Arm buys Apical to attack connected vehicle market

Arm has acquired the entire share capital of computer vision company Apical as part of its move into markets such as connected vehicles, robotics, smart cities, security systems, industrial and retail applications, and IoT devices.

The Cambridge-based IP firm paid $350m for Apical, one of the UK’s fastest-growing technology companies. Its imaging products are used in more than 1.5 billion smartphones and approximately 300 million other consumer and industrial devices.

Arm plans to use the imaging products for next generation vehicles where intelligent image processing is needed. Apical’s technology will complement the Arm Mali graphics, display and video processor roadmap.

“Computer vision is in the early stages of development and the world of devices powered by this exciting technology can only grow from here,” said Simon Segars, CEO of Arm. “Apical is at the forefront of embedded computer vision technology, building on its leadership in imaging products that already enable intelligent devices to deliver amazing new user experiences. The Arm partnership is solving the technical challenges of next generation products such as driverless cars and sophisticated security systems. These rely on the creation of dedicated image computing and Apical’s technologies will play a crucial role in their delivery.”

Apical’s IP business was founded in 2002 and employs around 100 people, mainly at a research and development centre in Loughborough, UK.

“Apical has led the way with new imaging technologies based on extensive research into human vision and visual processing,” said Michael Tusch, CEO and founder of Apical.

A to Here for London roads

Location cloud company Here has mapped London in preparation for autonomous cars, as manufacturers plan to start trialling driverless vehicles on public roads as early as 2017.

The mapping specialist has used lidar technology to provide data that can be used by driverless cars to understand the world around them. It has also created a range of 3D image models of the UK capital to show the level of detail that vehicles will have at their disposal.

Using its fleet of collection vehicles, the company can record 700,000 3D data sections per second, allowing it to pinpoint curbs, trees and road furniture to a 10cm accuracy. These data are then transposed onto a detailed, dynamic representation of the road.
Aston Martin and Spirent extend GPS partnership

After a year of getting to know each other, Spirent Communications and Aston Martin Racing have cemented a technical partnership to evaluate technologies on the V8 Vantage GTE race cars with the aim of improving the accuracy and performance of GPS receivers and interference monitoring.

“After a year of getting to know each other, Spirent Communications and Aston Martin Racing have cemented a technical partnership to evaluate technologies on the V8 Vantage GTE race cars with the aim of improving the accuracy and performance of GPS receivers and interference monitoring,” said Stephen Douglas, technical strategy lead at Spirent Communications. “That has now become a larger part of our business.”

The ability to capture real world GPS receiver signals during testing and replay the data in simulated track scenarios gives Aston Martin a perspective on their GPS signal performance before arriving at race events. In the vehicle, there is a GPS module that is monitored by the FIA, and that provides the governing body with positional and speed information as well as data for the pit crew.

“We are working with them to minimise the error, because in racing milliseconds count,” said Douglas. “We also monitor the spectrum to see what interference could come up. We started the partnership last year. The first year was a get to know each other relationship. We realised there were a lot of synergies, so we have extended it.”

As an official partner, Spirent branding will appear on the Aston Martin cars for the 2016 World Endurance Championship. “Using Spirent tools during testing means we can capture data and simulate many on-track scenarios in a controlled and repeatable environment back at base, which is a process that is invaluable when benchmarking our GPS receiver accuracy and performance through the season,” said Paul Howarth, team principal of Aston Martin Racing.

Magna acquires Telemotive

Magna has signed an agreement to acquire Telemotive, an engineering service provider in the field of automotive electronics. Subject to regulatory approval, the transaction is expected to close this quarter.

Once complete, Telemotive, with its five German facilities and approximately 550 employees, will be integrated into Magna’s vehicle engineering and contract manufacturing operating unit, Magna Steyr. The addition expands Steyr’s engineering service portfolio in vehicle connectivity, HMI and infotainment.

“This acquisition strengthens our position to not only help customers meet today’s challenges, but also those of the car of the future including the increased integration of electronic vehicle systems,” said Karl-Friedrich Stracke, president of Magna Steyr. “We are excited to combine our holistic vehicle engineering knowledge with Telemotive’s electronics know-how.”

Autotalks helps Savari with V2X for smart cities

Autotalks is helping Savari provide V2X communications for US smart cities such as New York and Tampa, Florida, and other smart transportation projects including the movement of freight through the I-80 east-west corridor in Wyoming.

All three pilot sites are participating in the Connected Vehicle (CV) Pilot Deployment programme sponsored by the US Department of Transportation. The companies are collaborating to deliver secure V2X that is ready for smart city use. The joint systems, which use an integrated software stack and applications from Savari and VLSI systems from Autotalks, will let the three Wave One participant cities in the CV Pilot Deployment programme access proven, field-tested V2X communications technologies.

Savari delivers a complete suite of V2X safety communications technologies that enable connected vehicles to interact with other vehicles, roadside infrastructure, smartphones and pedestrians.

“Autotalks is known for its strong security background and is a perfect complement to Savari’s V2X software. We look forward to working closely with Autotalks to deliver these reliable, secure solutions to the cities and state DoTs in the US DoT CV pilots.”

Autotalks provides OEMs, tier-one and tier-two customers with V2X chipsets that deliver security features, ensuring reliable communications between vehicles and roadside infrastructure.

Autotalks has licensed and deployed the Ceva-XC communications DSP in its upcoming second-generation V2X chipset.
Ford has invested in software company

Ford has invested US$282.2m in Pivotal, a cloud-based software platform company headquartered in San Francisco, to enhance its software development capabilities and deliver innovations to customers more quickly.

The investment aims to help drive Ford’s transition to a a mobility company, while continuing to focus on and invest in its core vehicle business. At the same time, the company is pursuing emerging opportunities through Ford Smart Mobility – its plan to be a leader in connectivity, mobility, autonomous vehicles, the customer experience, and data and analytics.

“Expanding our business to be both an auto and mobility company requires leading-edge software expertise to deliver outstanding customer experiences,” said Mark Fields, Ford president. “Our investment in Pivotal will help strengthen our ability to deliver these customer experiences at the speed of Silicon Valley, including continually expanding FordPass – our digital, physical and personal mobility experience platform.”

Ford recently teamed up with Pivotal to deliver FordPass, a consumer experience platform that launched last month. FordPass will offer customer services, such as remote access to vehicles through a smartphone app, and mobility, such as parking and car sharing.

Innovating and iterating quickly, Pivotal and Ford engineers are working side-by-side to create new consumer experiences for FordPass members.

Building on this existing relationship, Ford plans to accelerate the incorporation of Pivotal’s software development methodologies and technology across the IT, product development, and research and advanced engineering teams. Ford will put Pivotal’s next-generation cloud platform and analytics capabilities to use on the company’s new mobility projects.

