

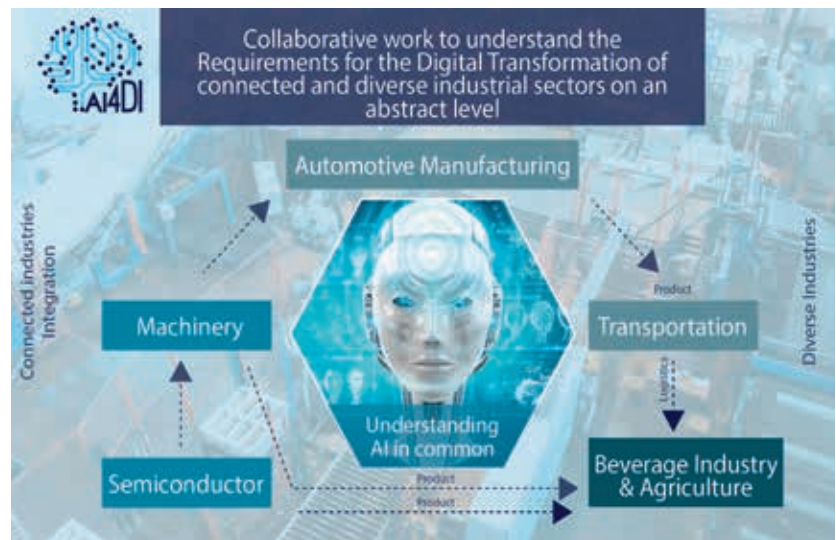
AI4DI – Artificial Intelligence for Digitizing Industry

Project description

AI4DI mission: make Europe the leader in Silicon-born-Artificial Intelligence (AI) for accelerated edge processing - bring AI from the cloud to the edge while making it resilient, safe & secure for future manufacturing & process technologies

Objectives:

- **Accelerate AI adaptation** to serve European priorities in digitizing the industry - foster the application of AI in all European industries, gain profit from the efficiency increased, extended knowledge, new forms of control, organization & business models.
- **Maximize the benefits of Moore's Law** and More Moore & revive Moore's Law beyond the current technology - AI as a chance to create processes & products – "Maximize of Moore's Law" & driving the semiconductor industry to More Moore.
- **Build a European AI community** with European values - AI as a tool for solving certain tasks while implementation is different to what people are used to.



Austrian contribution

The Austrian AI4DI Consortium consists of:

AVL List GmbH, Infineon Technologies Austria AG, Know-Center GmbH-Research Center for Data-Driven Business & Big Data Analytics, Kompetenzzentrum-Das Virtuelle Fahrzeug Forschungsgesellschaft mbH, TTTech Computertechnik AG, Technische Universität Graz.

Contributions range from combining AI with algorithms for automotive predictive maintenance to manufacturing industry edge computing for safe&secure platform elements. They are well spread over the workpages (WP 1: requirements, WP 2: System Level Design, WP 3: Methods, semiconductors, components, WP 4: Embedded Systems & Edge Computing, WP 5: Integration & Deployment of AI applications, WP 6: Validation & Verification, WP 7: Dissemination & Exploitation, WP 8 Project Management) and the Supply-Chains representing various industrial domains (SC1: automotive, SC 2: semiconductor, SC3: Machinery).

Impact/long-term benefits

AI4DI will significantly strengthen the cooperation of and thus the competitiveness of the European major industries, research and academia organization w.r.t. AI introduction and deployment.

By that the project makes a strong claim in world-wide lead in AI based and ML systems due to the establishment of a **European AI human centered eco-system**. By establishment of a dedicated roadmap for digitizing the European industry it will pave the way for future developments and sustainable growth of European Industry and research organizations/ academia.

Such dedicated action plan enables the players to take the right measures to put Europe in the lead for AI research and innovation through a long-term evolution in AI strategy and trough exploitation studies, business cases for AI technologies.



Project Duration:
37 Months

Project Coordinator:
Infineon Technologies AG

Project Costs: **30 Mio. €**

Partners: **41**

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APPLAUSE

Project description

APPLAUSE will build European expertise in advanced packaging and assembly to develop new tools, methods and processes for high volume manufacturing. The Project focuses on advanced optics, photonics and electronics packaging for multimodal sensing systems. High volume manufacturing is enabled by strong contribution of testing, process control and manufacturing equipment R&D.

