SESSIONS
APRIL 28, 2021

Morning wellbeing session

8:30am - 8:45am
Embedded IoT World Keynotes

Hosted at the very beginning of both days, our wellbeing sessions will set you up for a day filled with learning and networking.

Chairperson's Opening Remarks

9:00am - 9:10am
Embedded IoT World Keynotes

Participants

Josh Builta - Director Internet of Things, Omdia

Panel Discussion - Pushing the open edge machine learning ecosystem forward with RISC-V, Zephyr, TensorFlow Lite Micro and Renode

9:15am - 9:45am
Embedded IoT World Keynotes

By moving closer to the edge, machine learning is profoundly changing the IoT landscape, where RISC-V is already seeing immense success. To be able to fully capitalize on the opportunities that arise from this trend, as well as tackle the related challenges, various communities must come together to create an open ecosystem of modern tools, frameworks and platforms that together will constitute a seamless environment for developers to build advanced ML applications on RISC-V.

The keynote panel will feature representatives of Google, Zephyr Project, QuickLogic, STMicroelectronics and Antmicro in a discussion of how the strengths of RISC-V, Zephyr RTOS, TensorFlow Lite and Renode can be combined to provide innovative, collaborative, software-driven and traceable ML development for the very edge, also on the hardware level, e.g. using FPGAs or RISC-V custom extensions. The participants will discuss modern testing methodologies and HW-SW co-development enabled by the Renode simulation framework - as used by e.g. Google's TF Lite Team - unlocking efficient and deterministically testable ML development on platforms including RISC-V.

Other hot topics will include open source FPGA tools and Renode support for the Core-V MCU, recent developments concerning TensorFlow Lite Micro, RISC-V joining the Zephyr Project and the ML-oriented, EU-funded VEDLIoT project involving RISC-V and Renode.

Participants

Moderator: Michael Gielda - Co-Founder, Antmicro

Panelist: Tim Ansell - Software Engineer, Google

Panelist: Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

Panelist: Brian Faith - President & CEO, QuickLogic

CORE-V: Industrial grade, open-source, RISC-V Cores

9:50am - 10:10am
Embedded IoT World Keynotes

The CORE-V family is an OpenHW Group project to develop, deploy, execute pre-silicon functional verification and SoC based evaluation kits of the CORE-V family of open-source RISC-V cores. Written in SystemVerilog, the CORE-V open-source IP matches the quality of IP offered by established commercial providers and is verified with state-of-the-art, auditable flows.

The CORE-V cores are verified using CORE-V-VERIF a silicon-proven, industrial-grade functional verification platform. CORE-V-VERIF has been used to execute a complete verification cycle of the CORE-V CV32E40P core and is currently being used to execute verification of the CV32A6 and CV64A6 cores. CORE-V-VERIF leverage verification components developed by the RISC-V community and will be continuously maintained and enhanced to integrate the latest best-practices and technology for the verification of future CORE-V cores such that CORE-V cores can be used in high-volume production SoCs.

Participants

Rick O'Connor - President & CEO, OpenHW Group

Keynote Speaker Q&A Room

10:15am - 10:45am
Embedded IoT World Keynotes

Participants

Moderator: Josh Builta - Director Internet of Things, Omdia

Brian Faith - President & CEO, QuickLogic

Michael Gielda - Co-Founder, Antmicro

Tim Ansell - Software Engineer, Google

Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

Rick O'Connor - President & CEO, OpenHW Group

Device Security & Safety Opening Remarks

10:50am - 11:00am
Device Security & Safety

Participants

Pierre Lebas - IoT Devices & Solutions Architect, Microsoft

Processors & Instruction-Set Architecture Opening Remarks

10:50am - 11:00am
Processors & Instruction-Set Architecture

Participants

Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

Safe access of local IoT devices from the internet

11:05am - 11:35am
Device Security & Safety

This discussion will dive into one particular solution that combines long-polling, the device authorization grant, and an internet accessible controller to communicate with devices on a local network without opening inbound connections to those devices. We will also spend some time reviewing the attack surfaces of this approach and the required mitigations. Finally, we will spend a little time reviewing some of the COTS solutions that already exist in this area.

- How to use device authorization grant to initialize a device on a local network
- Understand how to create a simple controller that is accessible via the web and enables local devices to interact with it using tokens
- A look at some of the attack surfaces of this approach and the mitigations required

Participants

Carlos Mostek - Principal Solution Architect, Auth0

Scale4Edge RISC- V edge computing ecosystem: Virtual prototyping first!

11:05am - 12:05pm
Processors & Instruction-Set Architecture

Hardware based on the open RISC-V ISA is about to revolutionize the way edge computing devices and applications are developed. Especially RISC-V's flexibility to be extended by application-specific instruction which enables a wide variety of scalable customizations for different application domains. Yet, there are still many challenges to bringing RISC-V scalability into industrial practice.

Scale4Edge aims to address this challenge by providing an ecosystem of RISC-V hardware IP, software development IP and tooling support for scalable edge computing with a special focus on safety, security and embedded AI applications. Scale4Edge promotes a "virtual prototyping first" approach which allows for exploration of the flexibility of RISC-V with a virtual platform combined with the ability to generate most parts of the hardware, software and verification IP for the final target design.

This session will be comprised of three presentations:

Talk 1 - The industrial application view which explains why "virtual prototyping first" is the future of edge computing

Talk 2 - Introduces the flexible VP environment VP-Vibes which provides the building blocks to rapidly set up virtual prototypes of RISC-V processor-based edge devices

Talk 3 - The integration and evaluation of edge AI accelerators

- Gain the technical background needed to understand how the "virtual prototyping first" approach can speed up and improve quality for scalable RISC-V based designs
- Learn about readily available open source solutions and future plans to allow you to quickly bring virtual prototypes into your design flows
- A look at the path forward to also address safety, security and embedded AI applications at the edge using RISC-V based designs

Participants

Moderator: Daniel Mueller-Gritschneder - Professor, Technical University of Munich

Moderator: Wolfgang Ecker - Distinguished Engineer, Infineon Technologies

Talk 1 Speaker: Ingo Feldner - Project Lead, Robert Bosch GmbH

Talk 2 Speaker: Vladimir Herdt - Senior Researcher, University of Bremen / DFKI GmbH

Talk 3 Speaker: Christian Mayr - Professor, Technische Universität Dresden

A structured approach to comprehensive IoT security in the smart home

11:40am - 12:00pm
Device Security & Safety

With the rapid development of the Internet of Things, intelligent systems are increasingly finding their way into everyday life and into people's homes. With the spread of these technologies, there is a growing concern about device security and data privacy.

