



# a R&D projektů IMA

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# ArchitectECA2030

### **ARCHITECT ECA 2030**



# IMA challenges w.r.t. standards How to collect Req on the test code (TC) & code review

- (CR)
- How to set up methodology and criteria for TC development and CR
- How to apply CR methodology
- How to perform validation test
- How to evaluate test results

- Robust mission-validated traceable design of electronic components and systems (ECS) Quantification of an accepted residual risk of ECS for ECA vehicles to enable type approval, and Increased end-user acceptance due to more
  - reliable and robust ECS.





# Gan4AP

### **GaN for Advanced Power Applications**



 IMA: GaN-based power actuator for remote control in industry digitalization and IoT network

GaN4AP project will create a strong European competences

- $\succ$  Gallium nitride (GaN) is a wide-bandgap material that could take electronic performance to the next level
- New generation of vertical power GaNbased devices on MOSFET architecture
- > New concept high-frequency packages that can achieve te requested 99% power conversion efficiency.



# Listen2Future



### IMA owner of the UC < Infrastructure monitoring and maintenance optimization>

- Partners: UTIA, BUT, SINTEF, IFAT, IFD, CODA
- Localization and identification of issues on electric • distribution network, specifically within substation.
- Reduction of an unexpected breakdown of critical components and avoid unexpected maintenance
- Al experience utilization

- > New materials for high volume piezoelectric acoustic transducers
- $\triangleright$  Size reduction > higher sensitivity > consumption reduction > demonstrating the dual frequency PMUTs > more efficient piezoelectric thin film materials > improving ASIC immunity against ultrasound attacks in voice control systems



Capacitive MEMS microphone with charge pump





# A-IQ Ready



**01:** Improve sensing accuracy, latency, reliability and trustworthiness in complex environments

IMA is partner of Safe co-existence of automated and manual transport at industrial sites - Industrial park demonstrator

- Main challenge Human safety at work
- MA seeks to build a base for a new product that consists of the system for monitoring and detection of the objects and obstacles, software services processing and interpreting the sensor data
- Radar based detection platform
- Al model of the object recognition process and tool chain

**02:** Build AI methods for multi-agent autonomy in uncertain environments.

**O3:** Provide an open Al Edge Continuum platform

O4: Build applications relevant for the digital society,

**O5:** Europe's







# **SA4CPS** (in PO phase) Situational awareness for critical cyber-physical systems

IMA in coop with CUNI Human & machine position awareness within a production or logistic area.

- Sensor systems design and implementation,
- Ultrasonic and Time of Flight technology for object movement detection,
- AI & ML tool chain application



Figure 3. Secure situation awareness concept with contributing use cases.



UC: Security and location awareness of persons

UC: Multirouting secure awareness system for hunting and outdoors



## AI4DI **Artificial Intelligence for Digitalizing Industry**

### Development of an Indoor asset tracking system based on BlueTooth Low Energy devices with Al based positioning engine.













**IMA Car Access System:** 



Car Access System based on contactless door handle unlocking with online + offline autentication

### - Door handle reader / sensor development

- Form factor completed •
- Antenna optimisation completed ightarrow
- Functional integration (NFC, BT, MC, ECU, LTE) completed
- Server authentication functionality IMAporter cloud compatible
- Communication gateway completed
- Android app IMAporter cloud / 3rd party compatible







Parking and Paymer system Parking barrier control



### AI4CSM **Automotive Intelligence for Connected Shared Mobility**



### Connectivity & Communication



### **Mobility Trends:**



### **Perception, Sensor Fusion** •





# STORAIGE

Embedded storage elements on next MCU generation ready for Al on the edge

- Low resolution Time of Flight sensor matrix gesture recognition
- Embedded Neural network data processing •
- **Algorithmic generalization**