“We are at a major inflection point in global business, and Pivotal is at the fulcrum of that change,” said Rob Mee, Pivotal CEO. “We are collaborating with iconic companies like Ford to help transform their businesses with our unique software development methodology and modern cloud platform and analytics tools.”

Ricoh partners 14drive on displays

Japanese electronics manufacturer Ricoh is partnering adas company 14drive to develop display equipment for automotive use. 14drive technology will be integrated into Ricoh’s high-level optics display to increase driver safety and enhance the driving experience.

This collaboration will be carried out as part of the Japan-Israel cooperation programme, which is supported by Nedo (New Energy & Industrial Technology Development Organisation in Japan) and OCS (Office of the Chief Scientist of Israel).

“We are very pleased to partner with 14drive,” said Teruaki Mitsuya, executive general manager at Ricoh. “With their technology we can deliver powerful products to the automotive industry. I am confident this collaboration will bear fruits.”

The display equipment will be available for car manufacturers and after-market vehicles. In addition to driver safety, it will offer capabilities such as in-vehicle information, assistance and connectivity. The market for adas has grown in recent years and is expected to reach US$60bn by 2020.

“The collaboration with Ricoh is another important step for 14drive in expanding its product offering to new platforms and industries,” said Adi Goren, CEO of 14drive.

Ittia and Green Hills platform deal to tackle data sharing

Crank Software, Green Hills Software, Integrity Security Services and Ittia have teamed up to create a joint platform to let car makers capture, query and share data securely and efficiently in autonomous and solar powered vehicles.

The combination of the ISO 26262-certified Integrity rtos, Ittia DB SQL database, embedded cryptographic toolkits, and device lifecycle management system and embedded user interface allows the development, manufacture, and maintenance of complex in-vehicle systems.

Driverless vehicles will need to capture, manage and share a large volume of logging and operational data. This joint approach aims to let car manufacturers realise the potential in reducing the risk of software failure, preventing malicious software attacks, and delivering the best experience to drivers and service technicians. This includes the UI framework from Crank enabling automotive designers and embedded engineers to work in parallel.

To leverage new energy technologies, such as hybrid engines and solar power charging, vehicles must capture and integrate information from many sensors. For example, when a sensor monitoring the battery generates a warning, queries must be executed to determine the severity of the issue and investigate a workaround. The on-board software is responsible for correlating data collected from many different sensors, which can be accessed locally or remotely.

Data are secured at rest and over the air by Integrity and ISS cryptographic toolkits during manufacturing with keys by the device lifecycle management system.

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Tier one suppliers suffer as OEMs deal direct with vendors

Tier-one suppliers are losing their roles as system innovators and developers in the autonomous vehicle market, according to ABI Research. This is occurring as more OEMs engage directly with software developers and hardware and semiconductor vendors.

“It is becoming evident that no single tier-one supplier can deliver a complete autonomous driving system,” said ABI analyst James Hodgson. “As a result, OEMs are increasingly engaging directly with component vendors, and becoming more aligned with product roadmaps across the value chain.”

But he said tier ones will not disappear and still held an important role in functional safety, one that required a more overarching and holistic view than any component vendor could hold.

Evidence of OEM commitment to autonomous driving is apparent from recent merger and acquisition activity. This includes the purchase of Here maps by Audi, BMW and Daimler and GM’s purchase of Cruise Automation, showing that OEMs are willing to own parts of theadas value chain to enable autonomous driving.

The adas ecosystem will be further disrupted by new comers to automotive, as the increasing sophistication of adas necessitates greater processing power, attracting vendors such as Nvidia, Qualcomm and Intel to join an adas semiconductor market dominated by NXP and Renesas.

Such vendors have a strategy of entering the vehicle via the infotainment system, before building the competency for safety-critical applications. However, this is not unique to new comers, as Hodgson explained.

“There is a growing trend in which incumbents reposition or widen their automotive portfolio to extend beyond infotainment,” he said. “For example, recent launches by Visteon and Harmon, traditionally known for theirinfotainment offerings, signal an attempt to improve growth through entry into adas.”

CPT, Ricardo, Provector and Tata partner on rear driveline

Controlled Power Technologies, a developer of vehicle driveline electrification based on switched-reductance machines (SRMs), has partnered with Ricardo, Tata Motors and Provector to apply its low voltage electric motor technology to the rear driveline of a B-segment city car.

The consortium has secured a funding award from Innovate UK, which will be contributing £1.8m of the £3.4m investment. The investment will help introduce advanced mild hybrid functionality to mainstream vehicles at reduced cost to that of high voltage plug-in hybrid or pure electric vehicles. The electrified rear axle technology could be an important step in enabling OEMs to improve both regulated and real world fuel economy in modern urban city driving conditions.

The objective of the Fever (Forty-Eight Volt Electrified Rear-axle) two-year project is to achieve a CO₂ reduction of up to 15 per cent over the regulatory cycle through the development of two through-the-road hybrid demonstrator vehicles. Integrating the electric motor within the rear axle will enable features such as low speed electric driving or e-creep, as well as electrically assisted all-wheel drive, which will deliver additional significant savings over a typical representative city drive cycle.

The technology could allow a car maker to reduce the in-use carbon dioxide emissions of such vehicles by approximately 25g/km.

“This programme will require a high level of project management and engineering cooperation,” said project director Peter Scanes, “not least in the unique application of a low-voltage high temperature tolerant SRM, which has to be oil-cooled and packaged as efficiently as possible into a rear axle and suspension module complete with advanced lead-carbon battery.”

CPT will lead the project and will be responsible for developing the electric motor and control system, and will support their integration into the rear axle module. Provector has experience in the control and management of lead-carbon battery chemistry through projects such as Adept and its involvement with the Advanced Lead Acid Battery Consortium. Ricardo’s responsibilities within the project will be the design and analysis of the integrated 48V rear axle module, development of the supervisory vehicle control system, sub-system testing and project management support, building on its previous work on the Adept and Ultran projects. Tata will supply the base vehicles, develop the suspension, and provide support for the application of the technology and overall vehicle integration and testing.

“The mass roll-out of electrification within the urban transportation fleet will require new and innovative power architectures that provide a performance, value and emissions trade-off that will be attractive to potential customers,” said Stephen Doyle, Ricardo hybrid and electronic systems product group head. “Ricardo believes a 48V electrified rear axle offering through-the-road hybrid performance – including significant engine-off operation – will be highly attractive for many market segments but particularly for those that predominate in urban transportation.”
**NXP Bluebox demo for autonomous vehicles**

At last month’s FTF technology forum in Texas, NXP Semiconductors demonstrated a manufacturable autonomous vehicles platform using its Bluebox engine, and deploying silicon and software at each adas node.

The demo incorporated the Bluebox central computing engine, with radar, lidar and vision sensing, as well as an on-board secure V2X system.