Many of us already interact with at least 3 to 5 smart devices daily – a smartphone, fitness tracer, a smart TV, voice assistant, and smart appliances to name a few.

Data from one device may not be a problem, but combining data from several devices could create a pattern that may reveal unwanted information about a user. And with more devices coming into homes, concerns around the way personal data is managed, controlled, and used by devices and organizations are increasingly being raised.

In this presentation, Tuya Smart, a global IoT Cloud and Development Platform, will discuss the top security concerns facing tech providers, product manufacturers, and consumers, highlighting best practices to ensure device security, data privacy, and end user peace of mind.

Participants

Ann Marie Olivo-Shaw - Marketing Director, Tuya

Closing the security certification gap: State-of-the-art security for IoT devices

12:05pm - 12:35pm
Device Security & Safety

With literally hundreds of certification frameworks across multiple regions and verticals, one thing is clear: security evidence is an important trust enabler. While this trend continues, embedded IoT developers are confronted with the need of showing evidence of the security capabilities in their products. This is relevant for compliance, risk management or simply for accountability.

This presentation introduces SESIP, the Security Evaluation Standard for IoT Platforms. SESIP is a security evaluation scheme designed to support the entire IoT ecosystem. We will explore the state of the market in the area of security evaluations for IoT devices and introduce SESIP, with hands on examples including ETSI EN 303645 for consumer devices, and IEC 62443-4-2 for industrial IoT. Showcasing SESIP applicability and both the technical and commercial benefits for the entire value chain.

- A look at the global security certification and compliance trends for the IoT market
- Understand the benefits of security evaluations for IoT devices
- Experience the concept of composite evaluations as the scalable way to build products with secure, certified components
- Introduction to SESIP as the most relevant scheme in the world for IoT security

Participants

Carlos Serratos - Senior Director Strategy, Policy, Advocacy, Brightsight

IoT Area in Akraino

12:10pm - 12:30pm
Processors & Instruction-Set Architecture

This session will give an overview and discussion on IoT Area in Akraino, including Blueprint Families like ELIOT: Edge Lightweight and IOT, IIoT at the Smart Device Edge, Project Cassini - IoT and Infrastructure Edge. Security, APIs, oneM2M IoT Service Layer Platform will also be reviewed under this IoT Area.

Participants

Tina Tsou - Enterprise Architect, ARM

SESSIONS
APRIL 28, 2021

Addressing architectural challenges in science with open-source hardware

12:35pm - 1:05pm
Processors & Instruction-Set Architecture

The success of novel technologies in the Beyond Moore's Law era strongly depends on the idea of specialized hardware and extreme heterogeneity in system architecture. For decades, the research community has been developing techniques for design space exploration having limited interaction with industry partners. The appearance and rapid growth of open-source hardware initiatives, e.g. RISC-V architecture, helps to bridge the gap between academia and industry thereby transforming science and opening up new opportunities.

Participants

Anastasiia Butko - Research Scientist, Lawrence Berkeley National Laboratory (LBNL)

Secure update of software and firmware on IoT devices

12:40pm - 1:00pm
Device Security & Safety

Ensuring that the firmware and software on an IoT device are updated to the latest version is critical to maintain a secure state with all the known vulnerabilities addressed. This talk will set the context with pertinent threat landscape data from NVD database on IoT devices. The TCG guidance will be introduced and concludes with the evaluation of technologies including TPM and DICE to achieve the objectives.

Participants

Sunil Cheruvu - Senior Principal Engineer - Chief IoT Security Architect, Trusted Computing Group

Device Security & Safety Speaker Q&A Room

1:05pm - 1:35pm
Device Security & Safety

Participants

Moderator: Stephen Olsen - Principle Field Application Engineer, BlackBerry QNX

Carlos Mostek - Principal Solution Architect, Auth0

Ann Marie Olivo-Shaw - Marketing Director, Tuya

Carlos Serratos - Senior Director Strategy, Policy, Advocacy, Brightsight

Sunil Cheruvu - Senior Principal Engineer - Chief IoT Security Architect, Trusted Computing Group

Ask the Analyst Session

1:05pm - 1:35pm
Ask the Analyst

Head over to the Omdia booth on the platform to ask our analysts your most pressing embedded systems and IoT questions in this exclusive opportunity.

Participants

Josh Builta - Director Internet of Things, Omdia

Michael Yang - Research Director, Components & Devices: Memory, Omdia

Processors & Instruction-Set Architecture Speaker Q&A Room

1:10pm - 1:40pm
Processors & Instruction-Set Architecture

Participants

Moderator: Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

Daniel Mueller-Gritschneder - Professor, Technical University of Munich

Wolfgang Ecker - Distinguished Engineer, Infineon Technologies

Vladimir Herdt - Senior Researcher, University of Bremen / DFKI GmbH

Ingo Feldner - Project Lead, Robert Bosch GmbH

Christian Mayr - Professor, Technische Universität Dresden

Anastasiia Butko - Research Scientist, Lawrence Berkeley National Laboratory (LBNL)

Tina Tsou - Enterprise Architect, ARM

Security and safety in the IoT: Why you need a systems approach to device security

1:40pm - 2:00pm
Device Security & Safety

With so many headlines on IoT safety and security, and new attacks happening every week it can be difficult to know where to start. If you've ever asked any of the following questions, then this talk is for you:

- Where do I start with IoT security?
- How do I look at security and safety together?
- I'm on a project and what can I do to build secure devices?

This talk will walk through Synopsys' approach to threat modeling IoT systems and will answer the above questions while also demonstrating how to tie security and safety together with a systems approach.

