Nuremberg, Germany
25.–27.2.2020

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“Intelligence” is currently the dominating door opener for future applications in the tech industry. Artificial Intelligence (AI) and Machine Learning (ML) methods are already in use in many sectors of commerce, banks and IT companies. In the automotive industry, in health applications and other industrial sectors many problems can be addressed with artificial intelligence and machine learning, where the challenges are different: limited computing resources on site, no or only temporary network connections, very often power supply via batteries. But how to combine non-deterministic, dynamically learning software with functional safety and certification requirements?

Also, the other buzzword of recent years, “Internet of Things”, continues to be an important innovation driver. The IoT has by no means saturated and continues to evolve at a rapid pace. This is convincingly demonstrated by the development of wireless technologies such as Bluetooth v5.2, WiFi6, 5G and Low-Power Wide-Area “Zero-G” networks, like LoRaWAN, SIGFOX, or MIOTY. IoT technologies are now converging with AI and ML, making embedded systems even more complex. Therefore, “Connecting Embedded Intelligence” has been chosen as the motto of the embedded world Conference 2020. Embedded intelligent nodes are not only interconnected via machine-to-machine-communication, but they are also connected to physical applications to make up cyber-physical systems, and they interact with humans.

With a program of high-quality presentations, the embedded world Conference 2020 contributes to the ongoing challenges of “Connecting Embedded Intelligence”. The embedded world Conference once more adds to the success of the embedded systems industry that has now become an essential part of the technological future and, as such, is a precondition for our continued economic success.

The embedded world Conference 2020 is clearly structured along 10 subject areas, which are represented in different colors throughout the program: 1. Internet of Things, 2. Connected Systems, 3. Embedded OS, 4. Safety & Security, 5. Hardware Engineering, 6. Software & Systems Engineering, 7. Embedded Vision, 8. Autonomous & Intelligent Systems, 9. Embedded GUI & HMI, and 10. System-on-Chip. The solution-oriented presentations of each session follow a logical flow and address the most relevant questions in each sector. Discussions and an active exchange of ideas with the speakers as well with the conference participants are encouraged. The 30-minute presentations of the sessions are complemented by 14 classes, which provide comprehensive basic information on selected topics in the form of condensed training courses. You will find all 281 presentations and all 14 classes fully explained on the following pages of this booklet.

The steering board of the embedded world Conference 2020 wishes you and all participants stimulating discussions about new ideas and solutions enabling you to cope more easily and efficiently with the immense challenges that lie ahead. You are welcome to gain great insights in a pulsating atmosphere.
**KEYNOTE-SPEAKER**

Hassane El-Khoury, Cypress  
Conference Keynote: How the IoT Will Drive the Convergence of Man and Machine  
February, 25th, 1:30 PM | NCC Ost | Hall Sydney

The marriage of man and machine is the next wave of convergence. It may have a far greater impact on humanity than even the smartphone: it will transform the way we interact with the world. IoT technology, led by connectivity and cloud-based analytics, will effectively become an extension of our soul, driving applications where computers will eventually demonstrate emotional and social intelligence and make decisions for us.

The keynote will look at artificial intelligence, and discuss the advances in IoT technology – from purely analytical, to human-inspired, to humanized. The »converged« human-machine connection will affect leading applications in automotive, industrial, medical, smart city, and smart home.

Hassane El-Khoury is president, chief executive officer and a member of the board of directors at Cypress Semiconductor. He led Cypress’s Programmable Systems Division and formerly it’s automotive business unit.
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Marcel Ziswiler, Toradex

**Anticipating Data Reliability in Managed NAND Systems**  
Justin Hunter, Micron

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Colin Walls, Mentor, a Siemens Business

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### Conference Keynote:

**How the IoT Will Drive the Convergence of Man and Machine**  
Hassane El-Khoury, CEO, Cypress

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Rod Watt, ARM

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Marco Roggero, The MathWorks

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**Verification of RISC-V SoC Designs Using Formal Methods**  
Sven Beyer, OneSpin Solutions

**Embedded Co-debugging Made Easy with Intuitive Instrumented SoC FPGA**  
Rajashekar Reddy Merugu, Microchip Technology

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<td>Debian or Yocto? Which is the best for your Embedded Linux Project?</td>
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Samuel Fuller, NXP Semiconductors
Adding Differentiating Value, Reduce Implementation Time – A Fast Track for Integration of New Protocols/Standards
Ralph Grundler, Synopsys

Coffee Break

Session 5.3: Hardware III – Power Supply
USB Type-C, A New Power Paradigm
George Slama, Würt Elektronik eSos
Microcontroller Supplies Made Easy
Thomas Eichstetter, Essentielle Elektronik Eichstetter
Beyond the Data Sheet: Calculating Battery Life for Wireless IoT Devices
Matt Maupin, Silicon Labs

