ANNUAL REPORT 2021

SAL

SAL
SILICON AUSTRIA LABS

Silicon Austria Labs (SAL) is a top European research center for electronics-based systems (EBS). At three locations, Graz, Villach, and Linz, the application-oriented center offers cooperative research along the value chain of EBS – from wafer to intelligent system – and develops innovative solutions for industrial production, health, energy, mobility, safety and more.

silicon-austria-labs.com

143
PROJECTS

129
PUBLICATIONS

€ 32 million
COOPERATIVE PROJECT VOLUME

251
EMPLOYEES

430
MEDIA REPORTS

Leonore Gewessler
Federal Minister
for Climate Action,
Environment, Energy,
Mobility, Innovation and
Technology

With the ongoing COVID-19 pandemic and the climate crisis demanding ever more urgent action, the year 2021 challenged us on a global level. Therefore, we maintain our proactive approach in promoting research excellence and innovation. With our support for Silicon Austria Labs, we are investing in outstanding domestic research and support climate-friendly innovation. We strongly support the strategic focus of SAL on five excellent and global competitive lighthouses in electronics-based systems.

With this investment in the Austrian R&D landscape, we hope to make an important contribution to climate protection and to successfully guide our industry into a greener future.

Marion Mitsch
CEO Austrian Association for the Electric and
Electronics Industry

Microelectronics and microelectronic components such as chips, sensors, power semiconductors and the associated software form the basis for digitization, climate protection and the technological sovereignty of Europe. Without these electronics-based systems, it would not be possible to meet the major challenges of our time. The electrical and electronics industry is Austria's second largest industrial sector, generating more than EUR 17 billion in the previous year alone. The most research-intensive companies in Austria are active in this sector. As shareholder of SAL, we at FEEI are convinced that cooperation between top research and top companies is needed, because only together will it be possible to compensate for the economic slump caused by the pandemic and continue to generate added value in Austria as a business location.

Barbara Eibinger- Miedl
Provincial Minister for Economics, Science and Research (Styria)

Microelectronics is a key field of the future that has become an indispensable part of our lives and plays an ever-increasing role in the development of the global economy. In this rapidly growing industry, Silicon Austria Labs has become an important player. With their commitment, the employees of SAL further expand this economic and scientific strength of Styria and thus increase our international visibility as a research country. I would like to sincerely thank you for your achievements and wish you continued success!

Gaby Schaunig
Provincial Minister for Technology (Carinthia)

Accelerator, magnifying glass, catalyst: The impact of the pandemic on all areas of life and work is manifold. As a top research center in the field of electronics-based systems, SAL is right at the heart of the rapid changes we are currently experiencing. I would like to thank the teams at the three locations for their outstanding achievements in raising SAL to an excellent level within a very short time and establishing it as a dynamic network. I am convinced that the successes of the present will be followed by many more successes in the future.

Markus Achleitner
Provincial Minister for Economics and Research (Upper Austria)

Digital transformation is a central field of action in our economic and research strategy #upperVISION2030. With research into the next generation of mobile communications, 6G, Silicon Austria Labs is developing key technologies for the wirelessly networked factory of the future. With our participation via Upper Austrian Research GmbH in SAL, Upper Austria and its capital Linz are establishing themselves as a center for 6G research with an international appeal. This will provide further tailwind for our efforts to position Upper Austria among Europe's leading economic regions.

A New Phase for SAL

Ingolf Schädler
Chairman of the SAL
Supervisory Board

2021 was the last year of the SAL start-up phase. Within three years, it was possible to set up a new enterprise in three different locations with more than 250 researchers and staff coming from more than 40 countries. A total investment of about EUR 37.7 million was initiated and „research business" was started with more than 50 partners from industry and universities. Five SAL University Labs and one SAL Innovation Lab were set up and have started their operations. That's quite an achievement for such a very short time!

Based on last year's mid-term plan, we developed a clear strategy for the further development of SAL with its lighthouse research programs on More-than-Moore, Photonics, 6G, Dependable EBS, and High Power Density Converters, To support this strategy, important investment decisions were taken by the Supervisory Board: in the summer, we approved the creation of 5 and 6G testbeds in Linz, in September the cleanroom investment package for Villach was accepted and in early December the package on High Power lab infrastructure for Graz and Villach passed the Board. During the last three years, all business rules necessary for the functioning of a modern enterprise were set up, including a high-level risk and compliance management system. In May 2021, the Supervisory Board also saw its completion by the involvement of representatives of the Works Council. Now, the company is fully on track!

Thanks to the unprecedented support of so many contributors from administration, universities, industry and, above all, from our management and staff. The journey of SAL to realize its ambitious vision to become Austria's first address in microelectronics research and development has entered a new phase.

Top EBS Research Made in Austria

Klaus Bernhardt
Deputy Chairman of the
SAL Supervisory Board

The current chip shortage shows the enormous importance of high technology for Europe. Awareness of the geopolitical importance of electronic systems as well as the required software, both for a sovereign Europe and to counter the challenges of climate change, is increasing. In a recent strategy meeting, the words „if we hadn't founded SAL yet, we would definitely have to found it now" were uttered: Silicon Austria Labs focuses on the right topics and stands for world-class research and thus for the successful combination of business and research. With this outlook, SAL has been able to establish itself as a top research institute for electronics-based systems in Austria. Now, the goal is to bring SAL into the top field at a European level.

The domestic electric and electronics industry has particularly great knowledge of electronics-based systems and thus the basis of digitization. Austria is a pioneer here and EBS forms one of the country's great strengths. Many domestic companies are global leaders in this area. SAL's goal is to further support these strong companies with its research performance. And while it takes time to build know-how and trust, the strategy is working: While the number of joint projects of SAL with industry is increasing massively, SAL also contributes to the visibility of the Austrian EBS sector. In this way, we manage to make Austria a more attractive location for young researchers. Silicon Austria Labs is an important element in strengthening Europe's digital and technological sovereignty, connecting regional areas of strength, and thereby generating added value and creating jobs.