Participants

Daniel Lyon - Senior Principal Consultant, Synopsys

Embedded Industrial IoT Opening Remarks

1:45pm - 1:55pm
Embedded Industrial IoT

Participants

Cüneyt Songüler - Senior IoT Solution Architect, Siemens

Jumpstart your asset tracking applications using sensors and solutions

2:00pm - 2:20pm
Embedded Industrial IoT

How to develop an asset tracking application

- Products: Sensors and platform solutions - discussions of ST's sensors with optimum features necessary to create cost effective, high performance asset tracking applications
- Solutions: Evaluation boards that can address various asset tracking applications using different connectivity options and collect data from sensors
- Create Value: Proof of concept with a sandbox turn key asset tracking application, log and visualize sensor data through a cloud dashboard

Participants

Alexandra Gogonea - Product Marketing Engineer - Sensors, STMicroelectronics

Kirby Atwater - Product Marketing Staff Engineer, STMicroelectronics

Daniel Griffin - Applications Staff Engineer, STMicroelectronics

Hacker vision: Cybersecurity risks and what's evolving in homomorphic encryption

2:05pm - 2:25pm
Device Security & Safety

- Understand the security complications introduced by trends like 5G edge computing and private LTE/ 5G networking in order to stay protected
- Discover how to apply new cybersecurity frameworks such as homomorphic encryption: Why is this the next big thing?
- Leave this session with hacker vision: Gain the ability to see your networks from the perspective of a hacker
- Best practices in the field of IoT to establish zero-trust systems and networks (for any type of multi-tenant compute or network, not just mobile)

Participants

Pat Wilbur - CTO and Co-Founder, Hologram

SESSIONS
APRIL 28, 2021

Implementing a green recovery: How Digital Twins will pave way to sustainability

2:25pm - 3:10pm
Embedded Industrial IoT

Modern buildings contain complex mechanical devices, sophisticated control systems and a suite of features to improve the energy blueprint. As businesses and consumers adjust to life in this 'new normal', it's clear that implementing a 'green recovery' is vital to ensuring that Sustainability is central to every business. With the right guidance and solutions, businesses can put initiatives in place to improve their sites' energy efficiency and reduce their carbon footprint. The concept of sustainability is receiving increasing attention, and sustainable manufacturing & smart spaces is evolving. The digital twin is an emerging technology used in intelligent manufacturing that can grasp the state of intelligent manufacturing systems in real-time and predict system failures.

In this state of the art session, we will look at how contrary to popular belief, achieving stretching sustainability objectives doesn't need to break the bank. We will dive deeper into Digital twin technology and IIoT that aims to put sustainability at the heart of smart cities/ smart spaces initiatives. I will take the audience through a demo of an ideal implementation of a sustainable solution as well. Finally, combined with the current status, the future development direction of "Connected Ecosystems" is presented.

- What exactly is the meaning of a sustainable solution?
- How to think about implementing a Sustainability solution and why IIoT & Digital Twins are so central to this idea
- How Digital Twin technologies can be leveraged by manufacturers to meet sustainability and efficiency goals

Participants

Rishabh Gaur - Technical Architect, Microsoft

Security as an afterthought: The challenges of keeping IoT products secure

2:30pm - 2:50pm
Device Security & Safety

What are the consequences of leaving security as an afterthought when building a product? During this session, Exset Labs' Security Researcher & Analyst, Diogo Pimentel, will speak about:

1- The current trends within the IoT industry and why you should care

2- The challenges and risks of not taking security seriously

3- What role do legislation and security standards play in ensuring secure products?

4- Types of threats and real world hacking cases/ scenarios and what companies like yours can learn from this

5- Solutions to how you can protect your assets

Participants

Diogo Pimentel - Security Analyst, Exset Labs

Panel Discussion - Safety certification in the open: How the Xen project is making progress to achieve certification

2:55pm - 3:25pm
Device Security & Safety

Safety certification is one of the essential requirements for software to be used in highly regulated industries. Besides technical and compliance issues (such as ISO 26262 vs IEC 61508,) transitioning an existing project to become more easily safety certifiable requires significant changes to development practices within an open source project. In this session, we will lay out some challenges of making safety certification achievable in open source. We will be offering an in-depth review of how Xen Project is approaching these challenges and try to derive lessons for other projects and contributors.

- Understand the process of the Xen Project Special Interest Group (SIG)'s journey toward safety certifications so far and lessons learned along the way
- Discover documentation, requirements generation, static code analysis, and contribution processes that need to be improved to make progress

Participants

Moderator: George Dunlap - Xen Project Advisory Board Chair, The Xen Project

Panelist: Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

Panelist: Stefano Stabellini - Principal Engineer, Xilinx

Panelist: Artem Mygaiev - Director, EPAM

Mastering the industrial IoT journey: Delivering value at the edge

3:15pm - 3:35pm
Embedded Industrial IoT

The physical world is creating a massive explosion of data and has the opportunity to transform industry and enrich our lives.

With the merging of IT and OT, the complexity in manufacturing rises. IIOT technologies such as artificial intelligence and edge computing, today's and tomorrow's challenges in the manufacturing industry can be mastered.

Explore how leading manufacturers integrate AI, Machine Learning, and IoT technology together with deep domain know-how into their automation systems to realize value. Learn in several use cases, such as equipment predictive maintenance, asset management and product and process improvement how this integration brings productivity to the shopfloor and generates value over time.

Participants

Thibault de Assi - General Manager and Global Head of Industrial Computing, Siemens

Building IoTopia - standardizing security for IoT devices and services

3:30pm - 4:00pm
Device Security & Safety

The IoT landscape is rapidly expanding and there's an urgent need for standardized, interoperable and proven end-point security. Years away, right?

Wrong.

Introducing IoTopia

In this presentation GlobalPlatform, a non-profit industry association will deliver insights into its new initiative, IoTopia. The initiative:
• Proposes a common framework to standardize the design, certification, deployment and management of IoT devices.
• Aims to be testable and meet vertical requirements by building on four foundational pillars: secure by design; device intent; autonomous, scalable and secure onboarding; and device life-cycle management.
• Will be a simple but executable framework that is standards-based, industry-wide and able to evolve as security capabilities and requirements change.
• Will provide the opportunity to support tiers of security as well as certification in desired verticals.