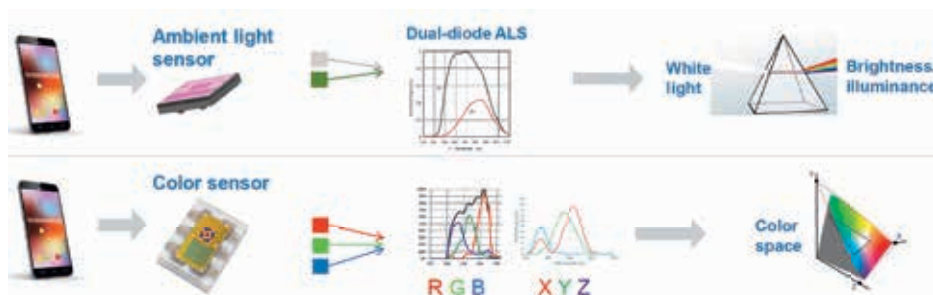
The project develops eight technology building blocks with new tools and manufacturing methods.

These technology blocks feed to six industrial use cases:

- **Ambient light sensor** for mobile and wearable applications (AMS)
- **Thermal IR sensor** for automotive and surveillance applications (IDEAS)
- **High speed datacom transceivers** (DustPhotonics)
- **Flexible patch for cardiac monitoring** (Precordior)
- **Miniaturized invasive cardiac sensors** (Cardiacs)
- **Optical humidity measurement modules** (Vaisala)



▲ IDEAS Thermal IR Sensor



◀ AMS Ambient Light and Color Sensor

Austrian contribution

ams AG develops in this project a substantially smaller 3D integrated ambient light sensor for next generation of mobile and wearable applications and is also leader of WP2. New process modules, new wafer level integration schemes for optical functions and the required handling for thin 3D wafers will be developed together with Austrian and international project partners.

Besi Austria will develop new assembly equipment and processes for advanced optics packaging technologies. Focus is laid on high-accuracy component placement, enabling passive alignment of photonic-system manufacturing with high yield. Besi participates in demonstrator developments of next generation of photonic devices suitable for large-scale production.

EVG will develop hermetic bonding and ultra-thin wafer handling technologies for optical and IR sensor manufacturing. The major focus is the industrial validation of the processes and the development and adaptation of equipment. The technologies will be assessed with regards to upscaling, automation, reliability, life time and cost of ownership.

Impact/long-term benefits

Advanced semiconductor packaging is becoming an important functional part of systems and the integration of optics and photonics into the package is essential for sensors and optical interconnects.

Through the APPLAUSE project, European industry will build on the European expertise in **advanced packaging and assembly** to develop new simulation and test methods, processes and related process equipment, as well as process control equipment for high volume manufacturing of advanced packages combining semiconductors, optics and photonics.

APPLAUSE



Project Duration:

05/2019 - 04/2022

Project Coordinator:

Moritz Stoerring, ICOS KLA

Project Costs: **34 Mio. €**

Partners: **33**

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MADEin4 – Metrology Advances for Digitized ECS industry 4.0

Project description

MADEin4 is a consortium of 47 partners from 10 countries connecting the full range of supply chain: from semiconductor equipment manufacturers and system-integrating metrology companies to RTOS and key applications such as the automotive industry. The MADEin4 project develops **next generation metrology tools, machine learning methods and applications** in support of Industry 4.0 high volume manufacturing in the semiconductor manufacturing industry.

The MADEin4 project improves Industry 4.0 manufacturing productivity by developing:

- **Next generation metrology tools** for the ECS industry (higher productivity and connectivity in cyber physical systems)
- **Predictive yield and tools performance improvement** by combining machine learning design and metrology data
- Next generation **metrology and inspection tools** demonstrated through Industry 4.0 pilot line
- **Smart Manufacturing Standards**



Austrian contribution

Austrian partners **AVL** and **ViF** will enhance existing platforms for End of Lines (EoL) cold test of automotive engines for more advanced sensing and analytics.

