
SAL
SILICON AUSTRIA LABS
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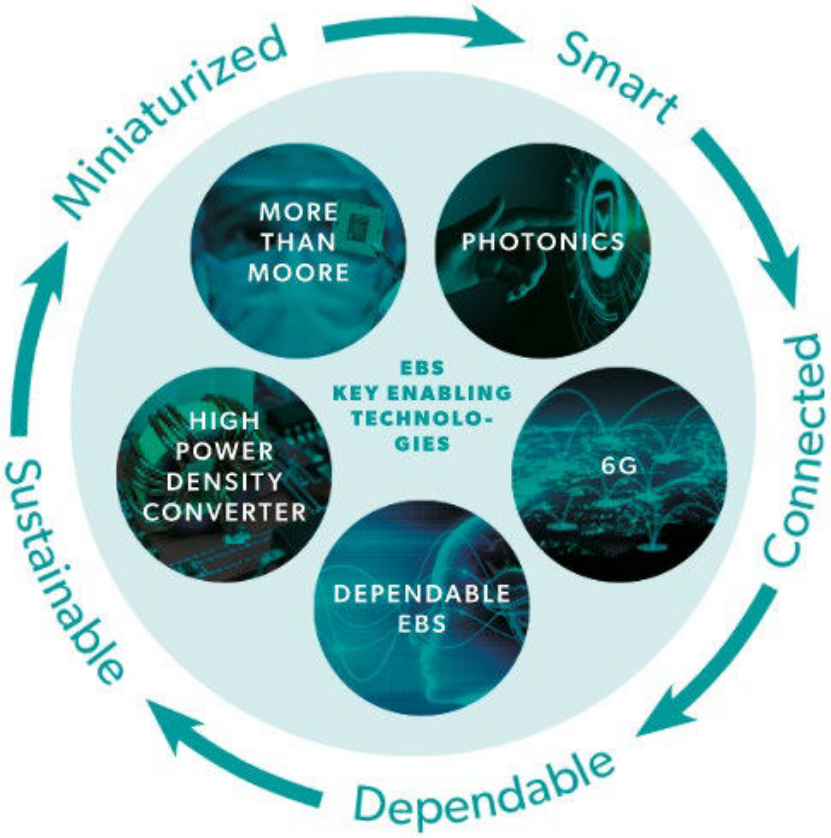
The Austrian Research Center for Electronic Based Systems (EBS)
Bundesministerium
Klimaschutz, Umwelt,
Energie, Mobilität,
Innovation und Technologie
FFG
Das Land
Steiermark
SFG
ZUKUNFTSFONDS
STEIERMARK
LAND KÄRNTEN
ober
österreich
Member of
UAR
INNOVATION
NETWORK

SILICON AUSTRIA LABS

What do we do?

We research efficient, sustainable and trustworthy technologies in the field of electronic-based systems (EBS), along the entire value chain.



Bundled in lighthouses:

- **More than Moore**
- **Photonics**
- **High Power Density Converter**
- **Dependable EBS**
- **6G**

SAL BENEFITS FOR INDUSTRY

What do we offer?

Industry oriented research

SAL experts conduct research along the entire EBS value chain: from the semiconductor industry to system integrators and industrial users.

