.8 million

Asia, 7.2%

Americas, 33%

Finland, 18%

Rest of Europe, 41.8%

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**Background**

Prior to 2002, Elektrobit Group was a contract R&D company based in Finland serving the global telecommunications industry. In 2002, the Elektrobit Group merged with JOT Automation Group, a production automation specialist. The production automation business was sold off in June 2007, the same year the company name was changed to Elektrobit Corporation. Elektrobit Corporation has been listed on NASDAQ OMX Helsinki since 1998. In 2007 the company also began referring to itself as EB, and EB is also used as a brand identifier for its products.

EB cites core competence in three areas: automotive software, wireless systems and systems architecture solutions. It reports two business segments: Automotive and Wireless. Sales per employee were quite low in 2010, just €105,333, a result of EB’s reliance on engineering services revenue. In the software service business it is difficult to compete with Indian-based providers such as KPIT Cummins, Wipro and HCL. In the coming years, as Elektrobit’s strategic emphasis shifts from services to selling software products to multiple customers, sales per employee will increase.

**Automotive Business**

Elektrobit’s expansion into automotive markets took off in 2004 with the acquisition of 3SOFT GmbH, an embedded software developer based in Erlangen, Germany, which became EB’s Automotive Software Business Unit. 3SOFT developed an implementation of the OSEK operating system used by BMW as the basis of its standard core software platform, beginning in 1997. EB continues to provide software modules for BMW’s standard core.

In 2007, EB added FlexRay and Autosar technology to its automotive portfolio with the purchase of Decomsys. Based in Vienna, Decomsys’ core products were FlexRay design and network analysis tools and software stacks. EB was already using Decomsys’ FlexRay software stack in its Autosar products.

EB further strengthened its automotive business with the 2008 acquisition of Net Consulting and Services, a small French company specializing in tools and engineering services for automotive CAN and LIN networks.

Two-thirds of EB’s automotive software engineers work on infotainment applications; the rest work on software for the rest of the vehicle. Audi is EB’s largest automotive customer. Other major customers include Ford, Volkswagen, BMW and Daimler as well as auto electronics and semiconductor suppliers. EB provides R&D services and software products, which are usually adapted to meet specific customer requirements.

EB calls its business model a solutions...
services will drop somewhat as a percent-
20% to 25%. Infotainment products and
ECUs; driver assistance will account for
tomotive turnover will be related to
and services. By 2016 roughly 30% of au-
tions, EB expects will grow 15% annually,
which, citing Frost & Sullivan’s projec-
tion, a combination of products and ser-
ices, modifying and integrating products
within its customers’ systems. While five
years ago the majority of revenue came
from engineering services, going forward
EB aims to grow its software business
faster than its R&D services business,
which means its sales will be more directly
dependent on its automotive customers’
production volumes.

Steady Growth Expected
EB is confident its Automotive busi-
ness segment’s net sales will grow at 20%
per year for the next five years, which
means 2010 sales will have more than
doubled in four years. That’s faster growth
than the automotive software market,
which, citing Frost & Sullivan’s projec-
tions, EB expects will grow 15% annually,
long term.

The company expects to see growth in
all areas of the business, but the most will
come from driver assistance products and
services, followed by ECU (non-infotain-
ment electronics control unit) products
and services. By 2016 roughly 30% of au-
tomotive turnover will be related to
ECUs; driver assistance will account for
20% to 25%. Infotainment products and
services will drop somewhat as a percent-
age of sales, to 45% to 50%, as the other
two product segments grow.

In the past few years, the company has
seen a lot of sales growth in the U.S. mar-
ket and believes the potential is there for
further growth. EB is actively investing in
growing sales in Japan and China and has
set up engineering facilities in Tokyo,
with roughly 20 employees, and Shanghai,
where roughly 10 engineers are dedicated
to automotive.

Following the March 2011 departure of
Jarkko Sairanen, who served as president
of the automotive business segment and
worked for EB since 2007, Gregor Zink,
vice president of finance, became acting
president until the position is filled.

e.solutions
A trend is emerging among carmakers,
starting with Audi, and more recently
Ford and Toyota, to take direct control
over the development of their new
infotainment platforms, work that in the
past was performed by tier ones. This ap-
proach not only saves development costs,
it also facilitates software reuse and the
flexibility to add or update features.

Audi decided its newest infotainment
platform’s complexity was beyond the ca-
pabilities of the tier one suppliers. The
carmaker in 2009 formed a joint venture
based in Germany called e.solutions be-
tween its Audi Electronics Venture divi-
sion, which owns 49%, and Elektrobit
Automotive GmbH, which holds 51%.
The goals of the joint venture are to en-
hance infotainment software and hard-
ware reuse and to enable innovation.