The Bluebox engine works in NXP’s autonomous vehicles platform to provide OEMs and suppliers with technology to meet safety, power and processing requirements.

“With this industry-first platform, NXP is leveraging its worldwide automotive silicon leadership to dramatically advance the state of autonomous vehicles,” said Kurt Sievers, general manager of NXP’s automotive business. “Our systems-level expertise, deep understanding of complex adas engineering, and broad portfolio of NXP products meeting automotive grade, ISO 26262-level functional safety requirements, all position NXP as the definitive silicon provider capable of single-handedly speeding the readiness and availability of the self-driving cars of tomorrow.”

In autonomous vehicles, multiple streams of sensor data are routed to the Bluebox engine, where they are fused to create a 360° world model around the vehicle. This improves car safety by managing and preventing emergency situations. Bluebox and its connected secure smart products also incorporate embedded intelligence and machine learning for situational assessments, supporting classification tasks, object detection, localization, mapping and vehicle driving decisions.

Unlike closed systems focused only on vision or other single-sensor data streams, the engine is an open-platform, Linux-based system programmable in linear C language that automotive manufacturers can customize to their needs.

The engine incorporates NXP’s S32V automotive vision processor, as well as the LS2088A embedded compute processor that integrates eight 64bit Arm Cortex-A72 cores running at 2GHz, along with accelerators, communications interfaces and DDR4 memory controllers for low latency.

The power result is 90,000DMPs of performance at under 40W.

**Airbag sensor distinguishes between child and groceries**

Bebop Sensors has developed a way to let airbags deploy more safely by providing intelligence about the car occupant.

Using smart fabric sensor technology, the OCS occupant classification system uses embedded car seat sensors that continuously take full seat pressure images in real time. They detect pressure information and movement from the entire seat for all aspects of physical contact between the occupant and the seat, including leaning forward or back, left or right, crossing legs, detecting the rigid bottom of a child’s booster seat, the occupant’s size and weight, and more.

Most current systems only estimate the weight of a passenger to deploy or disable airbags when determining if a child or infant car seat is placed on the front passenger seat. In these, a bag of groceries and a small child look the same, since they rely on a combination of bladders, hoses and pressure sensors to estimate the weight on the seat.

Armed with only weight information, very little intelligence is used to determine airbag deployment, resulting in numerous malfunctions.

“Anyone trying to determine a person’s position, size and seating attitude using only weight is making a faster horse,” said Keith McMillen, Bebop founder and CEO. “That technology is now obsolete. You can tell more about a person through a picture than a scale.”

Bebop’s sensing system provides more granular detail to distinguish subtle details and changes to an occupant’s position and movements in real time. The flexible, waterproof sensor system, at 1mm, is thin enough to be placed under the seat cover. The fabric-based sensors are lighter than other liquid-based options. There are also no moving parts, increasing reliability.

The sensors are automotive grade for environmental specifications and durability and can be custom designed for any seat in the front or back row.

The California company is now working with OEMs to develop and deploy custom fabric sensors.

**Mobileye and STM co-develop autonomous SoC**

Mobileye and ST Microelectronics are co-developing the next generation of Mobileye’s EyeQ5 SoC, to act as the central computer performing sensor fusion for fully autonomous driving vehicles starting in 2020.

Engineering samples of EyeQ5 are expected to be available by first half of 2018. First development hardware with the full suite of applications and SDK are expected by the second half of 2018.

To meet power consumption and performance targets, the EyeQ5 will be designed in 10nm or below FinFet technology node and will include eight multithreaded CPU cores coupled with 18 cores of Mobileye’s vision processors. Taken together, these will increase performance eight times over the EyeQ4.

The EyeQ5 will produce more than 12 tera operations per second, while keeping power consumption below 5W to maintain passive cooling.

“EyeQ5 is designed to serve as the central processor for future fully-autonomous driving for both the shear computing density, which can handle around 20 high-resolution sensors, and for increased functional safety,” said Amnon Shashua, CTO of Mobileye.

STM will support physical implementation, memory and high-speed interfaces, and system-in-package design to ensure the device meets qualification processes.
While there is little doubt that we are on the road to the dominance of electric vehicles, the move is not happening quickly enough to meet short-term emission goals. Thus the stopgap may have to be plugged by so-called 48V mild hybrids.

So believes Peter Harrop, chairman of IDTechEx, who pointed out that analysts and manufacturers were predicting that less than half the vehicles would be pure hybrids or electric vehicles by 2026.

“But the emission laws mean there will still be a lot of illegal vehicles,” he told the conference.

He described the work being done over the past two years on 48V mild hybrids as a “rescue mission” as it let the design of existing vehicles be modified with a 48V battery and a DC-DC converter to meet pollution requirements.

“These are not electric vehicles yet but they are a way of making a hybrid vehicle that doesn’t plug in and can be done with only a slight modification of the production line,” he said. “It is the least cost, easiest way to meet the regulations.”

Even though Europe was leading the way with this, most major car makers were working on it. Though they don’t exist yet, he said next year they would be in production from the likes of Audi and Mitsubishi.

And he quoted figures from Valeo that said such vehicles would be 50 to 75 per cent cheaper than those with a full hybrid powertrain. The cost though is in extra weight, with Hyundai saying the extras added up to 48kg.

“Existing powertrains have run out of development potential,” he said. “The end game is pure elec-
The Nuon Solar Team from the Netherlands was on hand to explain how they had won seven of nine solar challenges in Australia and what was the motivation for these Dutch students.

“We are students who set aside our studies for one and a half years to build a solar power car,” said public relations manager Winnifred Noorlander (below). “We want to see everyone driving electric vehicles and we want to show everyone what is possible with renewable energy.”

She the key was their focus on eight factors. First is teamwork.

“If you don’t have a good team, then the end product will have less quality,” she said. “The second factor is partners. This gives us more knowledge than just the team members. Plus you get lots of components, which means you can spend more money on research and development.”

The third factor was the solar array and the electronics that go with it. The array is limited in size so the trick was to make it more efficient.

Aerodynamics is the fourth factor. “Wind resistance accounts for two-thirds of the energy we lose,” she said. “The whole car now has the same wind resistance as a normal side mirror on a car.”

Next comes rolling resistance. The team made a carbon-fibre body with a few aluminium parts, and even the small amount of aluminium will be cut back in the next couple of years.

Handling is another factor. “We have to make sure everyone can handle it without breaking it,” she said.

Quality and reliability form factor seven and when it comes to the race the eighth factor of strategy comes into play.

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Ervin Tal-Gutelmacher: “We use an alkaline membrane.”

Ralph Stömmer: “Introducing 48V is a way to make combustion engines survive for at least the next ten years.”

Andy Fuchs: “Renewables are the way forward.”