R&D services

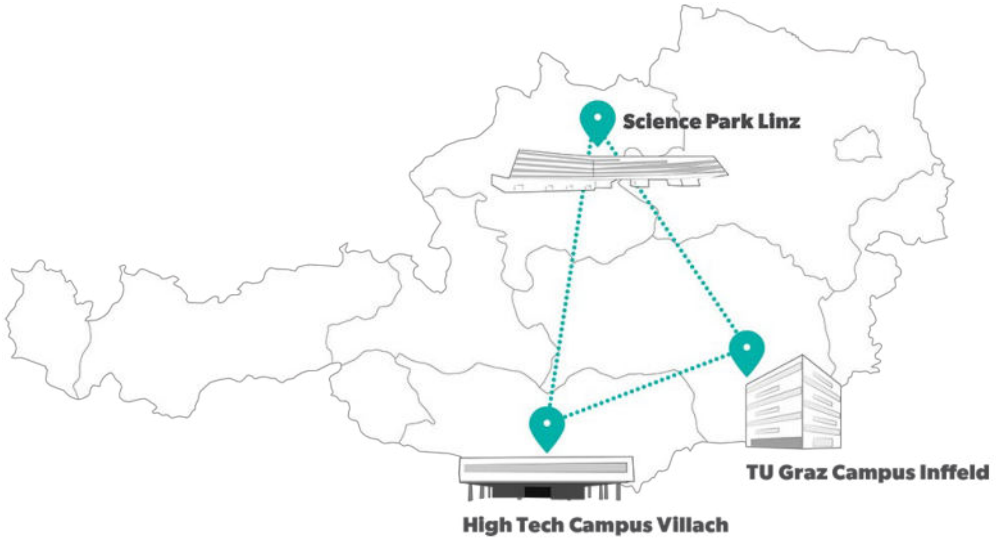
Our service portfolio includes customized solutions for our partners:

- Design & Simulation
- Characterizations
- Measurement and testing services
- Manufacturing in the field of micro- and nanotechnologies (TRL: 2-7)

Cooperation

We offer our partners various possibilities of cooperation: from our unique **SAL cooperation model** (50% of the project costs are covered by SAL), **contract research** to **funded research**.

KEY FACTS



> 300

EXPERTS

- Experienced team
- 40 nations
- Multidisciplinary

5

SHAREHOLDER

- 50,1 % Republic of Austria (BMK)
- 24,95 % FEEI
- 10 % Styria (SFG)
- 10 % State of Carinthia
- 4,95 % Upper Austria (UAR)

3

LOCATIONS

- Graz (HQ)
- Villach
- Linz

> 90

PARTNER NETWORK

- From Industry & Research

20

RESEARCH UNITS

in 5 DIVISIONS:

- Sensor Systems
- Microsystems
- Power Electronics
- Embedded Systems
- Intelligent Wireless Systems

OUR BUSINESS MODELS

How to work together

SAL Cooperative Research

Purpose:
- Easy accessible cofinancing for R&D projects with SAL
- Long term R&D cooperations (>1year)

Organisational Framework:
- Project Evaluation by SAL
- SAL General Contract Terms
- SAL Project Agreement
- IP-rules are in line with the european state aid law

Advantages:
- 50% co-financing by SAL
- Bi/multilateral cooperation possible
- No application process necessary

Contract Research

Purpose:
- Technology Concepts
- Test & Measurement Campaings
- Feasibility Studies
- Proof of Concept Studies
- (Rapid) Prototyping

Organisational Framework:
- Quote – Order Process

Advantages:
- Fast project start
- No further contractual framework necessary
- Fixed price
- Clearly defined deliverables

Funded Research

R&D Services

Design and **simulation**, **characterizations**, **measurements** and **testing** up to **manufacturing** in the field of micro- and nanotechnology

