

SENSOR PERCEPTION

FEATURES

Automated Analysis
of Environmental
Sensor Data

High Accuracy
Temperature Sensors

Temperature Sensing
with Thermistors

PLUS

REGULARS

Industry News:

Micron buys AI start-up

Untethered HQ
multiplayer VR

GaN power 98% efficient

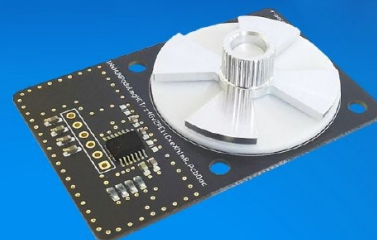
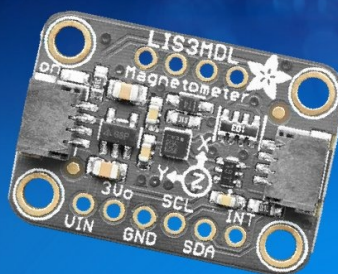
Initiative to nurture talent

Dev Kit pick

Tech Tips

Q&A

NPI



subscribe now | emea.info.mouser.com/EIU

Cover image credit: spainter_vfx/Shutterstock.com



**MOUSER STOCKS THE
BROADEST PORTFOLIO OF TI**

46,000+ TI Products
4,000+ TI Dev Tools

Mouser Electronics – your authorised TI distributor
stocking more products for your next design.
mouser.com/ti



In this issue...

Big Data, the IoT, increasing digitisation – all rely on sensors for the quality of the information. We look at new developments in our April issue with articles entitled: ‘High accuracy temperature sensors improve system performance/reliability’; ‘More effective cloud-based automated analysis of environmental sensor data’; and ‘Temperature sensing with thermistors’.

Our industry news round-up reports on: Micron’s AI start-up acquisition; a 98% efficient GaN power module; the launch of an untethered HQ multiplayer VR; and an initiative to nurture talent.

With regulars: Dev Kit Pick, Tech Tips, Mouser Q&A and the latest, most innovative NPIs now in stock at Mouser. Now read on...



INDUSTRY NEWS
Micron buys AI start-up FWDNXT
* Purdue creates untethered HQ multiplayer VR system * Transphorm’s GaN enables 98% efficient power module * ‘OpenLicht’ to foment lighting innovation



MOUSER NEWS
Mouser signs IP deal with Zipcores * Create the Future – enter now * Mouser is TE’s #1 for Global High Service * 3D tracking and haptics tools added



FEATURE
High accuracy temperature sensors



FEATURE
Temperature sensing with thermistors



Q&A WITH...
Mouser’s Andrea Krause addresses the challenges and benefits of working from home.



FEATURE
Automated analysis of environmental data



DEVELOPMENT
Mark Patrick spotlights development tools from Adafruit, Crowd Supply, Maxim, Diodes Inc and ams



TECH TIPS
MEMS sensors monitor fuel performance




NEW PRODUCTS
Latest products now available from Lattice, UDOO, Infineon and more

Embedded computing/vision spec adds SerDes

There has been increased pressure on the industry to meet the increasing demand for a fusion of embedded computing and embedded vision systems, to support advanced edge-computing applications. Taking a step to address this need, SGET (Standardization Group for Embedded Technologies) recently approved the SMARC 2.1 ("Smart Mobility ARChitecture") specification, with features such as SerDes support for extended edge connectivity and up to 4 MIPI-CSI camera interfaces. These features are backward-compatible with Rev. 2.0, which means that 2.1 modules can be integrated on 2.0 carriers. All extensions to Rev.2.0 are also optional.

"The new SMARC 2.1 specification is an important step towards embedding MIPI-CSI camera technology, which is widely used in smartphones, firmly and for the first time within the standard of an embedded computing specification.