“Average CO₂ reduction for mild hybrids is 17 per cent, but there is a wide spread around that. It is possible to boost this to over 20 per cent with active engine-off coasting.”

As to the 12V lead-acid batteries, Harrops said there was a lot of speculation as to how long they would continue being put into vehicles. He said even though some were predicting as long as 15 years, he said it would be more like ten years.

Generally, he said pure electric vehicles were going up in voltage “very fast”. Despite the renewed interest of 48V, some EVs were heading for 800V.

Andy Fuchs from Toyota Motor said renewable energy was the way forward for EVs and that hydrogen was the ideal element.

“The beauty of hydrogen is it can be obtained from several primary sources,” he said. “It can come from sewage sludge, for example.”

He said even though the infrastructure was not in place for refuelling such vehicles, the move had to start somewhere.

“Renewables are the way for-
Transphorm’s director of sales Luc Van de Perre (above) is a fan of gallium nitride (GaN), especially compared with silicon. “GaN has advantages over silicon in terms of higher power density,” he told delegates. “This lets you use smaller components. You can switch faster with silicon but the power losses go up. That is why you can go to a higher power density with GaN.” He said the higher switching frequencies also led to higher efficiencies. He was also critical of Jedec tests when it came to GaN.

“The Jedec tests for silicon are easy for GaN,” he said. “GaN laughs at Jedec. That is why we test above and beyond Jedec.”

His company is targeting electric vehicles and their charging stations with the technology. “In automotive, there are areas where 660V GaN devices are needed,” he said. “These include single and three-phase AC charging, DC charging and inductive wireless charging. Also, DC-DC step down from high voltage to 12 and 48V systems, the inverter for the AC motor and the AC outlet in the car.”

He described GaN as the “ideal choice” for automotive power applications in electric vehicles and pure hybrids. He admitted though that the GaN sweet spot was 650V and that for some higher voltages silicon carbide (SiC) was better. “SiC will do well when you need high power and high temperature,” he said. “SiC can handle higher temperatures better.”

He said to help boost the market, Toyota was sharing for free all its patents on hydrogen fuel cell vehicles.

Cost

The highest barrier to most fuel cell technology is cost, said Jörg Wind, who is in charge of strategic energy products at Daimler. “We need to bring the cost down with technology development,” he said. “But we also need to establish a competitive supplier industry that can supply low-cost components. And we need the scaling effects of mass production.”

He said a major problem was there was no consumer market for fuel cells as there was for Li-ion batteries.

Michael Harenbrock, business development manager at Mann + Hummel, also said fuel cells were too expensive. “Fuel cells have reached a maturity in that they work,” he said, “but they are too expensive.”

He also said there were other markets for fuel cells such as combined heat and power (CHP) schemes, notably in Japan. “CHP installations are the early market for fuel cells before the vehicle market ramps up,” he said. “The same technology can be used in vehicles. You need standardised and scalable products to achieve cost reductions.”

Tackling the cost issue in a different way is Elbit Systems. Senior scientist Ervin Gutelmacher said the company was working on a platinum-free membrane fuel cell. “We use an alkaline membrane,” she said. “Platinum can account for forty per cent of the cost. Our membrane has great potential because of the cost.”

Wind agreed with Fuchs that the lack of a hydrogen infrastructure was a problem. “We will build 2400 hydrogen fuel stations by 2023,” he said. “These will be funded by oil and gas companies as well as public funds.”

Fuel cells will be important for cities to hit emissions targets with public transport, said Manfred Schmidt, a senior director at Siemens. This was because while metros and trams were becoming more popular, they lacked the flexibility of buses when it came to adapting as cities changed.

“Many cities will need to set targets to have their bus traffic emission free,” he said. “There are various strategies such as battery swapping and on-road charging. There is no right way. But the only way if you really want zero emissions is a battery with a small fuel cell as an extender.”

Manfred Schmidt: “Buses bring flexibility.”

Jörg Wind: “We need to bring the cost down.”

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“Many cities will need to set targets to have their bus traffic emission free,” he said. “There are various strategies such as battery swapping and on-road charging. There is no right way. But the only way if you really want zero emissions is a battery with a small fuel cell as an extender.”
Learning experience

Dick Selwood reports from last month’s Device Developers’ Conference in Cambridge

The Device Developers’ Conference (DDC) has become an annual highlight for the UK embedded engineering community and this year its importance was recognised by Misra as it chose the event to launch clarifications to its coding standards.

As reported last month (Vehicle Electronics, May 2016), the new Misra documents cover safety and security and deviations. As part of this, Chris Tapp of LDRA and the chair of the Misra C++ committee looked at the thorny question of compliance. Even though the Misra guidelines are explicit on what is needed to claim that software is Misra compliant, all too often suppliers make a general claim and expect it to be taken on trust.

With the release of “Misra Compliance: 2016 – Achieving compliance with Misra coding guidelines”, it is now clearer what is needed in terms of documents and evidence.

The major issue with Misra compliance is that it is possible to deviate – that is make a case for not using some of the rules and still be in compliance. But these deviations need to be documented and Misra Compliance: 2016 provides the structure for this, while another new document – “Misra C: 2004 Permits – Deviation permits for Misra compliance” – provides examples and a rationale for many of the probable deviations.

Other papers in the workshop looked at the issues of security. Misra has analysed Misra C: 2012 against the ISO’s C Secure Coding Coverage and as a result produced an amendment with 14 new rules to improve the security role.

Also, there was an indication of future developments. Misra 201x will not be a complete re-think but will pull into one document Misra C: 2012, the compliance document, the security amendments and a document still to be published, Misra C: 2012 Technical Clarification, which will be built on user feedback.

Coding challenge

Phaedrus Systems, once again, ran a coding challenge at DDC. Entrants had to find the errors in a page of code, competing against each other and against PRQA’s QA-C analysis tool. The winner was Daniel Bailey, a research intern at Arm. “Not only did Daniel find the errors,” said Chris Hills of Phaedrus, “he annotated the code and produced an A4 page of notes explaining the whys and wherefores.”

Bailey now has a Fitbit.

Securing the gateway

For the internet of things, the gateway is going to be the key to overall security, according to Mark Pitchford of Lynx Software Technologies. The gateway provides the link between the things – the edge devices that contain sensors or internet toasters and so on – and the big data servers of the cloud through the internet.

Since many of the edge devices were not created with security in mind, it is the gateway that has to provide this.

It is Pitchford’s argument that this is best achieved through using a hypervisor that allows the gateway to create multiple domains using a mils (multiple independent layers of security) architecture.

Each domain will have its own operating system matched to its level of criticality. In automotive terms, the different domains could be those of the relatively uncritical infotainment systems and the extremely safety-critical areas of braking and steering.