Session 6.3 II: SW-Engineering III – Development Process II
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Henk Katerberg, Verum Software Tools
Safe Critical Application Development for Multicore Platform with ANSYS SCADE
Xavier Fornari, ANSYS
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Steve Howard, Perforce Software

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Martin Heininger, HEICON - Global Engineering
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Dr. David Long, Doulos
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Miroslaw Zielinski, Parasoft

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Prof. Alok Gupta, Xilinx
Designing Machine Learning Solutions for AI Based Embedded Systems
Neelaaksh Shigihall, Pradeep Bardia, Cadence Design Systems
Low-bit CNN Implementation and Optimization on FPGA
Dr. Yi Shan, Xilinx

Session 10.4 II: SoC V – System Technology II
From Design to Runtime: A Practical Approach to Reconfiguration
Mike Looijmans, Topic Products
RISC-V Hardware and Software Technology for Industry
Prof. Robert Oshana, NXP Semiconductors
Rick O’Connor, Open HWGroup
An Enclave-based TEE for SE-in-SoC in RISC-V Industry
Vincent Cui, Alibaba Group; Xuanele Ren, T-HEAD Semiconductor

Coffee Break

Vergleich von WiPo Eval-Boards von SW bis 20W
Robin Zwetzig, HFU Hochschule Furtwangen University & WEKA Fachmedien
Overcoming “Dirty-Power” Challenges Through Suitable Protection Schemes
Madhu Rayabahari, Semtech
Surviving Automotive Power Transients
George Slama, Würt Elektronik eSos

Guidelines, Tips and Tricks for Managing Open Source Software for Embedded Systems
Prof. Robert Oshana, NXP Semiconductors
A Hierarchical State Machine (HFSM) Realization with Polymorphism and Inheritance
Mustafa Eral, Aselsan
Dynamic Memory Allocation & Fragmentation in C & C++
Colin Walls, Mentor, a Siemens Business

Debugging Complex Failures of Real-Time Multi-Core Systems
Albert Schulz, Accem技術
Leveraging an Agnostic Approach to Debugging in Multicore Environments
Dr. Shawn Pretridge, IAR Systems
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Dr. Kristian Trenkel, 6st Intelligente Systeme

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Stephan Gillichs, Intel Deutschland
AI on Microcontrollers
Raphael Zingg, ZHAW Institute of Embedded Systems

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Jerry Wong, Xilinx
Blending DSP and ML Features Into a Low Power General Purpose Processor – How Far Can We Go?
Joseph Yiu, Arm
Improving Interface Adoption and Advancement with Programmable Devices
Grant Jennings, GOWIN Semiconductor