Gerald Murauer
Chief Executive Officer

Sustainable Growth in Challenging Times

2021 was again marked by the COVID-19 pandemic and presented a challenging year for many companies, including SAL. However, the global challenge highlighted the power and duty of research and the growing importance of the EBS industry. By working together, discussing current challenges, and developing new technologies, we can make our world smarter and more sustainable. In the last year, we have followed our strategy and worked on our so-called SAL Lighthouses. With focus on Photonics, More-than-Moore, High Power Density Converters, 6G and Dependable EBS, we want to establish SAL as a one-stop-shop for electronics-based systems and a highly competent, excellent research partner.

In order to become a world-class research center, we need innovative projects, motivated researchers and beyond-state-of-the-art infrastructure. In 2021, we increased the number of projects to 143. With our unbureaucratic, co-financed cooperation model, we have established SAL as an important and competent cooperation partner for Austrian and European companies. We were able to increase our cooperative project volume from EUR 20 million (in 2020) to EUR 32 million. In 2021, SAL grew to more than 250 employees from 40 different nations. Our interdisciplinary, international team lives and breathes research excellence. With our shared desire to promote and realize the transition to renewable sources of energy, we work on various projects in the fields of photovoltaics, electromobility, sustainable sensorics and much more.

With all these important milestones and our focus on key technologies, we can already see the Champions League of research on the horizon. We are well on our way and are excited to share our accomplishments with you. I want to thank our shareholders, partners and our employees for their continuous support – without you, the achievement of SAL's vision would not be possible.

SAL Leadership Team

In everything we do, we aim for the highest level of excellence and integrity. Our core values are about mutual respect of individuals, recognition of their contributions, and about open communication. They provide the framework for how we work together as one SAL team and implement our strategy. They guide the Leadership Team and all employees in their day-to-day business.

Gerald Murauer
CEO

Thomas Lüftner
CTO & Head of Research Divisions (until December 2021)

Christina Hirschl
Head of Research Division Sensor Systems

Rudolf Krall
Head of Research Division Power Electronics

Emily Knes
Head of Human Resources

Christoph Glanzer
Head of Finance

Peter Jakubitz
Head of Operational Excellence

Alfred Binder
CTO (starting from January 2022)

Female Power at SAL

Through all levels in both research and enterprise (non-research) positions, we encourage women to bring their competencies and motivation to management and project leadership roles and, thus, also inspire the next generations of women to aim for partaking in leadership.

Christina Hirschl
Head of Research Division Sensor Systems

Mirjana Videnovic-Misic
Principal Scientist Millimeter Wave Technologies

Cristina Consani
Staff Scientist Photonic Systems

Katja Harms
Scientist Sensor Applications

Sarah Risquez
Senior Scientist Microsystem Technologies

Mahin Atiq
Scientist Wireless Communications

Fjolla Ademaj
Scientist Wireless Communications

Johanna Zikulnig
Scientist Sensor Applications

Annalisa De Pastina
Senior Scientist Microsystem Technologies

Perla Malago
Senior Scientist Microsystem Technologies

Monika Stipsitz
Scientist
Power Electronics

Sabine Lengger
Senior Scientist
Sensor Applications

Gudrun Bruckner
Staff Scientist Heter-ogeneous Integration Technologies

Chairwoman of SAL Worker's Council

YouTube
Video "Superwomen in Science: Cleanroom Edition"

SUPERWOMEN IN SCIENCE

With our video series "Superwomen in Science", we want to show what our female researchers are working on, what motivates them, and how they want to inspire young women who are thinking about starting their own research careers.

MANAGERS IN ENTERPRISE FUNCTIONS

Emily Knes
Head of Human Resources

Kerstin Podlipnig
Head of Accounting & Controlling

Barbara Fuka-Viola
Manager Procurement

Julia Bocskay
Manager QM

Isabella Preuer
Manager Communica-tions & PR

HIGHLIGHTS 2021

12/2018
Foundation of Silicon Austria Labs GmbH

06/2019
Merger of CTR with SAL

07/2020
SAL joins the Research Financing Act

03/2021
Constitution of SAL Works Council

03/2021
SAL expands lab infrastructure in Villach (new HIT Lab)

05/2021
Start of ECSEL JU-funded project HiEfficient

06/2021
SAL co-hosts WFCS conference in Linz

08/2021
Start of cooperation
with Virtual Vehicle

08/2021
Lab Extension
Photonic 7 lab

08/2021
SAL produces
first samples with
Evatec Clustertool
in the cleanroom

09/2021
Successful FFG review

09/2021
Start of cooperation
with Fondazione
Bruno Kessler (FBK)

10/2021
SAL opens new office and lab
space at JKU Science Park 4
in Linz

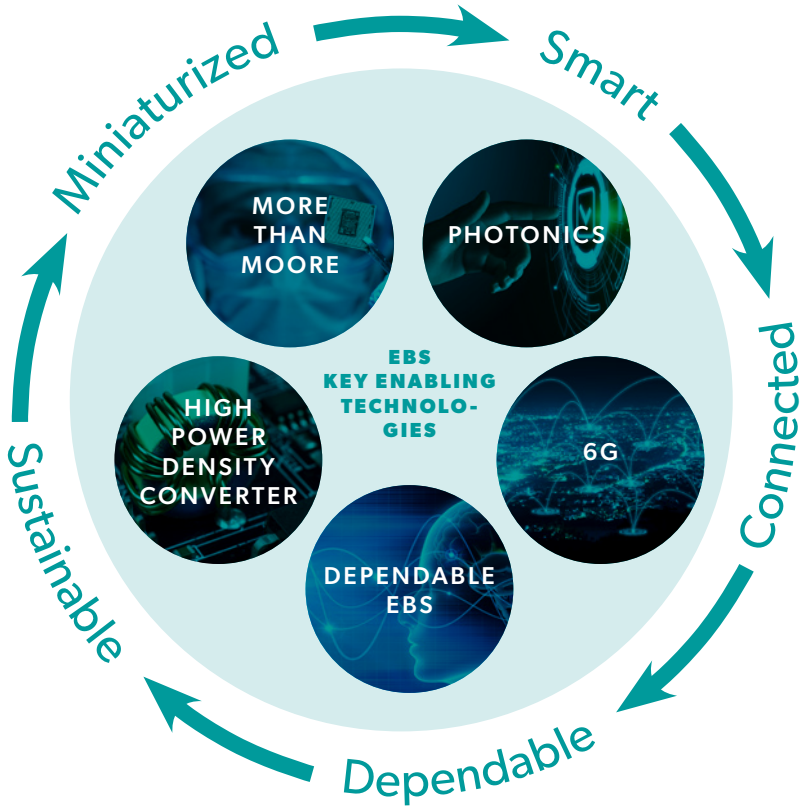
12/2021
SAL exceeds
number of 250
employees (FTE)