 SMARC module	
SMARC 2.0	SMARC 2.1
2x Gigabit Ethernet	4x Gigabit Ethernet ¹
4x PCIe	4x PCIe ¹
2x MIPI CSI	4x MIPI CSI ²
HDA + 2x I2S	HDA + 2x I2S
2x LVDS/eDP/MIPI DSI	2x LVDS/eDP/MIPI DSI
DP++/HDMI + DP++	DP++/HDMI + DP++
1x SATA	1x SATA
6x USB 2.0 + 2x USB 3.0	6x USB 2.0 + 2x USB 3.0
12x GPIO + 1x SDIO	14x GPIO + 1x SDIO
4x SER + 2x CAN	4x SER + 2x CAN
eSPI	eSPI/QSPI
SPI + I2C	SPI + I2C
Power	Power
<small>¹ 2x ETH & 4x PCIe or 4x ETH & 2x PCIe ² 2x Flatflop Connector</small>	

We need this extremely cost-effective technology in order to be able to integrate it into any embedded application. For this purpose, SMARC 2.1 provides not only one or two, but up to four interfaces for comprehensive situational awareness and highest device efficiency," explained Christian Eder,

Director Marketing at Congatec and SGET editor of the SMARC 2.1 specification.

The demand for machine vision cameras is growing at clear double-digit rates, with growth particularly strong in various non-industrial applications such as surveillance, forensics, robotic surgery, intelligent traffic systems, border control, and health monitoring.

In addition, camera technology continues to be used for process inspections to reduce errors such as incorrect fill levels, faulty products in the production line and packaging defects.

Autonomous logistics vehicles also take up a large market share in the industrial sector.

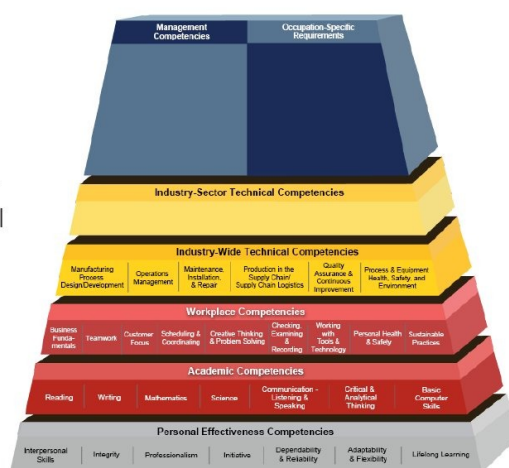
www.sget.org/standards/smarc

SEMI's initiative to nurture talent

SEMI has announced the release of a central feature of its workforce development initiative, designed to grow the microelectronics industry's talent pipeline. Available at the U.S. Department of Labor's Competency Model Clearinghouse website, the Unified Competency Model (UCM) for Advanced Manufacturing identifies skill sets required across strategic industry sectors to strengthen connections among the microelectronics industry, workers, and education and training providers. SEMI led the development of the new UCM in partnership with the U.S. Department of Labor – Employment and Training Administration (USDOL-ETA).

The release of the updated Advanced Manufacturing Unified Competency Model by the USDOL-ETA comes one year after SEMI announced SEMI Works, a comprehensive program to grow the electronics design and manufacturing industry talent pipeline.

A key building block of SEMI Works, the UCM will help ensure that job competencies the industry needs most are updated regularly to keep pace with its evolving workforce needs.



The UCM will help align changing job skills sets with industry certifications, credential requirements and occupational licensing to help clear the way to career paths in advanced manufacturing and the microelectronics industry.

"As technology advances, ensuring access to talent is increasingly important," said Mike Russo, Vice President of Industry Advancement and Government Programs at SEMI. "The Unified Competency Model developed by SEMI and the USDOL-ETA team will help ensure training and education for industry jobs dovetail with skills requirements to help the microelectronics industry continue to innovate and grow. We are excited to partner with government and industry stakeholders to build out and sustain the UCM, a foundational component of SEMI Works™."