The goal is to enable enhanced EoL testing by means of platform enhancement and combination with off-line hot tests.

The resolution of actors and sensors will be increased to enable this new range of testing. Furthermore, feedback information (e.g., position, backlash) will be provided to better apprehend the reaction of the device under test. Data analytics at the edge (smart sensors) and at the cloud (information processing) will be finally used to prepare and analyse the data, enabling improved cold tests by learning and verifying with the hot tests.

Impact/long-term benefits

The socio-economic impact of the MADEin4 project will be significant.

First, for the participating project partners: within the unique metrology centric pilot line infrastructure the equipment suppliers will be able to develop **new tools and techniques better and faster** and, thus, will be able to capture and secure a larger market share.

Second, for the wider European Society: **strengthening of the position of the European equipment suppliers and major R&D centres** will also have a direct positive impact on their supply chains: it will create more demand for highly skilled jobs and for academic education in the field of nanoelectronics.

Third, for the wider (Global) ECS community: the new metrology capabilities will help accelerating industry roadmaps for **More Moore, More than Moore and Industry 4.0**.



Project Duration:
36 months

Project Coordinator: **Applied Materials Israel Ltd.**

Project Costs: **127.5 Mio €**

Partners: **47 partners from 10 countries**

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Website:
www.semi.org/eu/MADEin4

Comp4Drones – Framework of Key Enabling Technologies for Safe and Autonomous Drones

Project description

COMP4DRONES will provide a framework of key enabling technologies for safe and autonomous drones. It brings to bear a holistically designed ecosystem from application to electronic components, realized as a tightly integrated multi-vendor and compositional UAV embedded architecture solution and a tool chain complementing the compositional architecture principles. Focusing on:

- Ease the integration and customization of **embedded drone systems**
- Enable drones to take **safe autonomous decisions**
- Ensure the deployment of **trusted communications**
- Minimize the design and verification effort for **complex drone applications**
- Ensuring sustainable impact and creation of an **industry-driven community**



On the fields of transport, construction, surveillance and inspection, logistics and agriculture demonstrators will be used to ease and validate the development of new applications and functionalities.

Austrian contribution

AIT Austrian Institute of Technology GmbH: Crypto libraries for secure drone communication, model-based communication protocol testing, workflow engine for drone manufacturing, contributions to standards

Forschung Burgenland GmbH: Self-adaptability framework for drone components using secure element (TPM), models for drone components related to secure and reliable communication

Infineon Technologies Austria AG: Hardware security components for trusted communication between drone and base station, secure and modular drone platform, APIs for trusted communication

Weinbau Moravitz: Test facility, provides the wine production evaluation field environment

Skyability GmbH: Drone provider (drone platform for installation of modular components), performing flights and data validation in laboratory environment and on the test fields, input about sensors design and interface

Impact/long-term benefits

COMP4DRONES will **reinforce the ecosystems of drones industry** by providing methodology and a reference software architecture framework that meets performance and safety requirements.

The project also aims to **improve the innovation capacity** in the European drone industry and the integration of new knowledge; a structuring aspect of COMP4DRONES is the adoption of a “safe-by-design” approach, which covers the activities of specification, design, implementation, and validation and verification.

Finally, COMP4DRONES will enable and ease the delivery of **new services** using drones in Europe.



Project Duration:
36 months

Project Coordinator: **Rodrigo Castiñeira - Indra Sistemas SA**

Project Costs: **30 Mio. €**

Partners: **49 industrial, SME, academic and research partners from 8 different countries**