“The primary focus of the joint venture
has been developing and implementing
next-generation high-end infotainment
software called MIB (Modular Infotain-
ment Baukasten) High for Volkswagen
Group, including Audi,” explained Martin
Schleicher, EB Automotive vice presi-
dent, infotainment product and platforms.
The idea behind the MIB High software
suite, which includes some pre-integrated
applications, is to bring down the enor-
mous cost of developing infotainment
systems. In the past, 60% to 80% of info-
tainment development costs were related
to software; half of all development costs
were related to integration and testing.

Very flexible, the MIB High suite will
make it easier to change the look and feel
of the human machine interface accord-
ing to which vehicle brand it is meant for.
The middleware and application core can
run applications developed by third par-
des, Alphabetically

Continental
Delphi
Falk
Fiat Group
Hella
General Motors
Johnson Controls
Magneti Marelli

Top Ten Automotive Customers
Ranked by Sales

Audi
Continental
Delphi
Falk
Fiat Group
Hella
General Motors
Johnson Controls
Magneti Marelli

The Hansen Report on Automotive Electronics, Portsmouth, NH USA www.hansenreport.com

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Elektrobit (EB)

Automotive Products

Very roughly, two-thirds of EB's automotive sales come from software products and engineering services related to those products. Engineering services unrelated to a specific EB product account for the balance of revenues. EB's top selling software products are EB GUIDE, EB street director and EB tresos.

◆ EB GUIDE

As HMI becomes a major differentiator for carmakers, especially in infotainment systems, software that allows them to develop the graphical elements and speech dialog of HMI in an integrated tool environment is likely to find a receptive audience.

Now in version 5, EB GUIDE is a tool for specification, modeling, code generation and mass production of infotainment systems, instrument clusters and speech-enabled navigation systems. The current version also supports modeling 3D HMI including moving elements. The HMI development and speech tool suite includes runtime software for the graphical user interface and for speech, connecting to speech recognition and text to speech engines. EB's software layer sits on a speech engine from Nuance or SVOX, for example, connecting it with the graphical HMI elements. EB GUIDE GTF (Graphics Target Framework) is already on the road in more than one million vehicles.

“The average infotainment system has more than 1,000 different graphics presentations that can be shown on the screen depending on how the system is being used at any time. High-end systems can have as many as 2,000 views,” said Mr. Schleicher. “The key benefit of EB GUIDE is really the management of complex user interfaces: defining the HMI workflow by connecting all the views, plus the combination of the graphical HMI with the speech HMI. This tool is unique in the market in that it allows you to connect them, so they are always consistent.”

Audi has used EB GUIDE to develop many of its new infotainment HMI. Other OEM customers include Honda, Daimler, Jaguar/Land Rover, PSA, Renault and Volkswagen. EB also licenses EB GUIDE to many of the top tier ones including Bosch, Delphi, Continental and JCI. In June 2011, EB will demonstrate a software tool it developed with Freescale and QNX, for reconfigurable instrument clusters.

By 2015 EB expects to win a 40% share of the automotive HMI design tool market and at least 30% of the market for HMI runtime software licenses.

◆ EB street director

“We see in the automotive navigation systems market a trend of separation of hardware from software, opening up an opportunity for navigation software suppliers to deliver product for built-in systems,” said Mr. Schleicher. Because it only sells software, not hardware, as most of its competitors do, EB thinks it can win a significant share of the market with its EB street director product. A navigation software platform designed for both consumer (PND) and automotive markets, EB street director is easily upgradable and scalable for all types of systems from low- to high-end. It can be combined with EB GUIDE to develop customized, automotive-grade navigation solutions that run on any operating system.

EB street director is already shipping in the standard navigation systems of the Audi A1, A6 and A7, in the Mercedes SLK and C Class and the Smart Fortwo. EB said it has booked business for a “huge” volume of cars that will ship in the next three years. EB expects to win at least a 30% share of the third party market for embedded navigation software by 2015.

Agnostic on infotainment platforms, EB plans to support all of them including QNX, Microsoft and Genivi. According to the company, some customers have already demonstrated EB street director on a Genivi platform. EB sees few Genivi implementations making it to the market any time soon, given the varied and sometimes conflicting interests of the member companies.

EB faces formidable competition in the automotive navigation market from long established players such as Alpine, Clarion, Pioneer and Harman International. But Mr. Schleicher sees another trend developing with the traditional navigation suppliers: “More and more of these companies are stepping away from navigation software development, since they have a difficult time competing with the innovation coming out of the consumer space, and their volumes in the automotive market are not sufficient for them to sustain in-house development.”