Purpose, Vision and Mission

WE WANT TO UNFOLD A BETTER FUTURE FOR AUSTRIA AND EUROPE.

At Silicon Austria Labs, we believe in creating a better and more sustainable future. We want to create positive societal and environmental impact by fostering green tech and sustainability in line with the United Nations' Sustainable Development Goals (UN SDGs). With our international team, we bring sustainable Brain Gain to Austria, who share one goal: Create a smart, connected, and green world for future generations.

We want to foster EBS innovation leadership in Austria and Europe and strengthen its international competitiveness by embracing key industry trends. This will increase the attractiveness of Austria as a hub for R&D centers and high-tech start-ups for EBS and establish Austria as an active participant in the scientific communities of electronics-based systems with high international visibility and intellectual leadership.



OUR VISION IS TO BECOME A WORLD-CLASS RESEARCH CENTER AND PIONEER IN EBS.

Due to the digital transformation and related key industry trends, almost every industry and market will be disrupted by smart, connected, sustainable, dependable, and miniaturized products and applications. We want to be at the forefront of these developments and grow into an internationally renowned research center with flagship research in the fields of Photonics, 6G, Dependable EBS, High Power Density Converters and More-than-Moore.

We want to be an EBS one-stop-shop for high-tech industries, innovative SMEs and start-ups, enabling cutting-edge research along the EBS value chain and fueling the digital sovereignty of Austria and Europe.

OUR MISSION IS TO PROPEL IDEAS INTO INNOVATIONS WITH RESEARCH EXCELLENCE AND ECONOMIC IMPACT

We partner and cooperate with industry in joint research projects along the EBS value chain. In 2021, we acquired a project volume of EUR 32 million and worked together with more than 30 industry partners in SAL Cooperative Research (SCR) projects. We also pursue scientific excellence in partnerships with universities to be ahead of the curve for new industrial megatrends. In 7 joint University SAL Labs, we work on strategic research to be implemented in future industrial projects. We build a diverse international research team, with currently around 50 % of our researchers from outside Austria. We also want to foster the next generation of researchers with our SAL Doctoral College. We strengthen the scientific network by working in internationally-funded research projects with partners (61 projects in 2021), publish papers (129 publications in 2021) and co-host conferences, such as the IEEE WFCS conference in June 2021 in Linz. We build and maintain cutting-edge research infrastructure and equipment to enable research far beyond the state-of-the-art.

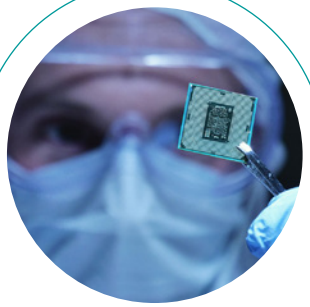
We live up to our corporate social responsibility, as we are conscious of our overall economic, social, and environmental impact.

SAL Light-houses

The charter of SAL is to serve the broader EBS ecosystem in Austria from the semiconductor industry to system integrators and industrial users of EBS, and thereby contribute to a successful digitalization of the Austrian economy. With the SAL Lighthouses, we have identified research areas that will have a strong impact for future technologies. The System Integration Program focuses on research that is integral for every lighthouse.

Systems Integration Program

Model-based system engineering, multi-domain modeling, EBS verification and validation



MORE-THAN-MOORE

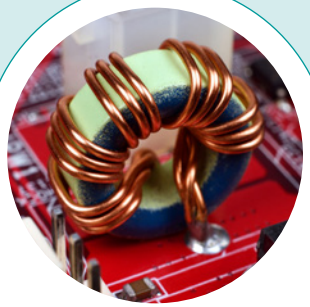
Integrated microsystems for sensors, filters and actuators

PHOTONICS

Age of light overcoming the physical limits of electronics

6G

Intelligent wireless systems for convergence of communications, radar and sensing

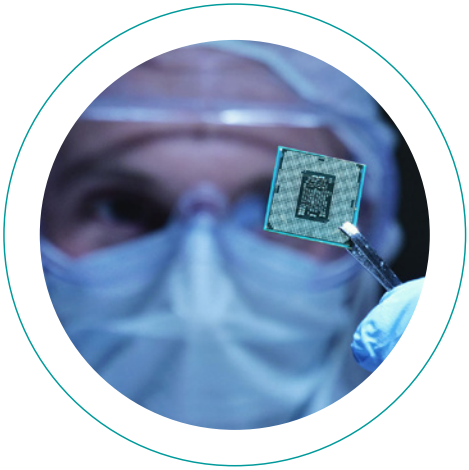


HIGH POWER DENSITY CONVERTERS

Electrification by power converters with highest power density and efficiency

DEPENDABLE EBS

Intelligent electronics-based systems in which we trust



More-than-Moore

COMPLEXITY REDUCTION, MINIATURIZATION AND EFFICIENT COMPONENTS TO SHAPE OUR FUTURE

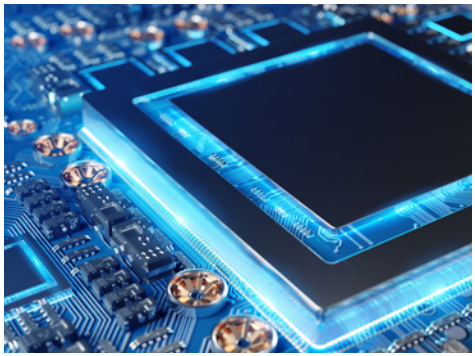
„More than Moore“ refers to a law observed by Gordon Moore in 1965, according to which the number of circuit components on a chip doubles every one to two years while costs remain the same. Current trends, however, show that more is possible - more functionality and more efficiency in ever smaller components. Or to put it another way: „More than Moore“.