Participants

Gil Bernabeu - Technical Director | Head of R&D and Innovation Funding, GlobalPlatform | Thales DIS

Digital transformation in Oil & Gas with edge computing

3:40pm - 4:10pm
Embedded Industrial IoT

The data center is no longer the center of data; in fact, data has "left the building! The explosion of IoT data coupled with bandwidth costs, latency, autonomy, and security force users to move applications that would have traditionally run in the cloud towards the edge, but the heterogeneity of the edge introduces unique IoT edge orchestration challenges in a scalable and secure fashion. Agora, a venture of Schlumberger, in partnership with ZEDEDA, is transforming the IoT edge by deploying intelligence in the field through an open and universal multi-vendor IoT edge orchestration system.

- Understand how Agora is transforming the edge as data center solutions don't meet the requirements of harsh environments
- Consolidating workloads by deploying cloud-native containerized apps alongside legacy apps in virtual machines to preserve existing investments
- Gaining visibility, control and lifecycle management across microservices, runtimes, apps, OS and hardware

Participants

Obinna Ilochonwu - Industrial IoT Architect, Schlumberger

Roman Shaposhnik - Co-Founder, VP Product, ZEDEDA

Device Security & Safety Speaker Q&A Room

4:05pm - 4:35pm
Device Security & Safety

Participants

Moderator: Stephen Olsen - Principle Field Application Engineer, BlackBerry QNX

Kate Stewart - VP, Dependable Embedded Systems, Linux Foundation

George Dunlap - Xen Project Advisory Board Chair, The Xen Project

Stefano Stabellini - Principal Engineer, Xilinx

Artem Mygaiev - Director, EPAM

Pat Wilbur - CTO and Co-Founder, Hologram

Diogo Pimentel - Security Analyst, Exset Labs

Gil Bernabeu - Technical Director | Head of R&D and Innovation Funding, GlobalPlatform | Thales DIS

Embedded Industrial IoT Speaker Q&A Room

4:15pm - 4:45pm
Embedded Industrial IoT

Participants

Moderator: Cüneyt Songüler - Senior IoT Solution Architect, Siemens

Rishabh Gaur - Technical Architect, Microsoft

Obinna Ilochonwu - Industrial IoT Architect, Schlumberger

Roman Shaposhnik - Co-Founder, VP Product, ZEDEDA

Alexandra Gogonea - Product Marketing Engineer - Sensors, STMicroelectronics

Kirby Atwater - Product Marketing Staff Engineer, STMicroelectronics

Daniel Griffin - Applications Staff Engineer, STMicroelectronics

Thibault de Assi - General Manager and Global Head of Industrial Computing, Siemens

SCHEDULE

APRIL 28, 2021 -

Embedded IoT World Conference & Expo 2022

April 5 - 7, 2022
Santa Clara Convention Center

TIME	ASK THE ANALYST	DEVICE SECURITY & SAFETY	EMBEDDED INDUSTRIAL IOT	EMBEDDED IOT WORLD KEYNOTES	PROCESSORS & INSTRUCTION-SET ARCHITECTURE
8:00AM				**8:30am** - Morning wellbeing session	
9:00AM				**9:00am** - Chairperson's Opening Remarks **9:15am** - Panel Discussion - Pushing the open edge machine learning ecosystem forward with RISC-V, Zephyr, TensorFlow Lite Micro and Renode **9:50am** - CORE-V: Industrial grade, open-source, RISC-V Cores	
10:00AM		**10:50am** - Device Security & Safety Opening Remarks		**10:15am** - Keynote Speaker Q&A Room	**10:50am** - Processors & Instruction-Set Architecture Opening Remarks
11:00AM		**11:05am** - Safe access of local IoT devices from the internet **11:40am** - A structured approach to comprehensive IoT security in the smart home			**11:05am** - Scale4Edge RISC- V edge computing ecosystem: Virtual prototyping first!
12:00PM		**12:05pm** - Closing the security certification gap: State-of-the-art security for IoT devices **12:40pm** - Secure update of software and firmware on IoT devices			**12:10pm** - IoT Area in Akraino **12:35pm** - Addressing architectural challenges in science with open-source hardware
1:00PM	**1:05pm** - Ask the Analyst Session	**1:05pm** - Device Security & Safety Speaker Q&A Room **1:40pm** - Security and safety in the IoT: Why you need a systems approach to device security	**1:45pm** - Embedded Industrial IoT Opening Remarks		**1:10pm** - Processors & Instruction-Set Architecture Speaker Q&A Room

SCHEDULE

APRIL 28, 2021 -

TIME	ASK THE ANALYST	DEVICE SECURITY & SAFETY	EMBEDDED INDUSTRIAL IOT	EMBEDDED IOT WORLD KEYNOTES	PROCESSORS & INSTRUCTION-SET ARCHITECTURE
2:00PM		**2:05pm** - Hacker vision: Cybersecurity risks and what's evolving in homomorphic encryption **2:30pm** - Security as an afterthought: The challenges of keeping IoT products secure **2:55pm** - Panel Discussion - Safety certification in the open: How the Xen project is making progress to achieve certification	**2:00pm** - Jumpstart your asset tracking applications using sensors and solutions **2:25pm** - Implementing a green recovery: How Digital Twins will pave way to sustainability		
3:00PM		**3:30pm** - Building IoTopia - standardizing security for IoT devices and services	**3:15pm** - Mastering the industrial IoT journey: Delivering value at the edge **3:40pm** - Digital transformation in Oil & Gas with edge computing		
4:00PM		**4:05pm** - Device Security & Safety Speaker Q&A Room	**4:15pm** - Embedded Industrial IoT Speaker Q&A Room		

SESSIONS
APRIL 29, 2021

Morning wellbeing session

8:30am - 8:45am
Embedded IoT World Keynotes

Hosted at the very beginning of both days, our wellbeing sessions will set you up for a day filled with learning and networking.