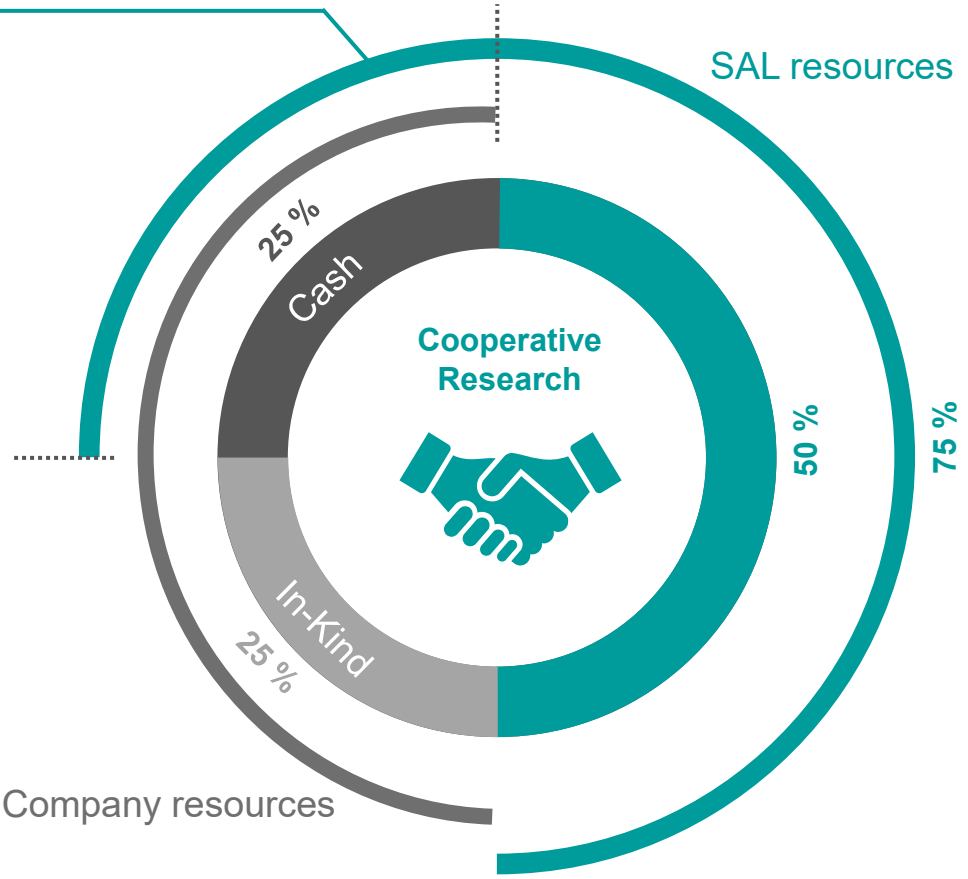
SAL COOPERATION MODEL

Collaboration on a higher level

SAL Cooperative Research

- Applied Research (TRL 3 - 6)
- Multi-firm or single-firm projects customized to company needs
- Optional participations of universities as scientific partners
- 50/50 co-financing
- No funding application needed, no waiting time
- IPR rules compliant to state-aid-laws

€ 300 k expenses on SAL's side amounts to approx. 2,720 personnel hours* at actual costs and € 21,000 direct material costs etc.**



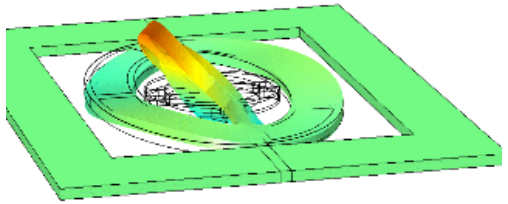
TO PUT IT IN NUMBERS*:

€	100 k	In-kind contributions by company
€	100 k	Cash by the company
€	200 k	Co-financing by SAL (in-kind contributions)
€	**400 k**	**Project Volume**

*400 k project volume as example

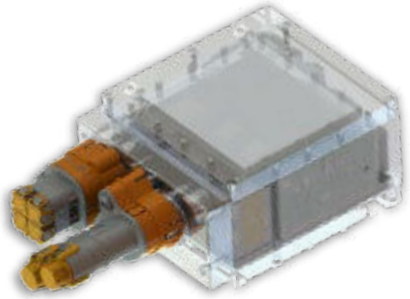
SUCCESSFUL PROJECTS

Range of projects



Dynamic light projection for road lighting

- Power consumption potentially lower (smart light management)
- Cost efficient (less optical components)
- Ability to implement distance measurement
- 4 Partners: ZKW, TDK, EVG, Evatec



Tiny Power Box

- Onboard Charger for Automotive / Industrial Forklift
- Bidirectional, Same power density than existing ones, Reduction in size: 80%, reduction in weight: 50%
- 5 Partners: AVL, AT&S, TDK, Infineon, Fronius

Smart Mask

- Measurement of Electrostatic Filter Charge in FFP2 Respiratory Masks
- Continuous wireless monitoring of the filter efficiency
- 2 Partners: Grabher Group, NXP