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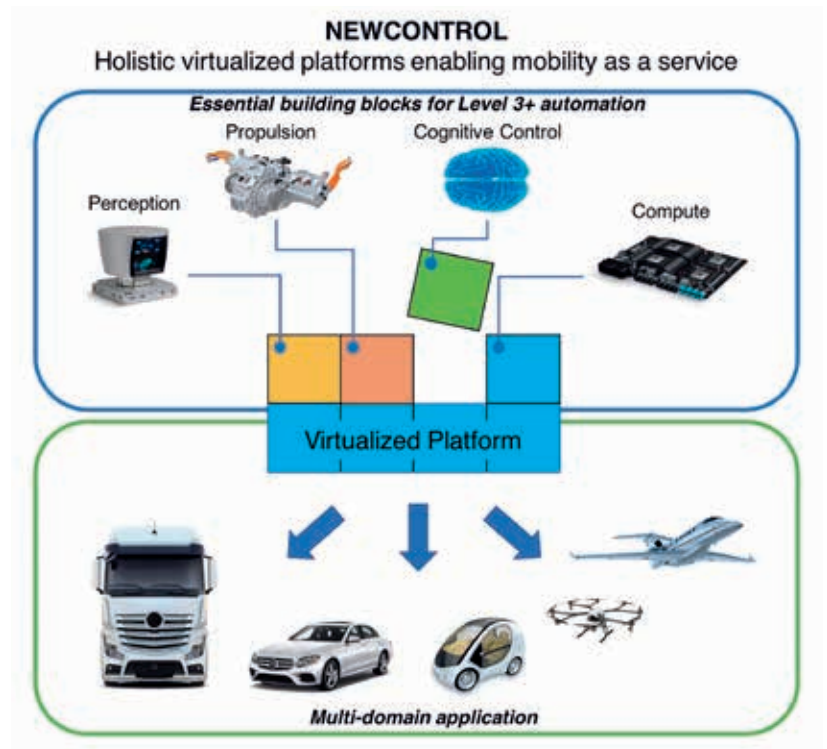
NewControl

Project description

NewControl will develop and deliver **virtualized platforms** for each vehicular sub-system essential to **autonomous operation at SAE Level 3+**.

Each of these unifies the critical components required to realize a specific function – perception, cognition, control – through vertical integration within an adaptive (not rigid) architectural framework.

The resulting virtual platforms effectively deliver specific functionalities as services to the vehicular platform, abstracting internal implementation, enabling portability to different application domains, and facilitating modular development of automation that is guaranteed as safe by design.



Austrian contribution

AVL List GmbH: WP 6 leader, enhancing algorithms for adaptive systems from software engineering applied for health, self-diagnostic and fail operation. Examining the possibility of improving the energy consumption of adaptive controllers by investigating neuromorphic processing units.

Infineon Technologies Austria AG: WP 3 leader, designing, developing and manufacturing adaptive environment perception striving for further mitigation of perturbations.

Kompetenzzentrum – Das Virtuelle Fahrzeug, Forschungsgesellschaft mbh: SC3 leader, defining overall system architecture and vehicle and traffic modelling and developing adaptive and predictive motion planning and control.

TTTech Computertechnik AG: SC2 leader, working on conceptual design and prototypical implementation of technology, e.g. scheduling, and the development of a next generation embedded software platform for autonomous driving.

Impact/long-term benefits

NewControl will deliver fail-operational holistic virtualized platforms for vehicular subsystems that are critical to automated driving (SAE Levels 3+), enabling mobility-as-a-service for next generation highly automated vehicles

- Increase the accuracy and robustness of algorithms, E/E architectures for adaptive perception
- Increase performance, power, reliability, and reduce cost of the on-board computing platforms used for perception, cognition and control
- Achieve certifiability of adaptive algorithms for safety-critical control functions
- Develop a generalized hardware abstraction layer for efficient, adaptive fail-operational control of propulsion systems across vehicular platforms
- Competitive advantage to European industry
- Increase user acceptance of automated control functions

NEWCONTROL

Project Duration:
36 months, start April 2019

Project Coordinator: **Infineon Technologies Germany AG**

Project Costs: **43 Mio. €**

Partners: **43 industrial, SME, academic and research partners from 12 different countries**

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UltimateGaN – Research for GaN technologies, devices and applications to address the challenges of the future GaN roadmap

Project description

The highly ambitious ECSEL RIA-project UltimateGaN will focus on **the next GaN technology generation** that particularly addresses six major objectives along and across the entire vertical value chain of power and RF electronics focusing on research and innovation in the fields of technology (including materials, equipment and device concepts), packaging, reliability and application.