"This new competency framework will improve signaling across our industry regarding the skills we need for our current and future workforce," said Kathryn Garner, Talent Acquisition & Global Mobility at TEL, a UCM working group member. "This standard will provide greater transparency of skills and credentials from a diverse set of backgrounds including our military veterans. We are excited to be an integral part of this impactful effort."

www.semi.org

TE Connectivity integrates with ADI's MeasureWare

TE Connectivity recently announced its integration with Analog Devices' MeasureWare, a plug-and-play suite of hardware measurement kits and software studio tools to help fulfil the growing need for precision measurement across multiple industries including precision agriculture, machine health monitoring, electrochemistry, and other areas requiring precise measurement.

This enables TE customers to quickly develop a precision sensor application, from prototype to production, without the need for a deep understanding of precision analogue or sensor design.

ADI's MeasureWare solutions are built to interface devices with the world around them, allowing users to more effectively measure the datasets necessary to their respective projects, such as temperature, weight, humidity, pH, and pressure.

MeasureWare also offers flexibility to adjust and change measurement parameters as a project evolves.

"We are excited about the integration of TE sensors with ADI's MeasureWare platform," said John Tuley, IoT business development – Sensor Solutions business. "MeasureWare combined with TE sensors enables our customers to quickly display precision sensor data on a cloud platform and focuses engineering time on end use case validation rather than hardware design."

www.te.com

Micron buys AI start-up FWDNXT

FWDNXT, a software and hardware start-up that spun out of Purdue, was acquired by Micron Technology, an industry leader in innovative memory and storage solutions. Micron is integrating FWDNXT's artificial intelligence hardware and software technology with its advanced memory, to explore deep-learning solutions for data analytics, particularly in IoT and edge computing.

"Purdue provided the entrepreneurial resources to help me achieve my vision of taking our work on machine learning and deep learning technology to a much wider audience where we can have a bigger impact," said Eugenio Culurciello, Micron fellow and chief machine learning architect. "Micron has the leadership in memory, long history of innovation and drive to deliver power and performance capabilities that address the most complex and demanding edge applications at scale."

Culurciello founded FWDNXT while working as an associate professor in Purdue's College of Engineering. Based in the Purdue Research Park, FWDNXT designed next-generation hardware and software for deep learning aimed at enabling computers to understand the world in the same way humans do.

Culurciello worked closely with the Purdue Research Foundation Office of Technology Commercialization to secure and develop an intellectual property rights strategy for the AI technology that he developed at Purdue, which Micron licenses today. Culurciello worked with the Purdue Foundry, an internationally recognized startup hub. Since its creation in 2013, the Purdue Foundry has generated more than 250 start-ups, nearly \$400 million in funding and investments and nearly 350 new jobs.

www.prf.org

Marvell and ADI work on highly-integrated 5G

Combining Marvell's baseband and digital ASIC solutions with Analog Devices' RF transceiver technology, the two companies have announced a technology collaboration leveraging Marvell's 5G digital platform and ADI's wideband RF transceiver technology, to deliver fully-optimized solutions for 5G base stations. As part of the collaboration, the companies will offer fully-integrated 5G digital front-end (DFE) ASIC solutions, with tightly-coupled RF transceivers, and will collaborate to develop next-generation Radio Unit (RU) solutions.

"Marvell is pleased to collaborate with ADI in addressing a significant opportunity in the next wave of 5G network architectures," said Matt Murphy, president and CEO of Marvell. "Marvell's leadership in baseband, digital ASIC and transport processors combined with ADI's RF transceiver technology creates an industry-leading architecture for 5G OEMs looking to accelerate time-to-market."

The increased complexity of 5G RUs driven both by massive MIMO deployments and mmWave spectrum requirements present unique challenges to RF and radio network designs. Optimized partitioning of RF and mixed signal technology with both digital ASIC and baseband silicon will be necessary to achieve the low power, size and cost requirements for 5G. The combination of Marvell and ADI's best-in-class technologies enables highly optimized RU designs enabling both standard and customized implementations.