SUCCESSFUL PROJECTS

Range of projects

MEDICAL

AMASE

- Development of a system for measuring and monitoring the force distribution in prosthetic sockets
- Increases comfort for patients & supports clinical staff (prosthetist)
- Partner: FH Kärnten, Saphenus Medical Technology, FH Kärnten Privatstiftung

5G

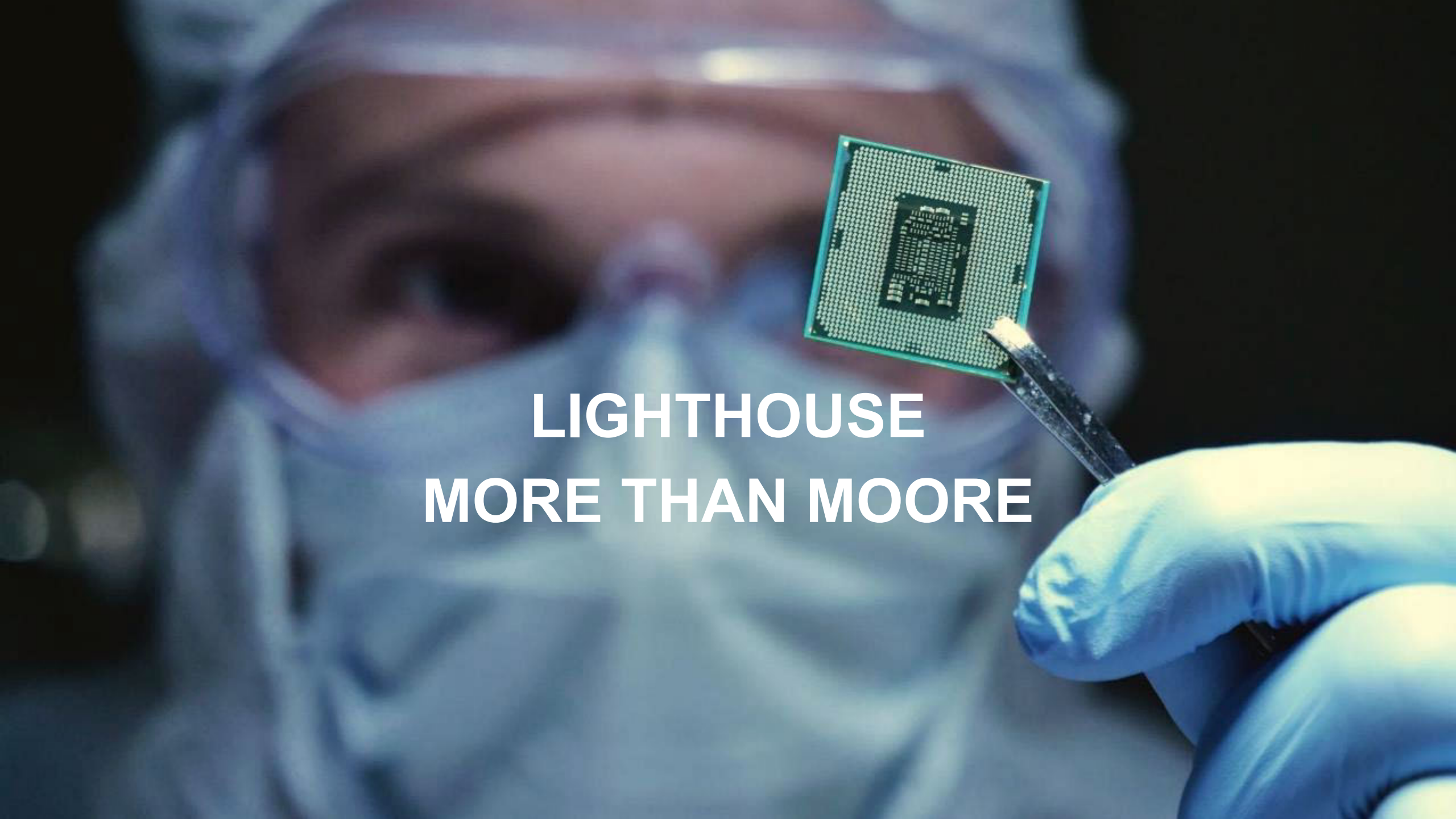
5G/6G-COFACT

- Research & development of 5G communication for industrial use cases, performance analyses and comparison of wireless products.
- SAL 5G/6G testbed
- Partner: Linz AG, LIWEST