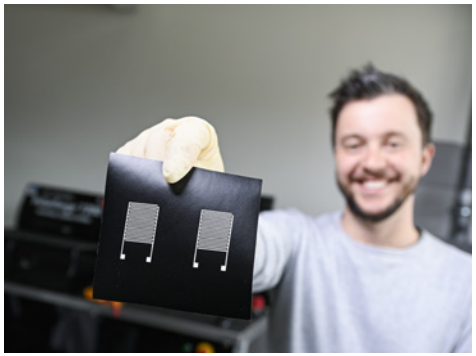
The goal of research into More-than-Moore microsystems technologies at SAL is to reduce complexity, miniaturize and increase the efficiency of components. By covering the entire research value chain combined with high-tech manufacturing technology, SAL creates a unique selling point.

Division Sensor Systems

RESEARCH FOCUS

- Photonic MEMS
- Piezo MEMS
- Magnetic Sensor Systems
- Sustainable Sensors
- Applicative Packaging



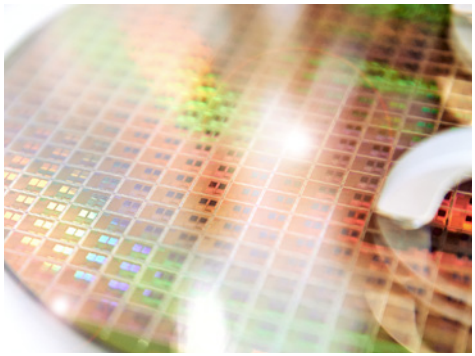


PIXEL

This project aims to develop advanced pMUT ultrasonic transducers and arrays (as functional demonstrators) for gas flowmeters. With their help, flow measurements in transportation and energy-related applications can be performed.

SMART LIGHTWEIGHT 4.1

As part of the Smart Lightweight 4.1 project, SAL has developed and characterized three sensors – for measuring temperature, humidity, and strain – using inkjet printing technology. These sensors are expected to generate significant advantages in both the production and the safe use of composite materials.



AWLT

The project AWLT investigates wafer bonding processes through a MEMS-based Tire Pressure Monitoring System (TPMS) as well as the causal relation between sensor performance, materials, and process factors. For this purpose, a state-of-the-art simulation tool for advanced wafer level MEMS technologies will be developed which is suitable for modeling the effects of the wafer bonding process on the TPMS.

PLATEAU

Within this project, next-generation ultrasonic transducers leveraging the advanced piezoelectric thin film and microsystems technologies for medical imaging applications are being developed. Medical ultrasound based on next-generation ultrasonic transducers has already improved overall performance and lowered product cost, which will make healthcare more inclusive and more easily accessible to the public.

Learn more about our Lighthouse MORE-THAN-MOORE
https://silicon-austria-labs.com/forschung/leuchttuerme/more-than-moore/

MOHSSEN MORIDI

Head of Research Unit Microsystem Technologies

MEMS is a key enabling technology for many emerging innovative applications. In the Microsystems Research Unit, we unfold the next generation of MEMS devices such as magnetic sensors, piezo MEMS and MOEMS, as well as integrated photonics in combination with our advanced microfabrication and thin-film technologies. These research directions are currently represented by 3 flagships in the More-than-Moore lighthouse.

ALFRED BINDER

Head of Research Unit Heterogeneous Integration Technologies

A highlight in 2021 was the inauguration of the new HIT lab in Villach, where we now have enough space to store sensitive backend equipment in a clean environment. More importantly, our high-end devices such as the EHD printer, Wafer Bonder, Wafer Aligner, etc. enable us to strengthen our competencies and research excellence in the areas of micro-assembly technologies (e.g., wafer-level packaging), additive manufacturing technologies (e.g., multi-nozzle ink-jet printing at µm resolution), wire bonding technologies and many more.

JÜRGEN KOSEL

Head of Research Unit Sensor Applications

I am delighted to work on Sustainable Sensorics, one of the research thrusts of this lighthouse. In today's world, this is a particularly important area of research since electronic waste is the fastest growing waste stream in Europe and the trend towards a digital world will increase this issue even further. It is also an attractive area of research as it provides a widely open playground for novel contributions and empowers us to achieve the high standards of social responsibility in our scientific work that we aspire.

Photonics

THE ERA OF LIGHT IS HERE

The mastery of light in any form is at the heart of photonics. Photonics is a key technology in digitization, as it provides the basis for optical sensor and measurement systems that can help overcome the limits of other technologies in terms of accuracy, sensitivity, miniaturization, and safety.

Complete photonic systems that can analyze at high speeds are essential, for example, for digitized industrial production (Industry 4.0), autonomous driving, and next-generation consumer electronics such as smartphones and tablets.

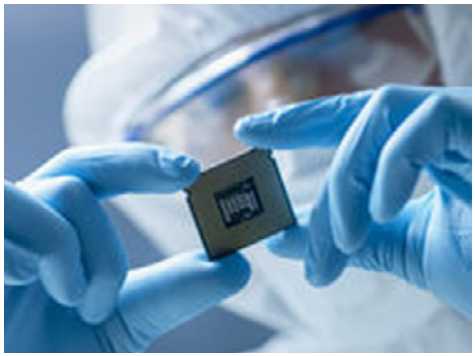
Division Sensor Systems

RESEARCH FOCUS

- Next-Generation Photonic Systems
- Advanced Photonic Assembly
- Non-Linear & Quantum Photonics
- Concepts for Integrated Photonics

QSENSE4LIFE

In the scope of the QSense4Life project, SAL is investigating advanced quantum-based sensing methods based on nuclear magnetic resonance spectroscopy using NV-centers in ultra-pure diamonds with the goal of detecting the presence of various chemical substances in life-science applications.