"ADI has consistently been at the forefront of cellular radio technology," said Vincent Roche, president and CEO of Analog Devices. "We see tremendous opportunity in our collaboration with Marvell to optimize the 5G RF and digital chain for the benefit of our common customers. The solutions we are developing in conjunction with Marvell will allow our customers to build highly optimized, high performance products for this dynamic market."

www.marvell.com

Research bids sought for next-gen batteries

As demand for battery energy storage continues to grow, and the demand for flexible and cleaner sources of energy to supply energy to the grid increases, battery technologies have been recognized as a cornerstone in achieving sustainable decarbonisation and electrification goals. Predictions from the International Renewable Energy Agency (IRENA) say 150GW of storage using batteries is needed by 2030 to achieve renewable energy targets.

As part of their efforts to promote cutting-edge research and innovation in advanced lead batteries, the Consortium for Battery Innovation (CBI), is seeking research bids focused on facilitating the latest understanding in energy storage applications, such as microgrids for renewable energy, load following for electrical grids, and demand response for commercial and industrial applications.



The research request focuses on identifying new pathways to continue the improvements in lead battery performance for energy storage systems.

According to Dr Matthew Raiford, manager of CBI's technical program, "Innovation is the lifeblood of our industry and each year we push the boundaries of research in lead battery technology.

We've made great progress in the last 12 months with our rolling research program so we're opening up the opportunity for universities, companies and other research institutes to submit proposals for a new wave of research projects.

We know that demand for battery supported energy storage is growing exponentially and innovation in our technology needs to keep pace with this growth."

CBI's technical innovation roadmap set out the highest priority research goal of increasing cycle life of lead batteries for energy storage applications by five times to 5,000 by 2022, a key technical parameter for renewable and utility energy applications.

As a newer application for lead batteries, research into field and laboratory tests for energy storage systems is essential to gain deeper insights into understanding total energy throughput and increasing service life and performance.

www.batteryinnovation.org

Purdue creates untethered HQ multiplayer VR system

Virtual reality headsets and application programs for VR are not gaining traction with users, because of a chicken-and-egg dilemma: lack of VR content; and slow market penetration of custom-made VR units. Offering a new approach, researchers at Purdue University have created a VR solution that allows multiple players to interact with the same VR game on smartphones, providing new opportunities for enterprise, education, health care, and entertainment applications.

The Purdue VR system, called Coterie, uses a novel way to manage the challenging task of rendering high-resolution virtual scenes to satisfy the stringent quality-of-experience (QoE) of VR. Those include high frame rate and low motion-to-photon latency, which is the delay between the movement of the user's head or game controller and the change of the VR device's display reflecting the user's movement.

The new approach enables 4K-resolution VR on commodity mobile devices and allows up to 10 players to interact in the same VR application at a time.

"We have worked to create VR technology that someone can use on a typical smartphone with a Wi-Fi connection," said Y. Charlie Hu, the Michael and Katherine Birck Professor of Electrical and Computer Engineering, who led the Purdue team. "Our solution not only allows multiple players to participate in a VR game at the same time, but also provides a better and more cost-effective option for single-player use."

One reason for the heavy computational workload of high-resolution VR apps is the constant need to render updates to both the foreground interactions with the players and the background environment in the virtual world.

VR apps using Coterie split up this heavy rendering task between the smartphone and an edge server over Wi-Fi in a way that drastically reduces the load on the smartphone while allowing the sub frames rendered on both to be merged into the final frame within 16ms, satisfying the VR QoE.

www.purdue.edu



OpenLicht project to foment lighting innovation

Intelligent light design is entering the smart home, yet currently-available solutions often pose a raft of challenges for users. It is frequently the case that they are, at most, partly automated and are complicated to program. Moreover, the systems often fail to safeguard privacy or unnecessarily consume power, since light usage is not tailored ideally to the user's needs, which in turn has a negative impact on CO2 emissions.