ARTIFICIAL INTELLIGENCE

FIRE-SAT

- In flight proof of concept realizations of artificial intelligence processing on board an earth observation satellite for remote fire detection.
- Partner: OroraTech, Joanneum Research


LIGHTHOUSE
MORE THAN MOORE

MORE-THAN-MOORE LIGHTHOUSE

While Moore‘s law reaches its saturation (due to its massive capital intensity and ultimately semi-conductor physical limits), a new functional diversification, mixing and matching best suited EBS technologies for the good of ever more compact and performant systems becomes paramount. MEMS and MOEMS devices, RF filters, CMOS, magnetic and sustainable sensors combined with heterogeneous integration will be the new growth drivers in the EBS sector.

Flagship Research Topics

Piezo MEMS advanced piezo thin-film development and innovative piezo MEMS devices for emerging applications

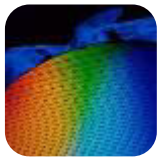
Photonic MEMS integrated silicon photonic MEMS for applications such as miniature sensors, telecommunication, …

Magnetic Sensors material characterization and system & application design for micromagnetic sensor systems

Sustainable Sensorics biodegradable and regenerative materials, resource efficient fabrication methods for flexible and conformable devices

Applicative Packaging dedicated leading edge packaging solutions driven by customer applications

Infrastructure & Services



Complete **process chain for 200 mm** wafers with a focus **high performance thin film tech.**

Bridging **Research** and **prototyping** to **small series** production

Cleanroom access for SAL VIP partners and their **strategic research**

Target Customers / Partners and Value Propositions

Semicon & Microelectr. Ind.