Want more? See page 12/13 for additional classes!
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<tr>
<td>09:30-10:00</td>
<td>5G is Here and Now – Bringing the Dream of Autonomous Driving a Step Closer to Reality</td>
<td>Juggling Multiple IoT Protocols</td>
<td>Impacts of Increased Software Diversity on Embedded Systems</td>
<td>The Death of End-to-end Encryption and Personal Privacy</td>
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<td>Martin Mausser, Qualcomm</td>
<td>Marius Munder, Silicon Labs</td>
<td>Maarten Koning, Wind River</td>
<td>Kris Chaplin, Intel</td>
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<td>10:00-10:30</td>
<td>Technical Principles and Simulations of the New 5G Radio Standard</td>
<td>IEEE 802.11AX for IoT</td>
<td>Ban: A Modern Lightweight Embedded Hypervisor</td>
<td>Our Critical Cyber Infrastructure is Under Attack: How We Can Protect it</td>
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<td>Marco Roggero, The MathWorks</td>
<td>Shewan Yitayew, Imagination Technologies</td>
<td>Jose Martins, University of Minho</td>
<td>with a Cloud-to-Flash Approach</td>
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<td>Yoni Kahana, Nanolock security</td>
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<td>10:30-11:00</td>
<td>Evaluation of Private LTE Networks for IoT Applications</td>
<td>IoT On-Demand: How NFC helps to Control &amp; Connect Sensors to the Cloud</td>
<td>Xen on Arm: Real-Time Virtualization with Cache Coloring</td>
<td>Understanding DPA Threads and Counter-Measures to Safeguard IoT Devices</td>
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<td>Ritu Sethi, Intel</td>
<td>without the Need of an MCU</td>
<td>Prof. Dr. Giulio Corradi, Xiilinx</td>
<td>Marius Munder, Silicon Labs</td>
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<td>Mubeen Abbas, NXP Semiconductors Germany</td>
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<td>11:30-12:00</td>
<td>The Role of 5G in Industry 4.0</td>
<td>DECT: Wireless for Professional Requirements</td>
<td>Design Considerations of Embedded Hypervisor for Safety Applications</td>
<td>Defeating Superman – Protecting Code Against Fault Attacks</td>
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<td>Ludger Boeggering, u-blox</td>
<td>Daniel Hartnett, DECT Forum</td>
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<td>Dr. Colin O’Flynn, NewAE Technology</td>
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<td>12:00-12:30</td>
<td>Protect the Worldwide IoT with iSIM IP &amp; Managed Services</td>
<td>Li-Fi TSN Node for Industrial Real-time Communications</td>
<td>Utilizing OpenAMP in a Mixed Safety-Critical System</td>
<td>Efficient and Secure Implementation of Post-Quantum Cryptography</td>
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<td>Dana Neustadtter, Synopsys</td>
<td>Dr. Michael Faulwasser, Fraunhofer Institut für Photonische Mikrosysteme</td>
<td>Jeffrey Hancock, Mentor, A Siemens Business</td>
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<td>13:30-14:00</td>
<td>Conference Sponsors</td>
<td>5G and LPWAN Fight or Team-up?</td>
<td>Comparing Debugging Strategies for Complex Embedded Systems</td>
<td>IoT Device and Data Security for uSoC FPGAs at the Edge</td>
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<td>Dr. Hakim Jaafer, STMicroweoelectronics</td>
<td>Dr. Carmelo Loliacono, Green Hills Software</td>
<td>Grant Jennings, GOWIN Semiconductor</td>
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<td>14:00-14:30</td>
<td>LoRa Cloud Enables Geolocation, Device and Application Services for LoRAWAN Networks</td>
<td>Multicore-Debugging with Virtualization-Awareness</td>
<td>Cognitive Platform for Industrial IoT System Security, Safety and Privacy</td>
<td>Konstantinos Loupos, INLECOM</td>
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<td>Pedro Pachuca, Semtech</td>
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<td>14:30-15:00</td>
<td>Maintenance-free MIOTY LPWAN Enabled by Energy Harvesting</td>
<td>Multi Zone Security for Cortex-M Devices</td>
<td>Workshop on Flexible IoT Device Security</td>
<td>Nicolas Ponsini, Oracle</td>
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<td>Ferdinand Kemeth, Fraunhofer Institute for Integrated Circuits IIS</td>
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<td>15:30-16:00</td>
<td>A Threat and Risk Analysis Methodology for LoRa-based IoT Systems</td>
<td>Open Sourcing Safety Certification: The Xen Project’s Journey within the</td>
<td>Privacy &amp; Security Implications for IoT Platforms in Large Scale Utility</td>
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<td>Dr. Dana Fabiana Andreescu, Internet of Trust</td>
<td>Auto Industry and Beyond</td>
<td>Deployment</td>
<td>Mohit Kedia, Arm</td>
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<td>SPURV: Running Android on Wayland</td>
<td>Challenges of Tomorrow’s Data Storage Integrity in Automotive and IOT</td>
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<td>Guy Lunardi, Collabora</td>
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Ted Marema, Western Digital

Low Voltage Motor Control System Design for Mobile and Wireless IoT Devices – How to Operate a Stepper or DC Motor From a Low Voltage Power Supply
Bernhard Dwerssteg, Trinamic Motion Control

Capacitive ECG Monitoring for Wearables and Smart Clothes
Daniel Laqua, Technische Universität Ilmenau

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Session 5.5: Hardware V – Architectures
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Prof. Dr. Dirk Pesch, University College Cork

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Greg Davis, Green Hills Software

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Dr. Andreas Gaiser, Axivion

Hack Proofing Your C/C++ Code
Greg Davis, Green Hills Software

Coffee Break

Session 5.7: SW-Engineering VII – Code Quality II
Steps to Improve Code Quality for Safer Embedded Systems
Marcus Nissemark, Green Hills Software

How to Prove that Your C/C++ Code is Safe and Secure
Christian Guss, The MathWorks

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Leonid Borodaev, Parasoft

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Lowry Snow, Amazon Web Services

Adding Machine Learning Based Image Processing to Your IoT Product; Real Time Edge Processing on the ConnectCore 8X
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Why Choosing the Right Machine Vision Software for an Embedded Vision Product is not a No-brainer
Christoph Wagner, MVTec Software

Session 6.2: Embedded Vision II
Simplified Edge Computing and Computer Vision with OpenVINO
Osuwotobi Oyinlola, Intel

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Jan-Erik Schmitt, Vision Components

Direct Data Exchange Between FPGAs and GPUs Using GPUDirect
Philipp Huber, ZHAW Institute of Embedded Systems

Session 9.1 I: Embedded HMI & GUI I
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Henrik Goul, Mjaler Informatics

Making the Cockpit of the Future a Reality – Via Optimized Human Machine Interfaces
Vincent Rossignol, Lionel Bennes, ANSYS