QSENSE4POWER

QSense4Power exploits point defects in silicon carbide as intrinsic quantum sensors for diagnostics on power electronic components. Potential applications span all phases of development, manufacturing, and electrical test operations.

ILIDS4SAM

Automated mobility systems are presently moving towards more complex urban traffic scenarios. The iLIDS4SAM project will enable this transition by developing high performance, low-cost LiDAR sensors with increased field of view and resolution.

Learn more about our Lighthouse PHOTONICS
https://silicon-austria-labs.com/forschung/leuchttuerme/photonik/

GERALD AUBÖCK

Head of Research Unit Photonic Systems

Since October 2021, a new femto-second laser system enriches the photonic area at the SAL site in Villach. The new Light Conversion laser enables SAL to expand its capabilities in mastering non-linear optics and ultra-fast spectroscopy. In particular, SAL can further extend its expertise in bringing applied non-linear spectroscopy to industrial applications.

ANDREAS TORTSCHANOFF

Head of Research Unit Photonic Systems

Within our Research Unit, we pursue projects covering the full development chain of optical EBS, from problem definition all the way to final prototypes. The large variety of topics includes, among others, advanced spectroscopic analysis, optical system design, fabrication, and testing, but also novel strategic fields like quantum sensing and non-linear spectroscopy. Photonics is a key enabler for many applications and one of the lighthouses defining SAL's long-term research strategy.

High Power Density Converters

EFFICIENT POWER CONVERTERS WITH THE HIGHEST POWER DENSITY AND EFFICIENCY TO COUNTER CLIMATE CHANGE.

Power electronics are at the center of the development towards ecologically compatible mobility and energy-efficient digitization. Invisible from the outside, this technology is hidden in almost every electronics-based system today - be it in the smartphone, the laptop, or the e-car.

To meet the growing demands of electronic components and the need for powerful, reliable, integrated power supplies, the SAL team is working on power electronic systems along the entire EBS value chain, from design and component characterization to hardware.

Division Power Electronics

RESEARCH FOCUS

- Highly efficient power converters & inverters
- Emerging control engineering theory
- Multiphysics simulation
- Power system health monitoring

TINY POWER BOX

Within the project Tiny Power Box, we develop an onboard charger for electric cars. The aim of this project is to design vehicles' bidirectional battery chargers as small and efficient as possible. In the future, the onboard charger should also make it possible, for example, to transport electricity bidirectionally from the socket to the battery and vice versa.

PREMI

This project intends to develop new modeling procedures and optimized methods to simulate Electromagnetic Interference (EMI) of power electronic systems. The primary goal is to lower the necessary design time and design costs of power electronic systems by already estimating their electromagnetic compatibility in the design phase.

HIEFFICIENT

The Horizon2020 project HiEFFICIENT makes a substantial contribution to the European Commission's "Green Deal" initiative by ensuring sustainable mobility and resource efficiency for future transportation. Therefore, highly reliable and integrated wide-bandgap (WBG) technologies in electronic power circuits and systems of electrified vehicles and charging infrastructures will be developed.

Learn more about our Lighthouse HIGH POWER DENSITY CONVERTERS
https://silicon-austria-labs.com/forschung/leuchttuerme/leistungsdichte/

BERNHARD AUINGER

Head of Research Unit Coexistence & Electromagnetic Compatibility

Electromagnetic Compatibility (EMC) for power electronics strives to find methods to recognize EMC problems as early as possible in the design flow and before having physically available prototypes. With PREMI, we have a flagship project addressing these topics.

HUBERT BERGER

Head of Research Unit Instrumentation & Testing

I have been part of SAL since the beginning of December 2021. My clear goal is to continue building a strong research unit dedicated to modern power electronics in the application field of testing electric and electronic components. This will also include the development of high-performance computing platforms for ultra-fast control of power converters.

CHRISTIAN MENTIN

Team Leader Research Unit Packaging & Multiphysics

Smaller, more efficient, lighter. As requirements increase, the power density in electronic assemblies is always growing. Under the premise “think shrink”, high integration makes power electronics invisible to the end user.

6G

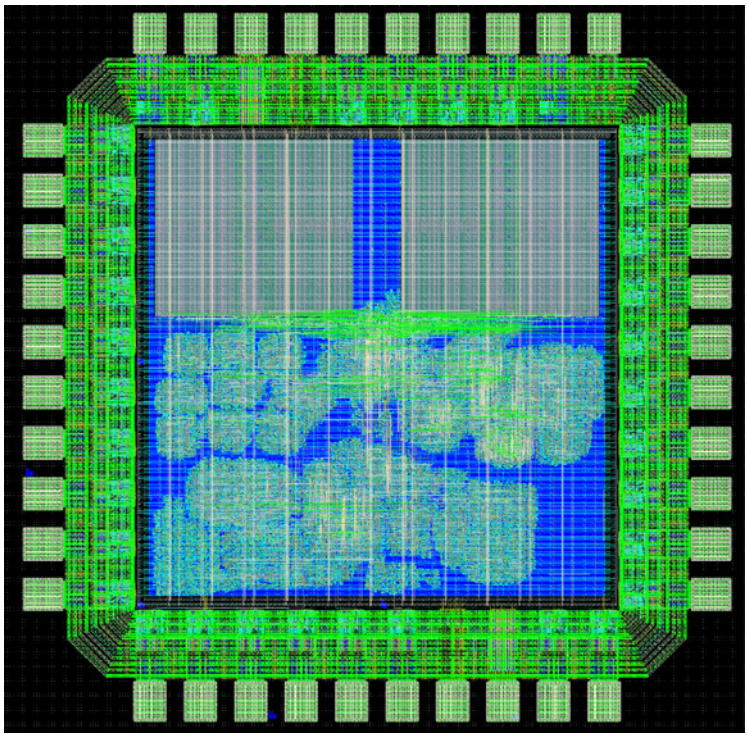
PROPELLING RESEARCH IN WIRELESS COMMUNICATIONS INTO SUSTAINABLE CONVERGED NETWORK SERVICES

6G as the umbrella term for future wireless communications solutions plays a central role as an innovation driver for EBS, providing solutions that are characterized by the following features: smart, connected, resource efficient, dependable, miniaturized. Through services that also extend beyond communications and are provided at an unprecedented accuracy, reducing, or even eliminating the need for physical presence, 6G will provide an infrastructure base to enable reaching many of the aims set forth by the United Nations' Sustainable Development Goals.