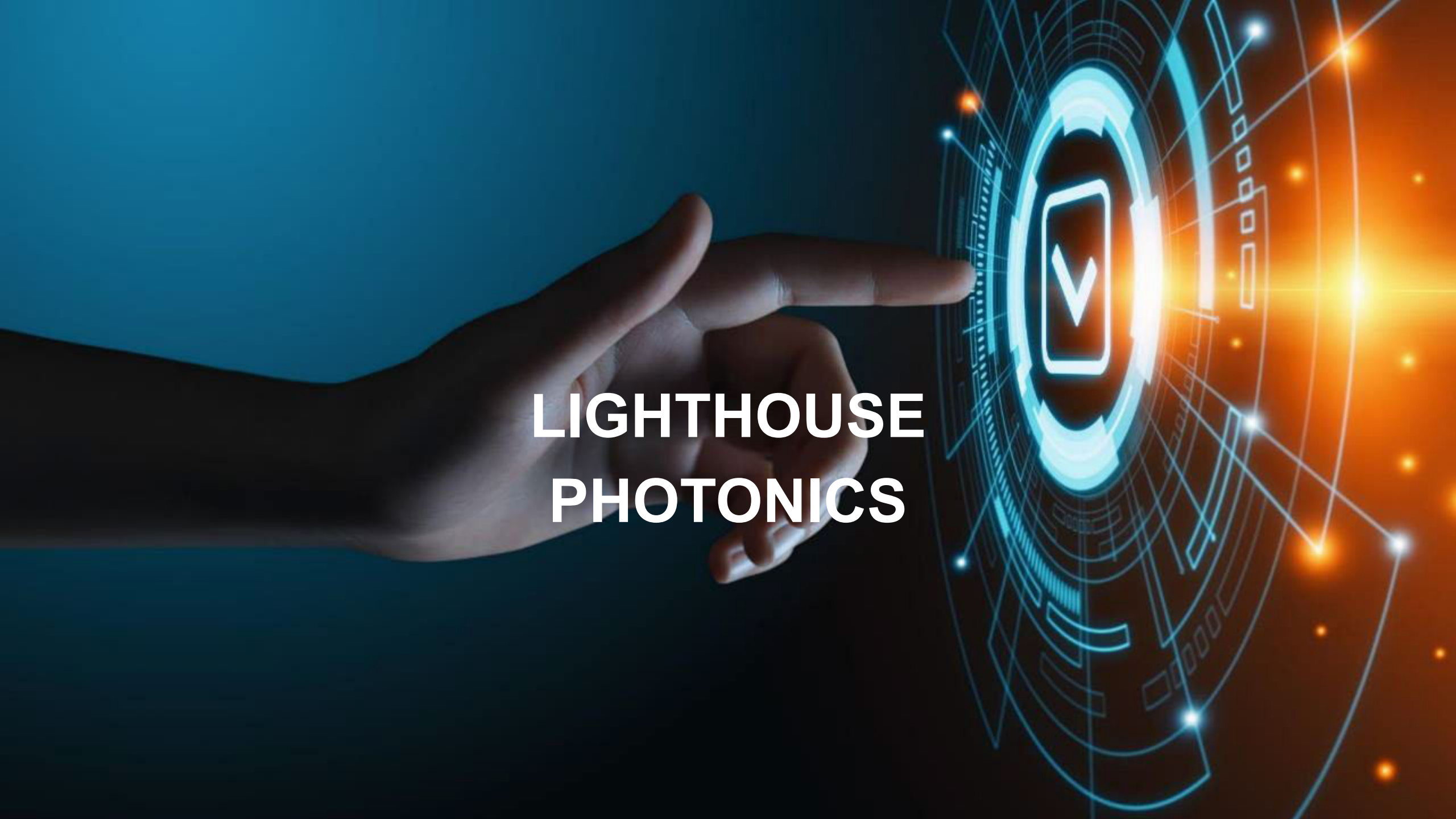
Material, telecom., Automotive, Helathcare,…

Industrial Users

Sustainable electronics and applicative packaging taking solutions a step further

Cleanroom Equipment Vendors

Driving beyond stat-of the-art manufacturing technologies


LIGHTHOUSE
PHOTONICS

PHOTONICS

The **technology of light** will make it possible to overcome the physical limits of micro- and nano-electronics. Defined as a “European Key Enabling Technology”, Photonics pushes the limits of a wide range of applications from sensing and metrology to (quantum-)communication, lighting and photovoltaics. SAL’s comprehensive capabilities from photonic devices to systems, backed by an advanced research infrastructure and long-term experience, is unique in Austria and amongst few in Europe.

Flagship Research Topics

Next Generation Photonic Systems for sensor and metrology solutions.

Advanced Photonic Assembly, key enabling technology for miniaturization, robustness and reliability.

Non-Linear & Quantum Photonics: Bring novel technologies of non-linear spectroscopy and quantum sensing to industrial application.

Infrastructure & Services

Simulate

Multiphysics simulation tool chain with Zemax, Virtual Lab, Comsol

Photonics Lab

400 m² class 4 laser-lab space for fabrication, testing, assembly

Cleanroom

Cleanroom facilities for Photonic MEMS customized for system requirements

Target Customers / Partners and Value Propositions

Semiconductor and Photonic component industry

RD&I for Photonic Components and Systems

Optical System Providers

Holistic Photonic system simulation and optimization including advanced photonic assembly

Application Industry

RD&I from simulation to custom photonic-component based application prototypes

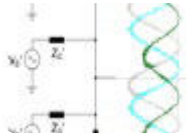

LIGHTHOUSE
HIGH POWER DENSITY
CONVERTERS

HIGH POWER-DENSITY LIGHTHOUSE

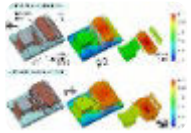
The climate change demands an energy turn-around along with stronger electrification. Modern efficient power converters with highest power density and efficiency are key enablers for that, with an immense range of target applications, replacement markets and hence impact potential.