Scalable Safe HMI System Architectures
Mark Beilam, Arm

Program is subject to change (as at 05.12.2019)

Want more? See page 12/13 for additional classes!
## TUESDAY | FEBRUARY 25 2020

| 09:30-12:30 | Class 3.1: The Robert Berger Class: Embedded Linux – a Crash Course  
Robert Berger, Reliable Embedded Systems | Class 5.1: How to Build & Secure a RISC-V Embedded System  
Cesare Garlati, Hex Five Security / RISC-V Foundation  
Prof. Dr. Sandro Pinto, University of Minho  
How to Build Hardware-enforced Software defined Separation in Cortex-M Devices  
Cesare Garlati, Hex Five Security / RISC-V Foundation | Class 5.2: Ultra Low Power Hands-on Workshop  
Herman Roebbers, Altran |
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### Classes:

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Greg Davis, Director of Engineering, Compilers at Green Hills Software

“The embedded world Conference and exhibition is a unique event in the embedded systems industry because of the mix of excellent technical content in the conference and the right attendees and exhibitors in the exhibition. For learning about the latest in embedded technology, to meeting with partners and customers, Embedded World has provided great value for me personally and for Imperas Software.”

Larry Lapides, VP Sales, Imperas Software Ltd.

“For me, the embedded world Conference is Europes leading communication platform to engage with developers and decision makers. Every year, Arm participates at the conference track with our best experts on topics that should soon be significant for the embedded industry. I really enjoy the interaction with our users that provide us with their feedback. This makes embedded world special and my personal key event every year!”

Reinhard Keil, Arm Germany

“For high-tech professionals who want to stay ahead of the innovation curve, The Embedded World Conference offers a unique mix of well curated topics from industry and research. Year after year I return to the Conference to learn about technology trends and to connect with industry peers. What sets the Conference apart is the quality of the speakers, the relevance of the subjects, and the truly non-commercial content of the sessions. See you in Nuremberg in February 2020!”

Cesare Garlati, Founder Hex Five Security, California, USA
Upcoming Events:

**Automotive Ethernet Congress**
12-13 February 2020, Munich
www.automotive-ethernet-congress.de

**TSN/A Conference – Technology & Applications**
7-8 October 2020, Frankfurt
www.tsnaconference.de

**Wireless Congress: Systems & Applications**
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The keynote is always a highlight of the embedded world Conference. In 2019 Jean-Marc Chery, CEO of ST Microelectronics, was guest speaker.

In the classes, the participants immerse themselves deeply in a technical topic. Many of the classes are hands-on workshops in which the trainer gives a live demonstration or the participants themselves take action.

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- Local Dimming for Automotive LCDs
- AR/VR: Techniques & Applications
- Gestures & HMI
- Automotive Displays & Touch Integration
- HDR Measurements
- Rough Display Applications
- LCDs & Haptic Feedback
- Micro-LEDs
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| Class 3.1 | The Robert Berger Class: Embedded Linux – a Crash Course |
| Class 3.2 | Embedded Android Workshop |
| Class 3.3 | Fast Track to OpenEmbedded and Yocto Project |
| Class 3.4 | BeagleBoard-Class |
| Class 4.1 | AES Cryptosystem Key Extraction on Standard µC and Countermeasures |
| Class 5.1 | How to Build & Secure a RISC-V Embedded System |
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| Class 6.1 | The Bruce Douglas Class 1: Agile for Embedded Systems |
| Class 6.2 | The Bruce Douglas Class 2: Advanced Behavioral Modeling in UML and SysML |
| Class 6.3 | The Greg Davis Class: Advanced C/C++ Coding and Debugging Techniques |
| Class 6.4 | Safe Modern C++ |
| Class 6.5 | The Bruce Douglas Class 3: Effective Use Cases, User Stories and Scenarios |
| Class 10.1 | Integrating Arm Cortex-M soft CPU IP into FPGAs |
| Class 10.2 | FPGA-Design using C/C++ and High-Level Synthesis |

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| Session 1.1 | Internet of Things I – Trusted Computing |
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| Session 1.3 | Internet of Things III – Data Management, Edge, Fog, Cloud |
| Session 2.1 | Connectivity I – Wired Communication |
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| Session 3.1 | Embedded OS I/II – Basics I/II |
| Session 3.2 | Embedded OS III/IV – Linux I/II |
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| Session 4.1 | Functional Safety & Security I – Standards |
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| Session 5.1 | Hardware I – Memory |
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| Session 6.1 | SW-Engineering I/II – Languages & MISRA I/II |
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| Session 7.1 | Embedded Vision I/II |
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| Session 9.1 | Embedded HMI & GUI I/II |
| Session 10.1 | SoC I – Supply Chain |
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