Division Intelligent Wireless Systems

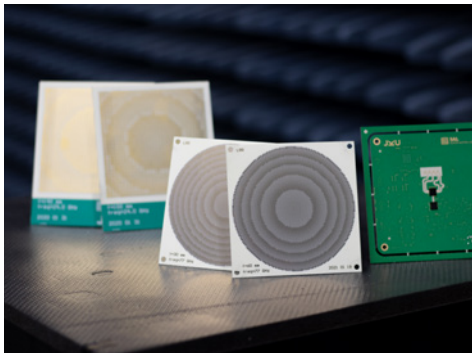
RESEARCH FOCUS

- RF- & Analog IC Design
- Embedded Artificial Intelligence
- Wireless Time-Sensitive Networking



DIGINEURON

On their way to develop a flexible and configurable 6G ecosystem to enable fast integration of embedded intelligent systems and edge accelerators on advanced integrated circuit technologies, the Embedded AI team set up the digital flow and produced a first prototype of a neuromorphic SoC via the TSMC 65nm technology.



ACTIVE METAMATERIAL

In the mmWave team, prototypes for RF metasurfaces were developed, making it possible to influence high-frequency waves. These surfaces will later function as thin lenses and active reflectors and will be used in the fields of wireless communication, full-wave measurement techniques, radar, and many other applications.

5G/6G-COFACT

As part of the COFACT project, research is being conducted in the SAL research and experimentation testbed in Linz on the possible future use of 5G and 6G in the industrial sector. The 5G/6G testbed is designed to perform research and development for performance analysis and new wireless products.

Learn more about our Lighthouse 6G
https://silicon-austria-labs.com/forschung/leuchttuerme/6g/

GERNOT HUEBER

Head of Research Unit Millimeter Wave Technologies

The 6G Lighthouse is the innovation hub where we develop technologies from silicon to systems, pushing the limits beyond the state-of-the-art to achieve the UN Sustainable Development Goals. Within this program, we play a central role in the Austrian and European academic and industry ecosystem.

HANS-PETER BERNHARD

Head of Research Unit Wireless Communications

Industrial applications are at the center of our 5G/6G research. SMEs can benefit from these technologies just as much as large industrial companies. In our testbed, which is being built at SAL Linz, industrial 5G/6G applications can be tried out prior to their commercial implementation.

PEDRO JULIÁN

Head of Research Unit Embedded AI

The 6G paradigm opens a new range of opportunities to integrate smarter, more connected, and more powerful systems. To achieve this in a sustainable and environmentally friendly manner, great research effort and creativity will be necessary.

BERND LEMAITRE

Team Leader Research Unit Frontend Integrated Circuits and Systems

For the fastly growing complexity of future communications like 5G/6G, massive MIMO or full-duplex serial data transceiver systems for chip-to-chip communication, and wide-band cable modem applications, RF frontends require new multidisciplinary modelling, circuit design and integration concepts.

Dependable EBS

FOR A FUTURE IN WHICH EBS TECHNOLOGY FOSTERS TRUST

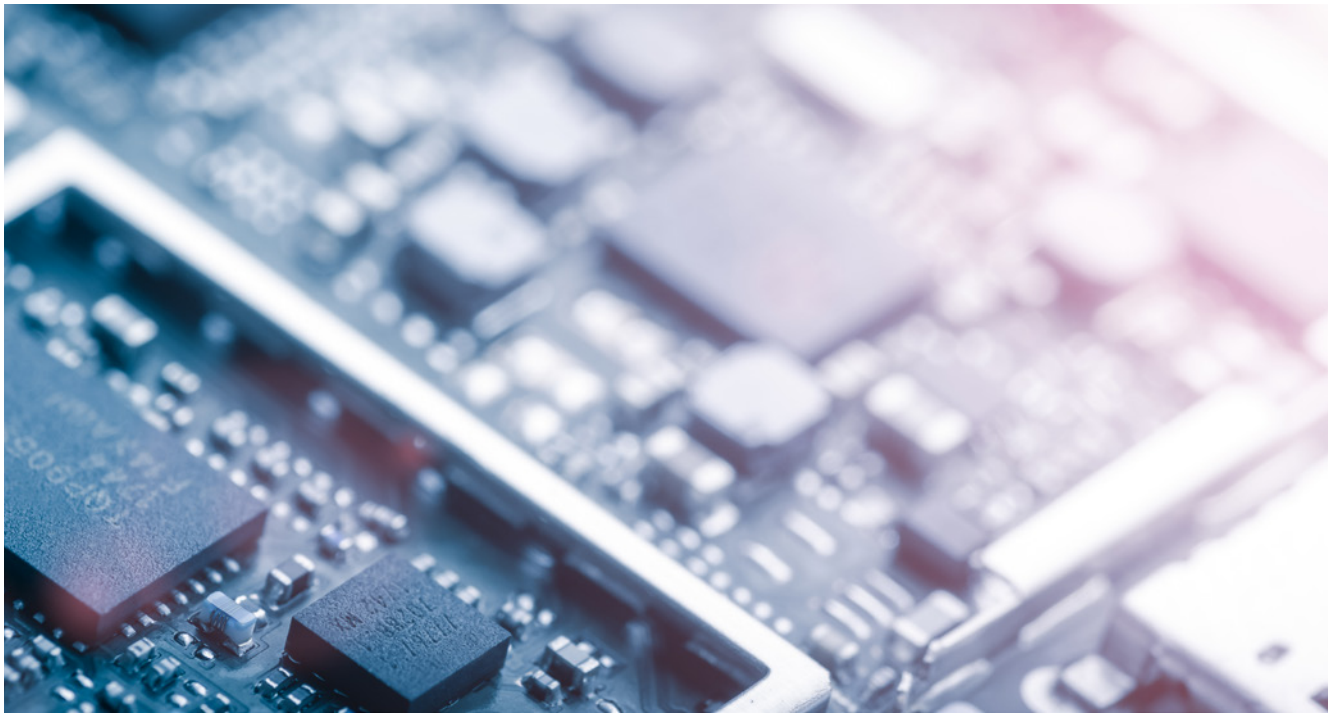
In everyday life, we increasingly rely on smart devices, with billions of them constantly networking in the Internet of Things (IoT) and industrial production becoming increasingly digital, too. It is therefore essential that the electronics-based systems that form their backbone are reliable and trustworthy: They must meet high requirements in terms of their functionality and security, be able to continue working even in the event of a failure, comply with data protection guidelines, and much more.