Flagship Research Topics

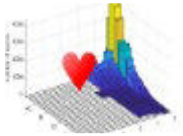
Highly efficient power converters & inverters with focus on resonant topologies aiming for compact hardware designs with high switching frequency exploiting wide-bandgap devices.



Emerging control engineering theory supported by signal processing, AI and high bandwidth controller hardware to enable full system/component utilization and lifetime optimized control.

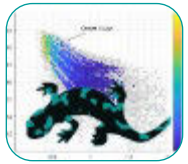


Multiphysics simulation for power electronics optimization & design. Multi-rate, multi-domain simulation for multi-objective, efficiency/lifetime/volume system optimization including EMC.



Power system health monitoring with minimal sensing effort via novel embedded multi-domain state estimators e.g. WBG device junction temperature sensing for lifetime aware systems.

Infrastructure & Services



Simulation

"SALamander" multi-domain simulation framework for multi-objective efficiency/lifetime/volume system optimization and design.

Characterization, Test & Prototyping

Rapid Prototyping and Test Infrastructure for precise component & system measurements as well as hardware design.

Target Customers / Partners and Value Propositions

Power semiconductor component and module industry

Multi-physical, component-level measurements and characterization for holistic multi-physics simulation approaches, workflows and methodologies

System integrators and industrial user of power electronics:

Advanced topology, modulation and control aiming for full utilization of power electronic devices, components, and systems


LIGHTHOUSE
DEPENDABLE EBS

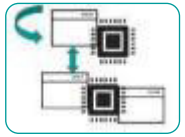
DEPENDABLE EBS

Our experts are researching technologies that contribute to the reliability ("Dependability") of EBS - from software development for the IoT to the question of the explainability of Artificial Intelligence (“xAI"). Of particular interest in the future is the combination of model-based AI on the one hand with machine learning on the other, in order to combine the advantages of both approaches in the areas of performance, robustness and practicality.

Flagship Research Topics

Advanced Signal Processing
for integrated digital- & virtual sensors

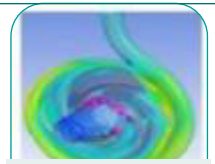
Trustworthy AI
for secure, explainable and verified AI at the edge



Efficient Computation
Dependable HW/SW-codesign and distributed algorithms up to middleware