Agile can work

Agile is a development process that can produce very strong reactions, both positive and negative. The proposal that Agile has a place in projects meeting safety standards and with large development teams was put forward by David Morris of Polarian, recently bought by Siemens.

In his approach, requirements are still specified up front along with the verification criteria. Actual implementation is then carried out using Agile techniques (or, as we called it in the 1960s, iterative development).

Morris said that while his company had found quite large projects where the development had been carried out first and then the requirements specified later, something he described as unusual, he preferred the more traditional approach of working to pre-defined requirements. He also pointed out that the Agile manifesto, in part, says: “We have come to value: individuals and interactions over processes and tools; and working software over comprehensive documentation.” But it does not say you do not need processes and tools, nor comprehensive documentation, and these are still important: if you are building to meet safety standards then they are essential.

Frightened by ISO 26262

In a presentation on testing complex safety-related systems, Mike Bartley of TVS talked about software people adopting the verification techniques hardware engineers, particularly those working on systems on chip, had developed.

He said constrained random testing, assertions, functional coverage and automated checking could play a valuable role in building systems to meet standards such as ISO 26262.

One throwaway line was that he had come across companies that saw the explosion in electronics in vehicles as a potentially lucrative market, only to pull back when they began to understand the organisational implications of implementing ISO 26262.

This year’s Device Developers’ Conference in Cambridge was a break from the pattern of previous years. A two-day event at one venue replaced the four-centre tour. And it was co-located with the Hardware Expo, giving two exhibition areas, and parallel sessions of presentations and workshops. The organisers report there were 22 companies exhibiting, including distributors who represented many more, and 150 visitors. Since some visitors came to both days, each day there were nearly 100 present. The event will be repeated on 26 and 27 April next year.
Dev-ops and continuous delivery are the current buzzwords surrounding application development methods. While distinctly separate, the methodologies have similar aims to align more closely the communities and processes involved in software development and deployment.

These aims help reduce the cost, time and risk of delivering changes, and ultimately increase value to customers by combining resources to allow more incremental changes to applications in production. While the terminology dev-ops and continuous delivery might be new, the principles they uphold are not.

Rewind to the early 1900s; Henry Ford was pioneering his own version of dev-ops. Early automotive production teams were highly skilled, cross-functional teams who manufactured, assembled and tested each vehicle to produce the optimum quality output. Ford’s goals were in common with ours today – to increase time to market and quality to gain a competitive edge. Even in this age, teams were working with an Agile approach, adapting quickly to changing needs and requirements of their customers.

So what has changed for our generation, how have things become so complicated? Put simply, an increase in volume, consumer expectation and demand, and the sheer advance in technological capability – we want it all and fast.

Henry Ford’s wisdom and insight meant he focussed on two main ingredients he thought necessary for success – the ability to repeat processes and standardise inputs and outputs. These two key practices helped reduce costs and increase quality, and these are exactly the same goals we strive for today. Understandably, the market has changed dramatically in scale and complexity since Ford’s time but standardisation and repeatable processes are at the heart of successful dev-ops and continuous delivery.

For software engineers in the 21st century, standardisation of inputs enables the repetition of processes that leads to system automation and the ability to manufacture a vehicle that satisfies not only consumer demand but industry regulations. The view of a dev-ops approach is positive overall.
At worst, the feeling is one of confusion about how to implement such a strategy. What is certain is that without the standardisation of inputs we are taken back more than 100 years to manual methodologies, which in the current climate would not produce vehicles fit for purpose.

Once understood, the benefits of a dev-ops approach are extensive, but what are the implications for the modern day automotive manufacturer?

As discussed previously, embedded software in the automotive industry is big business capable of swaying brand loyalty. The challenge with a dev-ops methodology in this sector is that automotive manufacture, and specifically embedded software development, is so fragmented. One of the goals of dev-ops is to align functionally separated departments, but with such a plethora of tools across the supply chain, creating and testing to prove software quality is a challenge.

In this safety critical industry, sub-standard software is simply not an option with so many features and functions relying on embedded software. In reaction to this, Asil, Autosar and ISO 26262 have been introduced to mitigate catastrophic failures, but still software glitches continue to make the news – Fiat and Jeep to name just two in 2015. Industry analysts have mooted that the auto industry will not be able to adopt ISO 26262 across the entire supply chain before 2020 as was hoped.

So what can be done to ensure a quality standard and compliance? As an interim, some major manufacturers are implementing ISO/IEC 15504 Software process improvement and capability determination (Spice) as a cross-functional standard for software quality and testing compliance as it is more straightforward to implement and prove that adequate testing has been achieved.

With so many regulations to comply with and numerous interested parties, it is clear to see that a more simple yet comprehensive answer needs to be found. If a dev-ops culture is the future of automotive manufacture, an easier way needs to be found to allow everyone in the supply chain to work together to uphold a quality standard and meet production deadlines.

IT is a central component of the dev-ops method and, with most of the development in the automotive industry being software driven, it comes as no surprise that an answer lies in improving processes through IT service delivery and removing computer-based tooling constraints. Dev-ops focuses on bringing people and teams together through improving collaboration between operations and development. Testing is a fundamental process in development and impacts on operational departments and so becomes the lynchpin.

Optimising a testing infrastructure by offering a common platform with test automation facilitates the dynamic structure that dev-ops demands. With such a focus on requirements-based testing and meeting changing customer needs, a test driven development practice with a test suite that offers functionality such as auto test code generation has to be the way forward, especially given the increasing speed of software development life cycles. Shortening the lead time for software tests through automation ensures that valuable time can be regained to develop software and APIs to enhance quality and therefore customer satisfaction.

Failure to involve downstream departments such as operations in a dev-ops environment means the production bottleneck is simply shifted further to the right. By making the software testing suite accessible to all, everyone can reap the benefits of faster testing, continuous and safe services delivered on time and on budget, with applications always being release ready. A report by Gartner says “to deliver at dev-ops speed and scale, the technology framework must be designed for human by exception, where as much work as possible is performed by programmatic means”.

With the challenge of accommodating changing requirements and the cyclical nature of the dev-ops environment, an automated testing platform allows all engineers the ability to test earlier; tests are faster and can be repeated as often as necessary. Extensive automation, whether it be test automation or application release automation, should become the hallmark of a dev-ops team. Not only does automation increase the speed at which products can be released but it also reduces the opportunity for human error that is a given in manual processes, thus increasing software quality. In a compliance driven world, automating testing processes and a common platform make it easy to provide proof of compliance and provide seamless integration across the tool chain.

Conclusion

It is clear that a dev-ops approach fits with the automotive industry’s goals to produce vehicles with maximum software quality, minimal technical debt, and a fast time to market. The hurdle is being able to roll out an effective dev-ops environment with the right tools. Over time, if a common testing platform is implemented the catalogue of automated test cases will increase in line with the rate of change based on developing customer requirements. Achieving this will allow manufacturers to release products faster and with greater confidence in software quality.