Omdia Opening Remarks & Analyst Briefing

8:50am - 9:10am
Embedded IoT World Keynotes

Participants

Michael Yang - Research Director, Components & Devices: Memory, Omdia

Panel Discussion - The relationship between connectivity, edge computing, AI and machine learning in embedded systems

9:15am - 9:45am
Embedded IoT World Keynotes

- Discover how definitions for edge computing will continue to evolve and the impact this will have on engineers building embedded systems for the edge
- Understanding the vast array of connectivity options to tailor your device build so the tech will run smoothly as well as looking at which option fits best
- Dive into AI at the edge: A look at the different types of hardware AI accelerators

Participants

Moderator: Barna Ibrahim - Zephyr Project Governing Board Member & Platforms and Ecosystems Partner Development Lead, Google

Panelist: Aditya Kumar - Compiler Engineer, Snapchat (Former Facebook)

Panelist: Colleen Josephson - PhD Candidate in Electrical Engineering, Stanford University

Panelist: Edoardo Gallizio - Sr. Product Marketing Manager - Americas, STMicroelectronics

Panelist: Jim White - CTO, IOTech

Keynote Speaker Q&A Room

9:50am - 10:20am
Embedded IoT World Keynotes

Participants

Moderator: Lee Ratliff - Senior Principal Analyst, Omdia

Barna Ibrahim - Zephyr Project Governing Board Member & Platforms and Ecosystems Partner Development Lead, Google

Edoardo Gallizio - Sr. Product Marketing Manager - Americas, STMicroelectronics

Aditya Kumar - Compiler Engineer, Snapchat (Former Facebook)

Colleen Josephson - PhD Candidate in Electrical Engineering, Stanford University

Jim White - CTO, IOTech

Edge Computing & Processing Opening Remarks

10:25am - 10:35am
Edge Computing & Processing

Participants

Nenad Ilic - Senior IoT Architect, Amazon Web Services (AWS)

AI & ML Opening Remarks

10:25am - 10:30am
Artificial Intelligence & Machine Learning

Participants

Rubathas Thirumathyam - Senior Managing Architect, IBM

Intelligent smart home work distribution

10:35am - 11:05am
Artificial Intelligence & Machine Learning

With more and more homes become smart and IoT devices become powerful, most cloud computing jobs can be shifted inside the home, saving the user on privacy and latency. When heavier AI models are deployed on IoT Devices, Data Parallelism using multiple devices minimizes the latency further. Models behave differently on different devices due to a variety of factors, some being user-based, others being device-specific. Analysis of these patterns helps identify the best devices for specific models. In a smart home scenario 'device churn' on powerful devices like mobiles is a factor that needs to be considered using a cost-benefit analysis to prevent any device currently in use from churning out.

We propose a heuristic-based methodology for tracking and using "user-device interaction patterns", "Model Specific device behaviours" and "Static and Dynamic device capability scores" to estimate runtimes of models on various devices. Using the Estimates of time and Churn probability of devices selecting best devices and distributing data in the most optimal way to get the overall fastest response times. The technique also proposed a self-learning process for the system to become better over time, with the flexibility of adding and removing devices dynamically.

Participants

Suresh LC - Chief Engineer, Samsung

SESSIONS
APRIL 29, 2021

Code size compiler optimizations and techniques for embedded systems

10:40am - 11:25am
Edge Computing & Processing

Code size of embedded application has been a concern for a very long time. While storage becomes cheaper and smaller, developers find creative ways to increase code size by adding features or unnecessary software engineering. Compilers have come a long way in optimizing applications for code size. While most compiler optimization work were focused on application performance, we have seen increase in the code size optimizations in recent years.

This session will cover classical as well as recent compiler optimizations for code size, a few of which Aditya has implemented in the LLVM compiler. Some optimizations (hot cold splitting, function entry instrumentation) require collecting data from the field while the application is running. The presentation will provide an overview of how those compiler techniques help reduce code size. We will also explore some tips and techniques (compiler flags to reduce code size, tuning of compiler options like inline threshold), that help reduce binary size. Having knowledge of the code generated by the compiler and the instruction set architecture can help engineers chose appropriate programming abstractions and idioms.

- Optimize applications for code size using available compiler techniques and software engineering techniques
- Various code-size and performance trade offs
- Understanding the code size requirements embedded application

Participants

Aditya Kumar - Compiler Engineer, Snapchat (Former Facebook)

Condition monitoring through machine learning

11:10am - 11:30am
Artificial Intelligence & Machine Learning

What are the challenges for today's Industrial IoT applications?

- Products: Industrial grade sensors - what do you need and why?
- Solutions: How to log sensor data directly from nodes or through a cloud application
- Create value: Move from condition monitoring to predictive maintenance with AI & Machine Learning

Participants

Ernesto Manuel Cantone - Product Marketing Manager - MEMS and Sensors, STMicroelectronics

Michael Hess - Applications Manager - Sensors to Cloud, STMicroelectronics

Networking Break & Scheduled Meetings

11:30am - 11:50am
Edge Computing & Processing

Optimizing machine learning models for IoT applications

11:35am - 12:05pm
Artificial Intelligence & Machine Learning

This session will explore the challenges of coding and debugging complex machine-learning (ML) and artificial intelligence (AI) systems. We will cover how to boost code performance and how to use the advanced debugging and trace capabilities in conjunction with various machine learning and deep learning models and algorithms. We will also look at why code quality is such a major issue with machine learning and how you can future-proof your source code. This session is a must-attend for embedded developers that want to improve the ML and AI models and algorithms for IoT applications.

- Explore how optimized code can positively affect the machine-learning code that is very compute intensive
- Learn how structuring your code effectively can improve your application's optimization and how code quality can have a huge impact on compiler optimization of source code
- Understand how to overcome the challenging process of debugging optimized code

Participants

Aaron Bauch - Senior Field Applications Engineer, IAR Systems

Edge AI processing in real time

11:55am - 12:25pm
Edge Computing & Processing

Edge computing enables AI inference processing to happen right where the data is generated. One of the most demanding applications of AI is computer vision. In this session, you will experience a walkthrough of what it took to create a real-time computer vision application that runs entirely at the edge. Learn what edge computing infrastructure is required to make it work and manage it remotely. Gain understanding of what compute hardware and software layers were used and what open source options are readily available for you to build your own edge AI solutions. Take away a realistic set of expectations around solution delivery timeframes and infrastructure requirements.