Created to address this challenge, the OpenLicht Project was funded by the German Ministry of Education and Research (BMBF), with the goal of enabling new forms of collaboration between science, business, maker and startup communities. Infineon Technologies is supervising the project in close cooperation with Bernitz Electronics, Deggendorf Institute of Technology, and the Technical University of Dresden.

A prototype of a smart lighting system based on artificial intelligence was recently released.

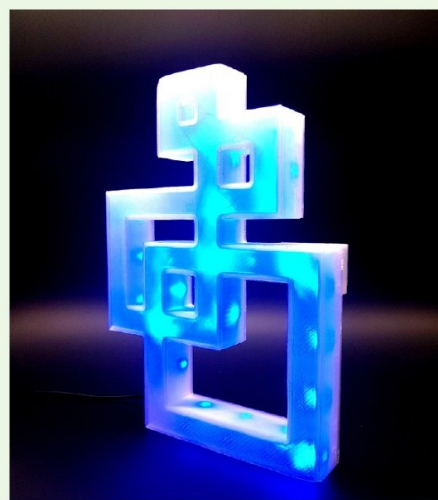
The solution automatically adjusts the light in the room to the user's position and activity, learns the person's preferences, and can even respond to a certain degree to circumstances it has not learned previously.

Developed using open source approaches like openHAB, a smart home system, and machine learning libraries. Use of freely available development environments, software frameworks and low-cost hardware solutions enables integration of a wide range of different sensor data and further development of existing results by the community.

The use of AI in the local network creates smart light solutions that are safe, yet sustainable and safeguard the user's privacy. The AI acts on a system that is closed off from the outside world and does not have to be connected to the Internet. An open source gateway based on a Raspberry Pi and an Infineon Trusted Platform Module (TPM) has been developed to enable that.

That means data does not have to be sent to the cloud, but can instead be processed locally, which ensures security and privacy for households. These factors are vital in increasing the acceptance of smart home solutions. In addition, automatic adjustment to the user's activities makes sure the light required at a particular moment is available. That avoids unnecessary "floodlighting" and helps protect the climate without the need to appeal to users' conscience.

www.openlicht.de



Transphorm's GaN enables 98% efficient power module

Underscoring the advantages of wide-bandgap semiconductors, Transphorm, a leader in the design and manufacturing of JEDEC- and AEC-Q101-qualified high-voltage gallium nitride (GaN) power semiconductors, has confirmed that Hangzhou Zhongheng Electric (HZZH) has developed the ZHR483KS highly efficient, GaN-based power module.

Achieving 98% efficiency, the module offers standardized output connector configurations, to enable drop-in replacement with existing same-wattage power modules to achieve a high reliability, higher performing solution at a lower overall system cost.

The ZHR483KS is HZZH's first GaN-based power solution and is the flagship product for a new product line. The module's input voltage ranges from 85V to 264V, while its output voltage ranges from 42V to 58V.

Transphorm's TPH3205WS GaN devices are used in an interleaved bridgeless totem-pole PFC to achieve 98 percent efficiency at half load.

The GaN devices reduce the power module's switching and driving losses, leading to the ZHR483KS outperforming preceding modules that used super-junction Silicon MOSFETs.



"We sought a power transistor that would enable us to develop a more efficient yet cost-effective solution for our customers," said Dr. Guo, CTO, HZZH. "We considered silicon carbide devices but could not achieve the desired advantages at low voltages.