Niroshan Rajadurai is director of EMEA for Vector Software
Lead-acid batteries are widely used in a broad range of industries and applications. Golf carts and other industrial electric vehicles are typically powered by a stack of series-connected lead-acid batteries. The telecoms industry uses a series stack of four lead-acid batteries to provide a 48V stack. Energy storage products use lead-acid batteries in various series and parallel configurations to store energy generated by renewable sources such as wind and solar. Series-connected lead-acid batteries find extensive use in the uninterruptible power supply industry to provide backup power when the mains power is lost.

In all these examples, two or more lead-acid batteries are connected in series. When a single lead-acid battery in the stack fails, all the lead-acid batteries in the series stack need to be replaced to maintain battery stack performance. This is a considerable expense.

When batteries are manufactured, they conform to tight specifications for parameters such as energy capacity, effective series resistance, leakage current and number of discharge cycles to ensure quality, guarantee a minimum lifetime and meet various standards. Furthermore, these specifications only apply to a single battery.

There are variations in battery specifications due to limitations in the manufacturing process, and when multiple batteries are stacked in series these specifications no longer apply to the battery stack.

Batteries connected in series will drift over time due to unequal leakage currents, and capacities of individual batteries may change over time. Extreme operating conditions and frequent discharge cycles further exacerbate these problems, which eventually cause one of the batteries in the stack to fail. At that point, the entire battery stack is deemed to be bad, and all the batteries in the stack require replacement.

Replacing a failed battery itself does not solve the problem since the replacement battery’s characteristics would be very different from other batteries in the stack and stack failure would recur. This problem is true for battery stacks made with batteries of any chemistry, not just lead-acid batteries. In most series-connected battery stacks, only the voltage at the top of the stack is measured, and it is assumed the batteries in the stack are matched and hence share charge equally. Fig. 1 depicts a scenario in which the top of the stack voltage is programmed to be 53.2V, but the individual battery voltages are unknown and may not all be 13.6V. Since not all batteries in the stack will share charge evenly, some of the batteries in the stack might be severely overcharged while one of the batteries may remain undercharged.

Overcharging lead-acid batteries causes the electrolyte water to break into oxygen and hydrogen gas, which depletes electrolyte.

Aspiyan Gazder describes a method for keeping lead-acid batteries balanced.

Fig. 1: Top of stack voltage is not divided evenly across the batteries in the stack.
levels in the batteries. This has two effects. The concentration of the sulphuric acid in the electrolyte increases, which is damaging to the battery plates and reduces battery life. Furthermore, since the electrolyte level has dropped, a portion of the plates is now exposed to air, causing plate oxidation and reducing battery capacity.

Sealed lead-acid and gel batteries are particularly sensitive to overcharging since any lost water cannot be replaced. Undercharging lead-acid batteries causes plate sulphation in which the sulphuric acid reacts with the plates to form lead sulphate crystals. This reduces the ability of the battery to accept a full charge, and undercharging worsens. This leads to premature battery failure.

To increase battery stack life, individual batteries in a stack need to be balanced. Conventional wisdom is that overcharging a series stack of lead-acid batteries achieves balancing of the individual batteries in the stack, which in theory helps increase battery life. However, this is a flawed approach.

The only way to ensure that all the batteries in a stack are at the same voltage is by employing a balancing method in which overcharged batteries shed excessive charge while undercharged batteries are given extra charge. An efficient battery balancer requires a switch network that can be used to move charge from one battery to another to achieve a balanced battery stack.

The control circuitry is complex and a discrete implementation is large and costly. However, there are available active lead-acid balancers that enable individual batteries in a series-connected stack to be balanced to each other.

Fig. 2 shows an application in which a single balancer is used to balance four series-connected lead-acid batteries. Each battery in the stack is individually and sequentially connected in parallel with an auxiliary cell using a network of ten external low RDS(on) npn transistors controlled by the balancer.

If the voltages are different, current will flow in the appropriate direction until the voltages of the individual battery and the auxiliary cell are equal. The balancer then commutates to the next battery in the stack.

This sequence continues (1, 2, 3, 4, 1, 2, 3, 4) until all batteries in the stack and the auxiliary cell are voltage balanced to within a specified threshold, as shown in the curve in Fig. 3.

The maximum amount of current permitted to flow during any connection is limited by an external positive temperature coefficient thermistor element.

The balancer provides two modes of operation, which are programmable via the mode pin and four termination thresholds, which are programmable via the term1 and term2 pins. The balancer also has overvoltage and undervoltage comparators that monitor the battery voltage and report a fault if the battery voltage is beyond the programmed threshold. The undervoltage and overvoltage thresholds are programmable using the VL and VH pins, respectively, in conjunction with the ISet pin.

Multiple devices can be stacked to balance battery stacks consisting of more than four series-connected lead-acid batteries. In Fig. 4, three devices are used to balance up to ten batteries in a battery stack. Each device needs its own auxiliary cell for the balancing operation.

Balancing lead-acid batteries using the device also has other benefits. Low voltage circuits can be powered from intermediate stack nodes without creating an imbalance in the battery stack, as shown in Fig. 5. This helps reduce costs since discrete components and IC costs scale with rated voltage. The capacity of the auxiliary cell supplements the stack capacity, resulting in longer run times.

**Conclusion**

Lead-acid battery packs would benefit from being balanced. A balanced battery pack helps extend stack run time beyond that of the lowest capacity battery in the stack. Furthermore, battery life is also extended, reducing the expense of replacing batteries in the stack due to failure. The complete lead-acid balancing described here allows battery packs to be balanced with a minimum of design effort.

Aspiyan Gazder is a design engineer for power products at Linear Technology.
Driver assistance systems are moving from cars to trams in Frankfurt

For tram drivers, every second on the job requires complete concentration. Heavy traffic conditions might lead to collisions with other trams, cars or lorries at any time. Soon, the first trams featuring technology that can actively prevent such accidents will enter into service in Frankfurt.

The driver assistance system warns tram drivers of any impending collision: if the driver brakes too late, or not at all, the system engages the brakes independently to stop the tram and avoid an accident.

“Our collision warning system significantly increases the safety of passengers and tram drivers,” said Bernhard Bihr, president of Bosch Engineering, which provided the technology. Bosch adapted the company’s large-scale automotive production technology for collision warning for city rail transportation.

The technical supervisory authority recently approved the electronic driver assistance system for use in public transportation. Once Frankfurt’s tram drivers have tested this guardian angel for both drivers and passengers, the first self-braking trams will go into regular service in the city.

Next stop
Driver assistance systems that can warn of collisions and automatically brake in an emergency are increasingly spreading to rail transportation systems and provide the basis for automated trams. These systems are capable of supporting the tram driver in all types of driving conditions, from monotonous to challenging, day or night, rain or snow. The first version of this collision warning system was launched in 2014.