- Understanding of the whole architecture needed for a managed application that does real-time AI at the edge
- Knowledge of what AI processing on streaming video frames requires
- Understanding of processing speeds, frame rates, and product delivery timeframes

Participants

Kilton Hopkins - CTO, Edgeworx

Enabling machine learning on Arm Cortex M0-powered IoT nodes using Qeexo AutoML

12:10pm - 12:40pm
Artificial Intelligence & Machine Learning

• Understand the importance and advantages of edge compute, convergence of IOT with ML
• Appreciate the challenges of performing ML on embedded targets, especially one as small as the Arm®Cortex™M0+
• Learn the basic concepts of embedded ML pipeline: sensors data representation -> features extraction -> inference
• Understand the basic concepts of ensemble algorithms
• See Qeexo AutoML in action with the Arduino Nano 33 IOT as a reference target

Participants

Josh Stone - Principal Machine Learning Engineer, Qeexo

AI enabled MCUs: The new frontier of Edge AI

12:30pm - 12:50pm
Edge Computing & Processing

As data volume grows, so does the cost of transmitting, storing and processing data. ONE Tech's MicroAI™ technology is revolutionizing the industry by training at the endpoint. By embedding AI onto devices as small as an MCU, OEMs and asset owners can greatly reduce the amount of data that leaves the asset. Learn about this transformational shift in the industry of Embedded AI during this session.

Participants

Yasser Khan - CEO, ONETech

SESSIONS
APRIL 29, 2021

Intelligent autonomy: Enabling endpoint devices to self-govern

12:45pm - 1:45pm
Artificial Intelligence & Machine Learning

Advancements in traditional compute combined with inclusion of power-efficient AI acceleration fabrics at the edge and within endpoints open up exciting new possibilities for managing the intelligence life-cycle of a system. There is a shift from a cloud-centric intelligence model to a more distributed intelligence architecture. While big-data workloads continue to be cloud centric there is a lot of demand for efficient small-data workload management right at the source.

Being able to run AI/ML workloads within tiny machines (TinyML) combined with how we are re-thinking our lives post COVID has led to some interesting market dynamics. Some of the areas and use-cases that are seeing disruption are using Voice as a User Interface for human-to-machine communication, environmental sensing and predictive analytics and maintenance.

Inference engines running on tiny computers within endpoints now enable far more efficient data handling and analytics right at the source, improving data gravity. Embedded intelligence within end points also means improved response times, reduced network data transport requirements and removal of the need to be persistently connected to the edge or cloud.

Participants

Kaushal Vora - Director - Strategic Partnerships and Global Ecosystem, Renesas Electronics Corporation

Brad Rex - MCU Product Marketing, Renesas Electronics Corporation

Networking Break & Scheduled Meetings

12:55pm - 1:15pm
Edge Computing & Processing

Edge Computing & Processing Speaker Q&A Room

1:20pm - 1:50pm
Edge Computing & Processing

Participants

Moderator: Frederic Desbiens - Program Manager for IoT and Edge Computing, Eclipse Foundation

Aditya Kumar - Compiler Engineer, Snapchat (Former Facebook)

Kilton Hopkins - CTO, Edgeworx

Yasser Khan - CEO, ONETech

Ask the Analyst Session

1:20pm - 1:50pm
Ask the Analyst

Head over to the Omdia booth on the Swapcard platform to ask your most pressing embedded systems and IoT questions from our market leading analysts.

Participants

Michael Yang - Research Director, Components & Devices: Memory, Omdia

Josh Builta - Director Internet of Things, Omdia

RESCHEDULED: Embedded Industrial IoT Q&A Room

1:20pm - 1:50pm
Embedded Industrial IoT

AI & ML Speaker Q&A Room

1:50pm - 2:20pm
Artificial Intelligence & Machine Learning

Participants

Moderator: Rubathas Thirumathyam - Senior Managing Architect, IBM

Suresh LC - Chief Engineer, Samsung

Aaron Bauch - Senior Field Applications Engineer, IAR Systems

Ernesto Manuel Cantone - Product Marketing Manager - MEMS and Sensors, STMicroelectronics

Michael Hess - Applications Manager - Sensors to Cloud, STMicroelectronics

Josh Stone - Principal Machine Learning Engineer, Qeexo

Kaushal Vora - Director - Strategic Partnerships and Global Ecosystem, Renesas Electronics Corporation

Brad Rex - MCU Product Marketing, Renesas Electronics Corporation

Panel Discussion - Edge device security: Challenges and solutions

1:55pm - 2:25pm
Edge Computing & Processing

The Edge is anywhere and everywhere outside the corporate center and the Cloud. This means edge nodes can be deployed in a wide variety of environments, where they will possibly face dangers such as humidity, vibrations, dust and many others. Their physical location also exposes them to tampering, theft and even complex network security threats. This panel will explore the various security challenges of Edge Computing and discuss the value of potential solutions, such as root of trust, device quarantines, network segmentation, data encryption at rest and many others.

Participants

Moderator: Frederic Desbiens - Program Manager for IoT and Edge Computing, Eclipse Foundation

Panelist: Ted Ross - Edge Networking Expert and Open Source Contributer, Apache Software Foundation

Panelist: Nicola La Gloria - CEO, Kynetics

Panelist: Steve Wong - Open Source Software Engineer, VMWare

Connectivity Opening Remarks

2:25pm - 2:30pm
Connectivity

Participants

Tony Pisani - Sr. Product Manager - IoT Software, Cisco

Creating a liquid edge: How to enable IoT practitioners to overcome the most challenging hurdles in IoT

2:30pm - 2:50pm
Edge Computing & Processing

aicas will discuss recent insights from multinational market research and how the smart edge solves this.

Based on market research performed by aicas, we will discuss the main challenges of the edge and how to address these. Challenges like security, latency, and others pose a hurdle for the simple adoption of IoT and edge computing. Based on existing customer architectures, aicas will discuss how these hurdles can be overcome easily providing a shorter time.

Participants

Johannes Biermann - President, aicas GmbH

SESSIONS
APRIL 29, 2021

Bluetooth® Technology: The Swiss Army Knife of Low-Power Wireless Technologies

2:35pm - 2:55pm
Connectivity

In the past two decades, since its inception, Bluetooth® technology has undergone many enhancements and changes that have allowed it to adapt to current and future market needs.

While most associate Bluetooth technology with wireless audio streaming applications, it has recently adapted to provide a wide range of flexibility for developers to utilize it for a wide variety of applications across consumer, commercial and industrial use cases.