We then vetted several GaN manufacturers' devices, and ultimately selected Transphorm's GaN FETs due to their reliability, device cost, and simple implementation." Transphorm's GaN FETs are two-chip normally-off devices available in standard TO-XXX packages and PQFN modules that can be driven with common off-the-shelf drivers. The current Gen III family offers the GaN semiconductor industry's highest threshold voltage at 4V and highest gate robustness at $\pm 20V$. These features enable customers to easily design-in highly-reliable GaN solutions to gain the technology's high-power density benefits.

www.transphormusa.com

Mouser named TE's #1 for Global High Service for 6th time



Mouser has received the Global High Service Distributor of the Year Award for the sixth time from TE Connectivity (TE), a world leader in connectivity and sensors. The top distribution award recognizes Mouser's 2019 performance based on sales growth, market share growth, customer growth and business plan performance.

"Mouser delivers exceptional service to our mutual customers, and I am very pleased to recognize them with this award," said Karen Leggio, Senior Vice President and General Manager, Channel, at TE.

"Mouser's track record of achievement with TE, including receiving the Global High Service Distributor of the Year Award six times, is a testament to our strong and successful partnership."

"We are incredibly honored to receive this prestigious award, and thank TE for recognizing the outstanding efforts of our teams around the world," said Glenn Smith, Mouser Electronics' President and CEO. "We look forward to our continued mutual success."

Mouser stocks a broad selection of TE products for industries and applications including automotive, industrial, harsh environments, data communications, consumer devices and aerospace and defence.

www.mouser.com/manufacturer/TE-Connectivity

Mouser and Molex sponsor Dale Coyne Racing for 2020 IndyCar season



Image Credit @ Mouser Electronics

Mouser is proud to once again sponsor the Dale Coyne Racing with Vasser-Sullivan race team throughout the entire 2020 NTT IndyCar Series which has been delayed until May due to the ongoing COVID 19 virus. Joining Mouser in the sponsorship is valued supplier Molex.

The Dale Coyne team welcomes Santino Ferrucci as pilot of the Mouser- and Molex-sponsored No. 18 car. Ferrucci made an impressive debut in IndyCar last season, finishing seventh in the 2019 Indy 500, earning the race's Rookie of the Year award.

"Ferrucci is an impressive young driver who brings a lot of excitement to the team," said Todd McAtee, Mouser Electronics' Vice President, Americas Business Development. "We are ecstatic to sponsor the Dale Coyne Racing with Vasser-Sullivan car and to support the team and Ferrucci in what promises to be a dynamic season."

"As a leading provider of integrated electronic solutions, Molex excels in providing components for challenging automotive applications", said Fred Bell, Vice President of Global Distribution at Molex.

"Our sponsorship further demonstrates our commitment to developing products that help advance the automotive industry."

Mouser and Molex first sponsored IndyCar racing in 2011 as a way to communicate their performance-driven business models and promote innovative technologies.

The Mouser-sponsored car won the Indianapolis 500 in 2013.

www.mouser.com/indy-racing

Mouser signs IP deal with Zipcores

Mouser has announced a global distribution agreement with Zipcores, designers of intellectual property (IP) cores for implementation on FPGA, ASIC and SoC devices. Through the agreement, Mouser now stocks Zipcores' digital signal processing (DSP) mezzanine card and a wide range of IP cores.

Designed for use with both IF and baseband signals, Zipcores' FMC-DSP mezzanine card is ideal for applications that require high-speed data acquisition and logging, software defined radio (SDR), DSP, and digital signal synthesis (DSS).

In addition, the inclusion of dual, symmetrical and balanced ADC and DAC channels means that the card is suitable for the processing of complex I/Q signals such as those required in baseband I/Q modulation and de-modulation schemes.

The FMC card is compatible with all development boards that feature the standard FMC-LPC or FMC-HPC connector (ANSI/VITA 57.1), including those from Xilinx, Intel® and Digilent.

Zipcores offers a wide range of IP cores for a variety of applications from basic building blocks to more complex systems. Zipcores IP cores are written in generic, human-readable VHDL or Verilog source code and are compatible with all major brands of FPGA, SoC, and ASIC technologies, including Xilinx, Intel, Lattice, and Microsemi. The company also provides fully custom design service.



www.mouser.com/manufacturer/zipcores