The envisioned applications will **enable 5G, Smart Mobility and Smart Grids.**



Austrian contribution

IFAT: UltimateGaN project coordinator, WP2 leader, 600V pGaN power HEMT, GaN on Si epitaxy for RF devices, lateral GaN power HEMT devices

Fronius: Single-phase PV inverter with new GaN semiconductors, focus on power device cooling, thermal management, EMI, PCB parasitics and heat dissipation

SAL: WP4 leader, heterogeneous integration technologies and multiphysics simulation of GaN packages

TUGraz: RF technologies (design, modelling and measurement of microwave monolithic integrated circuits and development of RF/mm-wave components and systems)

AT&S: Enhanced thermal management and RF behavior for GaN power packages / PCB

Impact/long-term benefits

UltimateGaN will provide solutions to master major societal challenges in digitalization, energy efficiency and mobility.

An early availability of affordable and reliable GaN semiconductors will heavily impact:

- **Digitalisation in Europe and worldwide** through opportunities created by ultra high speed 5G communication that are directly depending on the affordable excellent performance of GaN devices.
- **Efficient usage of energy** by providing high performance GaN components for data centers and power converters in applications like telecommunication and photovoltaic.
- **Future mobility scenarios** enabling electrification of vehicles by innovative battery charging concepts realized with GaN.
- **Novel driving scenarios** with emphasizing the steps necessary to reach the next level in autonomous driving through ultra-fast switching sensor applications (LIDAR, RADAR) with GaN based sensor systems.



Project Duration:
36 months, Start: May 2019

Project Coordinator: **Infineon Technologies Austria AG**

Project Costs: **48 Mio. €**

Partners: **26 partners from 9 countries**

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Power2Power – Providing next-generation silicon-based power solutions in transport and machinery for significant decarbonisation in the next decade

Project description

The global energy demand is constantly growing. We need to increase the usage of renewables to reduce carbon emissions. This pushes the demand for **efficient power semiconductors**, as all types of energy conversion from source via grid to usage need power semiconductors. The markets for discrete IGBTs and for IGBT modules are growing each year by ~15%. The most competitive technology for IGBTs is based on 300mm silicon wafers.

Power2Power will **push the technical frontiers** on high voltage, Si-based IGBTs to new dimensions: increased power density and improved robustness and reliability.

Power2Power will show many **power application systems**, with higher energy efficiency, higher power density and in other respect: for usage in mobility, industry and grid.



Power2Power will implement the latest knowledge and results of **Industry4.0-aspects** along the value chain.

Austrian contribution

IFAT will contribute to the Power2Power project with its know-how concerning front end processing and the cohesion with backend assembly and packaging. Furthermore, IFAT will coordinate development activities in the context of front end processing related to WP1.

VIF will contribute to Power2Power by modular simulation, system safety and system reliability, embedded intelligence along simulation, HW-in-the-loop and vehicle demonstration to highlight and quantify the Power2Power innovations.

MCL sees its role as a specialist for thermal analysis from nm to mm-scale with special focus on the experimental side.

CTR will mainly address tasks in WP3 "Pilot Lines Technology & Manufacturing Backend" with a strong focus on Heterogeneous System-in-Package (SiP).

Impact/long-term benefits

Power2Power Mission: Sustainably competitive and most advanced, silicon-based IGBT technologies for MtM applications in high power electronics "Made in Europe"

- The Power2Power mission aims at **offering solutions** to some difficult societal challenges addressing European policies for 2020 and beyond.
- First qualified technology for silicon based IGBTs above 1700 Volt, based on 300 mm wafers
- 200°C junction temperature, allowing 20% increased power density
- 50% improved lifetime and 10% reduction of losses in usage in train converters
- Innovate the **knowledge driven pilot line 2.0 approach** by leveraging the workflow in global value chains and proven productive semiconductor production environment
- Leverage the innovation potential of **enhanced power packages** toward cost competitive system solutions
- Interdigitate development and sample production to leverage **European competitiveness**

Power
2
Power

Project Duration:
36 months

Project Coordinator: **Infineon Technologies Dresden GmbH & Co. KG, Germany**

Project Costs: **74 Mio. €**

Partners: **43 partners from 8 countries**

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