Some of the important new and upcoming features are:

- Long-range mode
- High-speed mode
- Direction finding: Angle of Arrival and Angle of Departure
- Bluetooth mesh networking
- The upcoming release of LE Audio

In this talk, I give a brief introduction to these recent enhancements and explore the different ways Bluetooth technology has adapted to provide developers with the flexibility to develop solutions that address applications in different industry verticals.

Participants

Mohammad Afaneh - Sr. Developer Relations Manager, Bluetooth SIG

Eclipse fog05: Managing ROS2 applications at the edge

2:55pm - 3:25pm
Edge Computing & Processing

Edge computing enables robotics applications to offload some of their tasks to nearby computing facilities in order to (1) enhance robots' capabilities (e.g., for data-intensive analytics) and (2) improve overall planning and coordination (e.g., for a fleet of robots). By doing so, the whole robotics application becomes distributed with different components running on separate hardware and potentially different networks. Nevertheless, all these software components are expected to behave and be managed as a single and cohesive robotics application.

This talk aims to shed light on how a unified management of an edge robotics application can be effectively achieved by Eclipse fog05, an open-source project that falls under the umbrella of the Eclipse Edge Native Working Group. Eclipse fog05 provides a decentralised infrastructure for provisioning and managing compute, storage, communication and I/O resources available anywhere across the network, from the far edge up to the cloud. Moreover, Eclipse fog05 addresses highly heterogeneous systems like the ones find in robotics, where embedded controllers on the robots need to interact with powerful server at the edge.

A live demonstration will be presented showing how a teleoperation application based on ROS2, a popular robotics development framework, can be deployed by Eclipse fog05 across multiple geographical locations in France and Germany. The demonstration will walk you through the following aspects: (1) how to package a ROS2 application for Eclipse fog05, (2) how Eclipse fog05 automatically instantiates the ROS2 application on the robot, on the edge and on the cloud to allow you to remotely drive the robot.

- Understand how robotics applications can significantly benefit from edge computing
- Discover how Eclipse fog05 can provide a unified management of robotics applications at the edge
- Learn how a robot can effectively driven from a remote location
- The code of the demonstration is available as open source for anyone to explore

Participants

Luca Cominardi - Senior Technologist, ADLINK Technology

Gabriele Baldoni - Technologist, ADLINK Technology

Entering a brave new world with ultra-wideband (UWB)

3:00pm - 3:30pm
Connectivity

Ultra-wideband (UWB) communications use channels that have a bandwidth of 500Mhz or more, with transmissions at a low power. UWB has existed for decades, but has recently become popularized as major players like Apple and Cisco invest in adding UWB chips to their newest devices. As the number of devices equipped with a UWB chip grows, it will enable a broad spectrum of capabilities. Over the years, researchers have developed an exciting variety of applications like estimating room occupancy, landslide detection, and human body position/motion tracking. Perhaps the leading use case for UWB technology has been precise indoor localization, with accuracies between 10-0.5cm. In this talk, I give a brief introduction to the technology behind the UWB, how it operates and discuss some of its promises as well as implications for our day-to-day activities.

Participants

Colleen Josephson - PhD Candidate in Electrical Engineering, Stanford University

Edge computing: Use cases, requirements, architectures and implementations

3:30pm - 3:50pm
Edge Computing & Processing

Edge computing is poised to be a driving force in networked intelligence in the coming decade. This talk will discuss the migration of selected workloads from the cloud to a hybrid edge model. It will study several representative use cases that strongly benefit from edge computing. Requirements for edge computing in the network, box and node levels will be addressed. Several architectures for edge deployments will be considered, including the Industrial Internet Consortium's edge reference designs. Implementation choices will be explored, including type of processor(s), storage, wired, optical and wireless networking, software backplanes, security, reliability and management.

- Edge computing is a key emerging technology, poised to be as important to us during the next ten years as cloud has been for the last decade
- Critical requirements in areas like latency, network bandwidth, security, privacy, safety, reliability and resilience will drive edge architectures
- There are architectural tradeoffs to consider in how edge computing nodes and networks are deployed, and how compute workloads are mapped onto them

Participants

Charles Byers - Associate CTO, Industrial Internet Consortium

SESSIONS
APRIL 29, 2021

Explore wireless connectivity solutions for your next IoT device design project

3:35pm - 3:55pm
Connectivity

Embedded IoT wireless devices can have many different requirements including short to long range, different power budgets and support of industry standard protocols. STMicroelectronics provides a wide range of innovative embedded wireless solutions able to support the wide range of real world requirements

- What is the best connectivity option for your IoT application: Wi-Fi, Bluetooth/Bluetooth Mesh, Thread, Zigbee, LoRaWAN, SIGFOX, LPWAN?
- Discover ST's wide portfolio of single / dual core SoCs and transceivers for 2.4GHz and Sub1GHz embedded devices
- Learn which ultra-low power & high performance product best fits the need of your next generation industrial IoT application
- Discover ST's innovative wireless product portfolio including the industry's first Lora® and SIGFOX capable SoC and ST products capable of supporting multiple Bluetooth Low Energy concurrent connections
- Learn how the STM32Cube Ecosystem can simplify your next IoT device design
- Experience our technology through our video libraries and self-guided tutorial videos.

Participants

Colin Ramrattan - NA East Coast Staff System Solution Marketing Engineer, STMicroelectronics

Julio Sanchez - Product Marketing Engineer, STMicroelectronics

Edge Computing & Processing Speaker Q&A Room

3:55pm - 4:25pm
Edge Computing & Processing

Participants

Moderator: Frederic Desbiens - Program Manager for IoT and Edge Computing, Eclipse Foundation

Luca Cominardi - Senior Technologist, ADLINK Technology

Gabriele Baldoni - Technologist, ADLINK Technology

Charles Byers - Associate CTO, Industrial Internet Consortium

Ted Ross - Edge Networking Expert and Open Source Contributer, Apache Software Foundation

Nicola La Gloria - CEO, Kynetics

Steve Wong - Open Source Software Engineer, VMWare

Johannes Biermann - President, aicas GmbH

Charles Byers - Associate CTO, Industrial Internet Consortium

Project connected home over IP

4:00pm - 4:30pm
Connectivity

The industry is coming together under the Zigbee Alliance umbrella – through the Connected Home over IP project (Project CHIP). This is a big step for interoperability, and it will take the smart home to new levels with plans to expand those successes into commercial environments. This Working Group plans to develop and promote the adoption of a new, royalty-free connectivity standard to increase compatibility among smart home products, with security as a fundamental design tenet. The goal of CHIP is to simplify and unify environments with one technology. One certification. One logo. Connected Home over IP aims to simplify development for manufacturers and increase compatibility for consumers.