We are researching various technologies that contribute to the dependability of EBS, from software development for the IoT to the question of the explainability of artificial intelligence ("Explainable AI"). Of particular future interest is the reciprocal combination of model-based AI with machine learning, in order to combine the advantages of both approaches in the areas of performance, robustness and practicality.

Division Embedded Systems

RESEARCH FOCUS

- Ubiquitous sensing
- Collaborative Perception
- Development Enablers
- Testing



NEARNESS

Ultra-sonic sensors are widely used for measuring distances. Within the project Nearness, we want to investigate novel hardware concepts for ultra-sonic transducers, signal generators, and signal processing in the analog and digital domain.

LIGHTEN

In addition to patients and healthcare professionals, numerous other stakeholders (regulators, insurance providers, technology developers, patients' relatives) can contribute to results of health measures in modern healthcare. In this context, optimal communication/interaction channels between them are crucial. This project aims to support decision makers through the comprehensive use of digital tools.

Learn more about our Lighthouse DEPENDABLE EBS
https://silicon-austria-labs.com/forschung/leuchttuerme/dependable-ebs/

WILLIBALD KRENN

Head of Research Unit Trustworthy Adaptive Computing

From smart homes and smart mobility to smart farming, virtually nothing works without reliable electronics-based systems, and they are also the backbone of a sustainable and ecological future. The technical foundations needed for this reliability and security are being developed and deployed by SAL researchers at the Dependable EBS Lighthouse in joint projects with industry and academia.

ANDRAS MONTVAY

Head of Research Unit Collaborative Perception & Learning

In order to realize the concept of ubiquitous sensing within the Internet of Things, a heterogeneous multitude of smart devices with multi-modal sensors will collaborate to form a perception of their environment. Subsequently, these smart devices will employ data-driven decision-making based on machine learning algorithms. The key question there is how to match an edge computing architecture suitable for AI with an AI architecture suitable for edge computing.

RUDOLF HEER

Head of Research Unit Electronic Sensors

As part of the Lighthouse Dependable EBS, the Research Unit Electronic Sensors focuses on aspects of physical reliability testing. Supported by extensive software tools, we can greatly reduce the development cycles for robust electronics in this research area on the one hand, and on the other hand ensure that joint research with our partners accelerates the market entry of products.

Systems Integration Program

COMBINING DIVERSE TECHNOLOGIES

The Systems Integration Program is meant to ensure synergies between Lighthouses whose work concerns common research themes. This will be the case specifically for

- Model based System Engineering,
- Multi-Domain Modelling,
- EBS Verification & Validation

ALFRED BINDER
Program Manager Systems Integration

PROJECT SEED4SYSSIM

One project within the Systems Integration Program is Seed4SysSim. In this project, SAL will investigate options to establish a simulation workflow capable of simulating the many different phenomena involved in the behavior of electronic systems, from component or subcomponent level to system level. We will focus on the aspects relevant for the simulation of power electronic and optical sensor systems, including electronic, thermo- and electro-mechanical, electromagnetic or optical aspects.

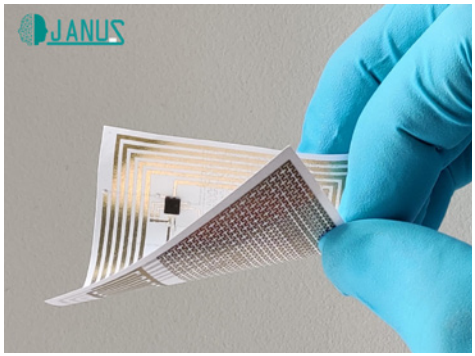
The intended definition of the workflow will tackle the problem of interoperability of the various existing tools and the establishment of well-defined interfaces. Furthermore, the workflow should identify methods (e.g., model order reduction) where information must be transferred from one simulation 'layer' to the next. For example, multiphysics simulations at component level provide necessary information for the next layer, such as a circuit simulation. Besides that, the workflow should show how the simulation tools need to integrate "black box models" into their work.

While the project currently focusses on two specific cases, the basic methodology developed and tested in the Systems Integration Program shall be applicable in a broader sense for EBS in general and in the context of the SAL lighthouses in particular.

TECH FOR GREEN

OUR SOLUTIONS FOR THE TRANSITION TOWARDS RENEWABLE ENERGIES

As the development of green technologies and the focus on sustainability are major driving forces of the success of SAL, we are currently working on several projects relating to a circular economy and the transition towards renewables in the mobility and energy sectors.



WASP

Within the project WASP, our researchers developed a multifunctional, flexible biface sensor on an uncoated paper substrate that optimizes performance and minimizes material consumption by double-side printing. We call this technology “Janus”, named after the Roman god of the beginning and the end. He is usually depicted with two faces, analogous to our sensor tag, which also makes use of both its sides. For this work, our researchers were awarded at the 5E Contest in May 2021.