“If that system’s sensors detect a potential accident, it reliably alerts tram drivers of the dangerous situation and does its best to help them react in time themselves to avoid a collision,” said Bihr.

The system now takes this to another level: in the event that the tram driver cannot react to the warning in time, the system will brake the tram automatically and bring it to a complete stop. This way, accidents and their expensive consequences can be either reduced or prevented altogether.

“We are taking the idea of automated mobility further – beyond the road – and developing solutions that offer increased safety and comfort for rail transportation,” Bihr said.

Radar and video sensors
The collision warning system combines a video sensor, radar sensor and a rail control unit, drawing on the company’s expertise in large-scale automotive production.

With an aperture of up to 70°, the radar sensor monitors the area up to 160m ahead of the tram and measures the speed and distance of any cars, buses or other trams. In addition to mobile obstacles, the radar sensor detects static objects such as buffer stops.

The video sensor complements the radar technology because it keeps an eye on the track ahead and detects anything crossing the rails more quickly and accurately. The central rail control unit processes information from both sensors, along with other factors, such as the speed of the tram, to provide a detailed image of the environment.

If the system detects that an object is coming dangerously close, it gives the driver a visual and acoustic warning. Should the tram driver not react to the warning signals within two seconds, the automated system slows the tram to a complete stop. The braking action is very gentle so even passengers who are standing will not lose their balance.

If necessary, drivers can deactivate the braking operation or increase the braking power at any time, depending on how critical the situation. This leaves drivers still in control, but means they can rely on the watchful eyes of their electronic assistant day or night and in almost any kind of weather.

“Our system is on all the time,” said Bihr. “It never gets tired, and cannot be distracted.”
Tester puts IGBTs for EVs through power cycling

Power electronic components in electric and hybrid vehicles can be tested during power cycling with the Micred 600A tester from Mentor Graphics. It lets development and reliability engineers test power electronics such as IGBTs, mosfets, transistors and chargers for thermal reliability and lifecycle performance. Thermal reliability issues can result in automotive recalls, and the wider adoption of electric and hybrid cars has created a specific need for this.

The tester also meets the industry’s need for power electronics thermal simulation and test. The product provides a simple reliability testing process for lifecycle estimation.

“One of the important features is field lifetime estimation,” said László Tolnay, product line director. “But no matter how good the simulation is, you have to make sure your inputs are correct.”

Device set-up is said to be easy and power cycles are fully automated.

“The thing is to make it simple and purpose built,” said Tolnay. “It was developed in close cooperation with our customers.” He said he was not allowed to talk about where it had been beta tested and the results.

The TJ3ster structure function feature inside the tester yields non-destructive failure-in-progress data for each IGBT. All diagnostic information is recorded during testing, from current, voltage and die temperature sensing, to structure function changes that point to reasons for failures in the package structure.

Package development, reliability and batch checking of incoming parts can be tested before production.

IGBT modules can be powered through tens of thousands of cycles. This provides real-time failure-in-progress data for diagnostics, reducing test time and eliminating the need for post-mortem or destructive failure analysis. Associated 3D computational fluid dynamics (CFD) simulation errors can be reduced from typically over 20% to 0.5% for accurate thermal characterisation of IGBTs and components.

Up to eight testers can be chained together so users can power cycle up to 128 IGBTs simultaneously in a system test.

The tester delivers 48V under load, and users can deal with components mounted externally on cooling systems to increase flexibility. It also meets the needs of emerging power electronics testing best practices such as those being developed for the German automotive industry.

The tester can be coupled with CFD simulation technologies. Flomerth and FloEFD 3D CFD software packages provide front-loading thermal simulation of power modules. It can also be coupled with the Flowmaster full vehicle thermal-fluid system modelling tool.

Shipping is scheduled for summer 2016.

Power inductors

Surface mount power inductors from TT Electronics are for high temperature, high power, automotive applications. The HA72T-06 inductors meet the demand for certified, high power inductors for DC-DC converter deployment using switching frequencies up to 3MHz as well as EMI and low pass DC ripple filters in high temperatures.

They use composite moulded core materials to increase inductance, temperature performance and saturation current while reducing DC resistance and size. The result is a surface mount component that operates in demanding environments with currents up to 45A.

Applications are from powertrains to electric power steering, braking, transmission control, engine control and lighting. The +180°C rated moulded inductor suits high stress environments that require high current saturation levels. Mechanically robust, they resist corrosion in humid environments and are AEC-Q200 certified.

Position sensors meet ISO 26262

Magnetic position sensors developed using the ISO 26262 compliance programme have been introduced by Austria Microsystems. The series also includes a magnetic position sensor in a system-in-package (SiP).

The AS5170 and AS5171 sensors were developed as SiEeOC (safety element out of context) devices, as defined in ISO26262. They provide full data path diagnostics, enabling automotive system OEMs to achieve a higher level of ISO 26262 system-level compliance.

The bi-built diagnostic tests the entire device, from the Hall sensor front end, through the DSP engine which converts raw measurements of magnetic field strength into sine and cosine vectors, to the back-end interfaces and pins.

They are qualified to AEC-Q100 grade 0, measure the absolute angle of rotation. Their 12bit output resolution enables precise measurements, even for reduced angular excursions down to a minimum arc of 90°. This means they suit safety-critical applications including chassis height, gear shifters, electronic power steering, exhaust gas recirculation, brake pedal and throttle position sensing.

The AS5171 comes in SiP format, which integrates the sensor die and capacitors in a single, encapsulated three-pin package. The SiP provides improved ESD and EMC performance, as well as enhanced supply protection. The supply and output pins are protected against over-voltages up to +20V. The supply pin also offers -20V of protection against reverse polarity.

The SiP eliminates the requirement to mount a position sensor IC on a PCB, thus reducing component count and cost, and making for easier design and assembly into the end product.

The AS5171A provides an analogue output, and the AS5171B a digital output, which may be programmed either as a PWM interface or as aSENT-compliant interface.

The analogue AS5170A and digital AS5170B ICs are housed in eight-pin SOIC packages. All benefit from stray magnetic field immunity, enabling unimpaired operation even in the presence of strong magnetic fields generated by electric motors, high current-carrying cables and other external devices. This reduces costs as there is no need for shielding.

The sensitivity of the Hall sensor front-end enables the use of small, target magnets and supports a magnetic field strength input range of 5 to 90mT.
RF IC suits vehicle activation and logistics

A multi-channel RF transceiver combined with a three-dimensional low frequency (3DLF) interface supports ultra-low power operation. Through its integration of sub-GHz RF and low-frequency technologies, the Melexis MLX73290-A RF IC is optimised for use in vehicle activation, logistics and various IoT applications.