The Project CHIP effort has already attracted more than 145 active member companies of all sizes and across a range of business categories. We have 1,300+ experts involved working through 30+ cross-functional teams within the Alliance – so there's a lot of passion and experience that's being contributed to the spec's development and roadmap.

The initiative offers compelling value across the IoT landscape, including key commercial applications from hospitality to multi-dwelling units and offices. And, with a foundation in IP networking, the spec creates flexible connectivity options beyond the smart home.

We are on track to deliver a draft specification by late 2020 and continue to drive towards our goal of releasing the standard in 2021. Products will be available in the market shortly thereafter.

Participants

Chris LaPre - Solutions Architect, Zigbee

Enabling mass IoT deployment with cellular connectivity

4:35pm - 4:55pm
Connectivity

Participants

Bill Boehm - IoT Regional Business Development Manager, Truphone

Solving cellular IoT challenges

5:00pm - 5:20pm
Connectivity

Cellular IoT connectivity holds tremendous potential for IoT applications. Low-power wide-area network (LPWA) devices are cost effective, power efficient, able to communicate across distances of up to tens of kilometers and do not require a constant network connection. They are ideal for applications where bandwidth is limited, and devices need to operate in the field for months or years at a time without maintenance (e.g., smart utility meters, underground sensors or other remote monitoring). Cellular IoT allows enterprises to deploy mass scales of devices cost effectively on existing network infrastructure.

Managing a massive IoT deployment can be complicated. Those new to IoT might assume that cellular coverage is available and stable everywhere, but that's not the case. Even in areas with consistent coverage, devices that consume too much bandwidth can be pushed off the network based on providers' fair usage policies. IoT projects often include a patchwork of hardware and software from various suppliers, creating vulnerabilities and difficulties in securing devices and data. While network operators can take steps to harden security in the cellular domain, the process is quite complex.

Participants

Ken Bednasz - VP Application Engineering, Telit

Connectivity Speaker Q&A Room

5:25pm - 5:45pm
Connectivity

Participants

Moderator: Tony Pisani - Sr. Product Manager - IoT Software, Cisco

Colleen Josephson - PhD Candidate in Electrical Engineering, Stanford University

Mohammad Afaneh - Sr. Developer Relations Manager, Bluetooth SIG

Colin Ramrattan - NA East Coast Staff System Solution Marketing Engineer, STMicroelectronics

Julio Sanchez - Product Marketing Engineer, STMicroelectronics

Chris LaPre - Solutions Architect, Zigbee

Bill Boehm - IoT Regional Business Development Manager, Truphone

Ken Bednasz - VP Application Engineering, Telit

SCHEDULE

APRIL 29, 2021 -

Embedded IoT World Conference & Expo 2022

April 5 - 7, 2022
Santa Clara Convention Center

TIME	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	ASK THE ANALYST	CONNECTIVITY	EDGE COMPUTING & PROCESSING	EMBEDDED INDUSTRIAL IOT	EMBEDDED IOT WORLD KEYNOTES
8:00AM						**8:30am** - Morning wellbeing session **8:50am** - Omdia Opening Remarks & Analyst Briefing
9:00AM						**9:15am** - Panel Discussion - The relationship between connectivity, edge computing, AI and machine learning in embedded systems **9:50am** - Keynote Speaker Q&A Room
10:00AM	**10:25am** - AI & ML Opening Remarks **10:35am** - Intelligent smart home work distribution			**10:25am** - Edge Computing & Processing Opening Remarks **10:40am** - Code size compiler optimizations and techniques for embedded systems		
11:00AM	**11:10am** - Condition monitoring through machine learning **11:35am** - Optimizing machine learning models for IoT applications			**11:30am** - Networking Break & Scheduled Meetings **11:55am** - Edge AI processing in real time		
12:00PM	**12:10pm** - Enabling machine learning on Arm Cortex M0-powered IoT nodes using Qeexo AutoML **12:45pm** - Intelligent autonomy: Enabling endpoint devices to self-govern			**12:30pm** - AI enabled MCUs: The new frontier of Edge AI **12:55pm** - Networking Break & Scheduled Meetings		

SCHEDULE

APRIL 29, 2021 -

Embedded IoT World Conference & Expo 2022

April 5 - 7, 2022
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TIME	ARTIFICIAL INTELLIGENCE & MACHINE LEARNING	ASK THE ANALYST	CONNECTIVITY	EDGE COMPUTING & PROCESSING	EMBEDDED INDUSTRIAL IOT	EMBEDDED IOT WORLD KEYNOTES
1:00PM	**1:50pm** - AI & ML Speaker Q&A Room	**1:20pm** - Ask the Analyst Session		**1:20pm** - Edge Computing & Processing Speaker Q&A Room **1:55pm** - Panel Discussion - Edge device security: Challenges and solutions	**1:20pm** - RESCHEDULED: Embedded Industrial IoT Q&A Room	
2:00PM			**2:25pm** - Connectivity Opening Remarks **2:35pm** - Bluetooth® Technology: The Swiss Army Knife of Low-Power Wireless Technologies	**2:30pm** - Creating a liquid edge: How to enable IoT practitioners to overcome the most challenging hurdles in IoT **2:55pm** - Eclipse fog05: Managing ROS2 applications at the edge		
3:00PM			**3:00pm** - Entering a brave new world with ultra-wideband (UWB) **3:35pm** - Explore wireless connectivity solutions for your next IoT device design project	**3:30pm** - Edge computing: Use cases, requirements, architectures and implementations **3:55pm** - Edge Computing & Processing Speaker Q&A Room		
4:00PM			**4:00pm** - Project connected home over IP **4:35pm** - Enabling mass IoT deployment with cellular connectivity			
5:00PM			**5:00pm** - Solving cellular IoT challenges **5:25pm** - Connectivity Speaker Q&A Room			