Testing complex and connected EBS under application relevant conditions

Infrastructure & Services



Simulation & Modeling

Edge Computing Dev. Platforms

EBS Reliability Tests Lab

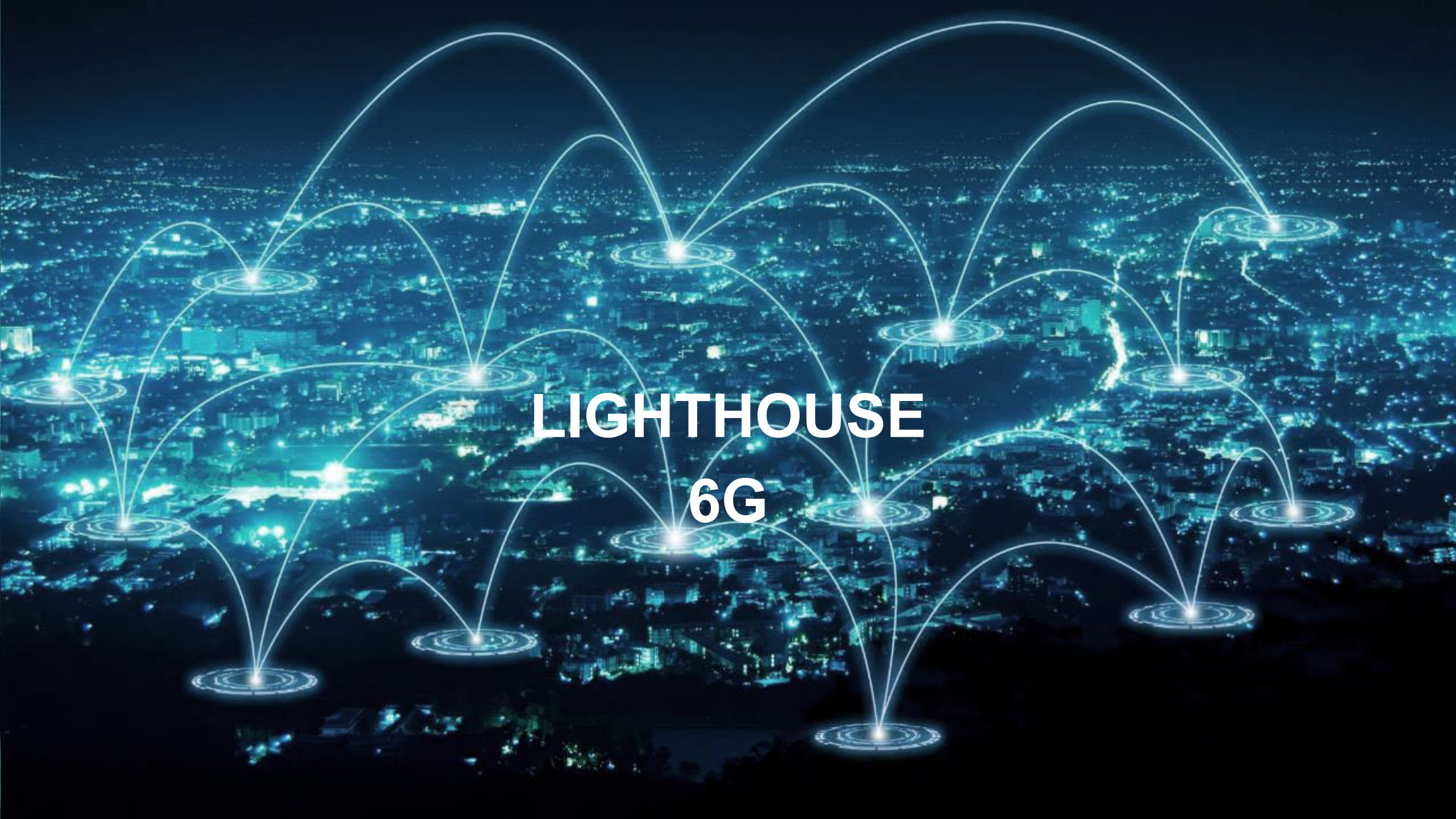
Edge AI System Test Lab

Target Customers / Partners and Value Propositions

Semiconductor industry
From formal methods to real-world testing on component and system level

Life Sciences & Medical electronics
Trustworthiness for wearables and point-of-care testing

Automotive & CPS
Combining safety, security, reliability into trustworthiness

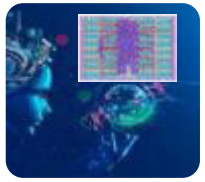

LIGHTHOUSE
6G

6G LIGHTHOUSE

6G will enable a “hyper-reality” blurring the boundaries of physical and digital worlds. It will enable ubiquitous connectivity for people, billions of “hyper-connected” machines and services beyond pure communication. 6G will drive the convergence of communication, radar, localization and sensing.

Flagship Research Topics

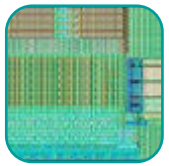
RF- & Analog IC design from mmWave to sub-THz frequency spectrum for convergence of communication, radar, localization and sensing.



Embedded AI for hybrid signal processing and machine learning in hardware.

Wireless time-sensitive networking facilitating real-time and secure wireless communications

Infrastructure & Services



IC Design

Digital-, RF-, Analog- & Neural Network Integrated Circuits Design

RF Test & Measurements

mmWave test- & measurement equipment (up to 500 GHz)

5G Use Case Prototyping

5G/6G research & experimentation testbed for industrial applications

Target Customers / Partners and Value Propositions

Semiconductor and ICT industry

RD&I for Integrated Circuits and Systems for RF, BB & ML for wireless communication and sensing

Industrial user of wireless systems and networks

RD&I for industrial applications of wireless communication and sensing

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