These include passive keyless entry and start, secure access and low-power tracking systems, where a low power wake-up function with long-range, high-speed RF feedback are mandated. The 3DLF interface has an automatic and programmable scan mode, constantly polling for a valid low frequency signal on the three differential receive coil inputs. This permits a typical 4µA power consumption in LF detection mode. The LF-RSSI feature allows monitoring of the received LF field. Working with the system’s host microcontroller, it can run in passive transponder mode and thereby support battery-less operation. For use in the sub-GHz ISM bands, covering 300 to 960MHz, the transmitter output is -20 to +13dBm. It has a receiver sensitivity down to -120dBm in a 15kHz channel bandwidth. A 250kbit/s maximum data rate is supported. Modulation schemes that can be used are on-off keying, binary frequency shift keying, minimum shift keying, Gaussian minimum shift keying and Gaussian frequency shift keying. Engineers can programme the device through its SPI, with different parameters being adjustable, including RF output power, RF bandwidth, modulation type, LF polling mode, and LF and RF packet handlers. Evaluation boards and software tools are available.

MLCCs handle high temperatures

Novacap and Syfer Technology jointly launched high temperature MLCCs at last month’s Hties in New Mexico. The HiT MLCCs have an operating range of -55 to +200°C, are for high temperature, under-the-bonnet applications and have tin over nickel terminations. Capacitance range is 4.7pF to 3.3µF, over the rated voltage of 16 to 630V DC. Stable and ultra-stable dielectric options, COG and X7R materials, are RoSH compliant and lead free.

RFID tag for vins

Impinj’s Monza 4i Rain RFID tag chip has 256bit EPC memory and 480bit user memory for applications that require extended serial numbers, such as vehicle identification numbers (vins).

The device comes in a 5 by 5mm 32-lead QFN package, covering an operational temperature from -40 to +105°C.

Circular connector goes racing

A version of Souriau’s 8STA circular connector aimed at the motorsport sector is available from Lane Electronics.

Designed to save installation time and weight, the connector has integrated clinch nuts that remove the need for nut plates making assembly easier. It is available in 12 shell sizes from 02 to 24 for standard crimp and PCB receptacles.

Featuring a rugged aluminium body plated with conductive black zinc as standard, the connectors incorporate a positive locking mechanism with locked colour indicators.

The True3D technology allows omnidirectional readability, while its interference rejection improves performance in noisy environments.

The device has been optimised for automotive manufacturing control and logistics. It can provide quality checks for vehicle parts in assembly lines, with data written in every production step.

Video analytics SoC from collaboration

Elvees Neotek and Imaging Technologies have collaborated on the Elise image semantic engine for video analytics markets such as adas and smart cities.

The SoC is based on an energy-efficient multimedia and video IP platform from Imagination. It combines functionality including blocks for pre-processing and post-processing of stereo video at ultra-high resolutions; CPUs for high, medium and low-profile tasks; high-end mobile GPU; and multicore standard navigation engine.

Companies can use the chip to develop IP cameras with video analysis and a range of OEM modules.

The SoC was manufactured in the TSMC 28HPM process, and contains the Power VR vision IP platform that combines a GX6250 GPU, V2500 imaging processor, E4500 video encoder and D3500 video decoder. A dual-core Mips Warrior P5602 CPU, energy-efficient multi-threaded Mips InterAptiv CPU and Warrior M5150 MCU-class CPU deliver acceleration for compute-intensive video analytics and audio processing.

The programmable Velcore Two eight-cluster video processor has accelerator IP cores that provide the foundation for capabilities such as 4k stereo streams for facial recognition, augmented reality and more.

Mini card for trains

The PX5 PCI Express mini card from MEN Mikro enables undisturbed transmission of audio signals as they are needed for announcements in trains and airplanes. This stereo audio functionality is a modular part of modern passenger information systems.

To enable the transmission of announcements for passengers in trains or buses, the card can be plugged into a PIS computer. It supports a USB HID interface to the analogue audio functionality, and provides a differential stereo input and output for undisturbed signal transmission.

It allows modern passenger information systems to be extended with a cost component, saving time for developing additional audio.
Stopper protects against transients

A low quiescent current surge stopper, providing compact overvoltage and overcurrent protection for always-on 4 to 72V electronics in automotive systems, is available from Linear Technology.

HMI panel PC includes Can interface and GPS

The Arbor IOT-500 12.8cm rugged Android HMI panel PC has RS232, DIO, Can, WWAN, Wifi, Bluetooth, GPS and camera for use as an IoT platform for remote monitoring, data acquisition and control within vehicles.

Based on the dual-core MTK MT2601 industrial chipset from Mediatek, it supports the Android v5.1 operating system.

Connectivity features include lan, two USB 2.0, RS232 com, GSM and GPRS sim slot, 2Mpixel camera and speaker with built-in mic. It supports DC power input range from 12 to 24V and provides four GPIO ports and a Can bus. The 12.8cm high-resolution display has a durable capacitive touch interface. The IP-65 ingress protection rating is MILS10 certification for shock and absorption, and an operating temperature of -10 to +50˚C make it suitable for harsh environments.

Sealed in a waterproof chassis, it is designed to perform in environments with high levels of vibration, shock and temperature extremes. Integrated connectivity options include Wifi 802.11a/b/g/n/ac, GPRS, WCDMA and Bluetooth 4.1.

IP meets V2X security needs

Cryptographic IP to meet the security communications and latency requirements of V2V and V2X applications in intelligent transport systems is available from Ensilica.

The ESI-ECDSA IP is compliant with IEEE 1609.2 and Etsi TS 103 97. These define the security layers in the V2X communications protocols where cryptographic algorithms are the primary tools used to safeguard against information security risks such as message confidentiality, integrity, availability and authenticity.

In particular, the elliptic curve digital signature algorithm (ECDSA) is specified for message authentication, the elliptic curve integrated encryption scheme (ECIES) for asymmetric encryption and the advanced encryption standard (AES) for symmetric encryption.

Theasic acceleration core has been designed to deliver the high level of message-signature verifications required by V2X ECDSA message authentication, where practical requirements range between 400 and 4000 verifications per second depending on the message beaconing rate (1 to 10Hz) and expected worst case vehicle densities on the road. It achieves this by off-loading the ECDSA signing and verification operations so the processor is only required to load and read back results via an APB or AHB interface.

In addition, the core has a range of lower level ECC operations that allow the acceleration of ECIES asymmetric encryption, flexible real key selection, support for all commonly standardised curves (such as Nist, SEC2 and Brainpool), and resistance against timing and power analysis attacks.

Editor and Publisher:
Steve Rogerson
editor@vehicle-electronics.biz

Advertising Manager:
Diane Trotman
diane@vehicle-electronics.biz

Web Site Manager:
Martin Wilson
admin@vehicle-electronics.biz

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