While navigation remains a core competence for Harman, for instance, its new mid-level infotainment platform is modular and could employ navigation software from a third party. Harman’s Becker Map Pilot, recently introduced by Mercedes in the SLK and C class, uses EB street director navigation software.

EB Engineering Centers

Germany: Erlangen, Munich, Gaimersheim (Ingolstadt), Böblingen (Stuttgart), Braunschweig (Wolfsburg), Konstanz
Japan: Tokyo
China: Shanghai, Beijing
Austria: Vienna
France: Paris
USA: Novi, Michigan; Bothell, Washington

EB Automotive Software Products

- EB GUIDE
  - HMI design tools and runtime frameworks
  - Navigation software for automotive-grade navigation systems, PNDs and other mobile devices
- EB tresos
  - Autosar software components used in ECUs and tools for their configuration and testing
- EB Assist
  - Software development environment for driver assistance systems
- Network Communications Solutions
  - For FlexRay, CAN, LIN

HMI design tools and runtime frameworks, navigation software for automotive-grade navigation systems, PNDs and other mobile devices, Autosar software components used in ECUs and tools for their configuration and testing, software development environment for driver assistance systems, Network Communications Solutions for FlexRay, CAN, LIN.
“A tier one may decide to use our navigation software as opposed to building their own because we can bring in innovation from the PND space and we could provide economy of scale. We can ship software to many different suppliers and OEMs, and may have a much higher volume than they have with their own systems,” Mr. Schleicher said.

Rather than developing brand new product lines, the company focuses on developing extensions to its existing product lines. EB recently announced that version 7.0 of EB street director, due to be released in the third quarter of 2011, will include support for mobile data services as well as enhanced graphical features such as 3D. According to IMS Research, connected navigation head units will comprise 56% of the global automotive navigation head unit market by 2018.

Increasingly navigation will be linked to driver assistance features such as adaptive curve lighting, which anticipates an upcoming curve and adjusts the headlamps to provide optimum illumination, or curve speed warnings, or downshifting automatically for upcoming hills. EB Assist ADTF (Automotive Data and time Triggered Framework) for driver assist systems development is used in R&D, hardware in the loop testing, simulation and validation. ADTF was developed by Audi; EB is making it available to the general automotive market.

◆ EB tresos

The EB tresos product line of software and development tools is devoted to the creation of software used in powertrain, chassis and restraint system ECUs, not in infotainment systems. EB tresos is based on Autosar, the automotive software standard that lets carmakers and suppliers reuse proven software. EB has been a premium member of Autosar since 2004 and is presently adapting its tools and software to version 4.0 of the standard.

EB tresos would have accounted for a larger share of EB’s business if Autosar’s adoption by carmakers had been faster. According to Jochen Schoof, vice president of the ECU business, “As we have anticipated, adoption of Autosar has been slow, but its adoption by carmakers worldwide is inevitable because of the growing complexity of electronics in the car and the benefits of software reuse. Carmakers need Autosar—just the definition of the standard has already created a market for software tools in the ECU space.”

EB sells the full Autosar software stack and a single tool environment that covers the complete V model, including support for FlexRay, CAN and LIN network development and the OSEK operating system. EB supplies Autosar-compliant software to BMW.

EB tresos tools are licensed to all major European carmakers and most of the top tier-one suppliers. EB’s main Autosar

Key Alliances and Partnerships

◆ Ford: EB worked with Ford to develop two applications for Ford Sync: 911 Assist and Vehicle Health Report, both in 2007. EB also developed AppLink, which allows mobile applications running on smart phones to interact safely with the vehicle through Sync.

◆ dSPACE: In March 2010 EB and dSPACE announced a cooperative agreement to integrate their Autosar tools, EB tresos and dSPACE’s SystemDesk, to provide developers with a seamless tool chain for creating production-ready ECU software. Successful linking of the tools is based on a consistent description of the ECU that complies with the Autosar standard and includes information about the application software modules and the configuration of the basic software.

◆ Infineon: EB and Infineon developed a multicore reference implementation based on Infineon’s TriCore technology that is particularly well suited to safety-critical applications.

◆ Microsoft: EB has been a Microsoft Gold Partner for Windows Embedded for many years. EB GUIDE is well integrated with Windows Embedded Automotive 7.

◆ QNX: EB and QNX collaborated to develop a new reconfigurable automotive instrument cluster.
48 Volts...

Other power-hungry features that would benefit from a 48-volt power supply in a conventional vehicle include heated windshields and high-power audio amplifiers.

In making the case for 48 volts, Mr. Michael was keen to point out that mild hybrid vehicles, even those without dynamic chassis control, will benefit from 48-volts. In a 12-volt battery system, braking energy recuperation is limited to about two kilowatts. “With a 48-volt starter-alternator you can improve this to eight kilowatts and reduce power consumption and [thus] fuel consumption in the whole vehicle,” he said.

More than a decade ago the German auto industry wanted a 42-volt bus. Now they want 48 volts. That number was chosen because it is still well below the 60 volts limit, which would require the added expense of shielding terminals against shock hazard while being an even multiple of standard lithium ion battery cells. “You can take 13 cells and have exactly 48 volts,” said Mr. Michael.

If the industry responds positively to the initiative by coming up with a 48-volt architecture and cost-effective components, Porsche would like to put an implementation on the road by 2015 or 2016.

Partial Network

Also at the Ludwigsburg meeting the German Five will publicize their efforts to develop partial networking technology for plug-in hybrid and electric vehicles. A system is needed that wakes up only the components required for charging, which then go back to sleep once charging is completed. Without partial networking the vehicle’s ECUs would quickly exceed their specified operating life.

“To do this, a new CAN transceiver must be developed, a costly effort that will require a lot of work. But it is needed, not only for normal charging in the middle of the night but also for preconditioning the vehicle with the climate control system in the morning from the charger and not from the battery,” explained Mr. Michael.

Ludwigsburg Auto Electronics Conference Recommended

Of all the conferences I attend around the world, Advances in Automotive Electronics, set in a lovely park in Ludwigsburg, Germany, is one of my favorites. Top electrical engineers from the German carmakers and top executives from key German suppliers will only plan the conference but make most of the presentations. The presentations are usually authoritative and geared to a management-level audience. Covering subjects vital to advances in German automotive electronics, each presentation is followed by a short exchange between the audience and the speaker that further illuminates the subject. This year’s presentations will cover the subjects of electro-mobility, connectivity and architecture. Among the presenters are Dr. Elmar Degenhart, CEO of Continental; Elmar Frickenstein, head of E/E and driver environment, BMW; Dr. Tatsuhiko Fujihira, chief technical officer, Fuji Electric; Uwe Michael, head of E/E, Porsche; Matthias Müller, CEO of Porsche; Dr. Peter Rieth, member of the executive board, Continental; and Stephan Wolsfried, head of E/E and chassis, Daimler AG. The sessions are moderated by Dr. Willibert Schleuter, former head of E/E, Audi, and Dr. Peter Thoma, member of the supervisory board of Elmos Semiconductor.

The conference organizer is the publisher of Automobil Elektronik magazine. Simultaneous English translation is available.

Dates: June 7-8, 2011
Location: Forum am Schlosspark, Ludwigsburg, Germany
Hotel: Nestor Hotel Ludwigsburg
Registration: www.elektronik-tagung.de

Body Control...

“Using EE architecture optimization tools together with our scalable building blocks, we work closely with Packard Electric, our sister division that does wiring and connectors, to minimize the overall cost of the wiring,” said Bob Schumacher, general director, advanced product and business development, Delphi Electronics and Safety. “No other tier one can do that.”

Using its optimization tool, Delphi has done some studies looking at the whole vehicle. The results: “A typical vehicle might have 40 computing centers in addition to the powertrain,” said Dr. Schumacher. “If you can get that down to eight or 10, you can take out 25% to 30% of the cost. You can eliminate a lot of cut leads, a lot of connectors, power supplies and boxes. You end up with more processing power in the body computer and a connector with many more wires into it.”

Despite the cost savings, one of the challenges of highly integrated body control modules is the high number of leads that must come into and out of the unit, which can make the connector and the cable leading to the module unwieldy. Thinner wires capable of carrying the small amount of current for signaling could be used if they weren’t so fragile.

Energy Management

Another challenge for body control module developers is coming up with ways to limit energy consumption. “It is not only a matter of picking the right components, it is also a matter of intelligent E/E architecture,” noted Hella’s Mr. Menge. “We are developing partial network solutions for our customers that partition the vehicle to switch off any electronics that aren’t needed and maintain only the functionality that is needed. We will deliver systems with this capability by the end of 2012.”

While body control may not be as sexy as driver assistance or infotainment, Freescale’s Mr. Lehmann still sees many challenges in the details. “There is complexity and that brings challenges that require innovative solutions. Developing 1.5 to 3 megabytes worth of bug-free software or integrating software from multiple suppliers so that it is clean and operates seamlessly are huge challenges. Add to that all the measures that must be taken to reduce current consumption so wire sizes can be reduced. We are using more smart drivers that have diagnostics capability. And the number of loads keeps increasing. There is a lot of innovation happening in this space,” he noted.