AEROMIC

In this Horizon 2020 Clean Sky 2 project, where SAL functions as consortium leader, we are developing microphones for aero-acoustic measurements. These microphones can significantly improve the environmental performance of an aircraft by, for example, reducing noise emissions and making airplanes more efficient.

FIRE SAT

Within the project FIRE SAT, research is carried out on artificial intelligence algorithms on board of earth observations satellites intended to enable remote fire detection from space.

WS2CARE

As future vehicles will be connected, efficient, and highly automated, they will be a primary target for all kinds of cyber-threats. Therefore, cyber security is becoming one of the most important issues for the vehicles of the future. The project WS2CARE focuses on the continuous verification and validation of the security and resilience of vehicles and mobility systems.

OPTPV 4.0

The research project OptPV4.0 aims to optimize the operations and maintenance procedures of photovoltaic power plants in order to improve and secure their energy yield and thus their economic viability. Reliable identification and modeling of error sources are only possible with appropriately advanced analysis methods using large amounts of data as well as additionally collected metadata.

PVRE²

When a solar panel system reaches the end of its service life or becomes defective, the question arises of what to do with it. The flagship project "Sustainable Photovoltaics - PVRe²" focuses on sustainable recycling, advanced material development, and repairing damaged photovoltaic modules, with the aim of optimizing the entire PV module recycling process on the one hand and increasing the recyclability of individual solar components on the other.

Cooperations

IMAGINE STARTING A RESEARCH PROJECT WITHIN 6 TO 8 WEEKS, NOT HAVING TO FIGHT YOUR WAY THROUGH A „FUNDING JUNGLE", NOT HAVING TO WRITE A PROPOSAL AND ABOVE ALL, KNOWING THAT THE ENTIRE PROJECT WILL BE CO-FINANCED. THIS IS POSSIBLE WITH SAL!

HOW DOES IT WORK?

50 % of any project volume is financed by SAL, while the cash contribution from industry partners amounts to only 25 % of the total project volume. The remaining 25 % is contributed via in-kind services from industry. Projects can be carried out bilaterally or multilaterally. The great advantage over a grant application is the rapid and unbureaucratic implementation. For instance, a sensor project was jointly launched in less than 10 weeks after the initial project idea.

Do you have an idea or challenge for us?
Are you looking for a research partner?
Then contact us!

businessdevelopment@silicon-austria.com

THIS IS THE COOPERATIVE MODEL YOU WERE LOOKING FOR

In 2019, we started our first cooperative project, Tiny Power Box, with five industrial partners. Together with Fronius International GmbH, Infineon Technologies Austria AG, AT & S Austria Technologie & Systemtechnik AG, TDK Electronics GmbH & Co OG and AVL List GmbH, we are developing a bidirectional onboard charger for electric cars.

Since then, many new projects have followed - from innovative micro-mirrors to smart masks, sustainable sensors, and the visual inspection of quality control systems. We always aim to find partners along the value chain, from chip manufacturer to systems provider. This enables all the different players to sit together, discuss current challenges, and jointly create technologies that benefit all the partners.

Now we have around 40 cooperative projects with a volume of EUR 32 million.

In my decade-long career in business development, I have never seen a more attractive offer for innovation and research than SAL's cooperative model. Without any bureaucratic hurdles and with just 25 % cash contribution, we boost your innovative ideas.

HEIMO MÜLLER
Head of Business Development and Grants Office

SAL Services

IF YOU HAVE TO DEVELOP EXPERTISE, SKILLS AND THE NECESSARY INFRASTRUCTURE FIRST, RESEARCH & DEVELOPMENT CAN BE A COSTLY UNDERTAKING INDEED. AT SAL, WE MAKE THE R&D FACILITIES, EXPERTISE, AND FLEXIBILITY YOU NEED TO DEVELOP NOVEL ELECTRONICS-BASED SYSTEMS AVAILABLE TO YOU – RIGHT IN THE HEART OF EUROPE.

SAL offers services in the following areas:

MEASUREMENT, CHARACTERIZATION & TESTING

Whether it's surfaces or the depths of a particular material – from chemical analysis to mechanical testing: We share our knowledge from everyday R&D to support you in getting new insights. Get in touch with us and send in your samples!

FRONT-END PROCESSING

From lithography to PVD – you don't want to play around with R&D stuff in your own facilities? At SAL you can!
Our experts operate an 8-inch compatible front-end line with state-of-the-art processing equipment, meeting the needs of future microsystems development – even for small series production.

BACK-END PROCESSING

Adding functionality to application driven microsystems: by utilizing bonding, dispensing, assembling, and packaging approaches, SAL is a preferred partner in the industry.

SIMULATIONS

The right tools in the hand of SAL's experienced model builders are often the most efficient way to avoid costly and time-consuming hardware iterations.

By simulating physical effects from the nano- to the macro-scale, we visualize your idea to support your decisions.

R&D SERVICES

A new idea is like a newborn – from crawl to run it takes a guiding hand and a trustful relationship.
SAL is at your side, leading you towards and along the right R&D path. Our R&D services portfolio spans from systems design support to feasibility studies – tailored to grow innovations fast.

5G TESTBED

5G in industrial applications holds enormous cost-saving potential for process and production operations. Reliable wireless communication through 5G enables high-level automation of distributed industrial plants. They can be more maintainable, flexible, and resilient to system changes.

With the support of JKU and Linz AG, SAL will establish a "5G Research and Experimentation Testbed" for industry-related research at the JKU LIT Factory in Linz in 2022. The testbed will support the development and validation of industrial 5G applications for industry and SMEs.

Research Network

TOGETHER WITH OUR PARTNER UNIVERSITIES, WE HAVE FORMED A STRONG RESEARCH NETWORK FOR EBS WITH THE OBJECTIVE OF MAKING YOUNG RESEARCH TALENTS THRIVE AND TO DELIVER EXCELLENT RESEARCH RESULTS OF HIGH RELEVANCE FOR THE ACADEMIC AND INDUSTRIAL EBS ECOSYSTEMS.

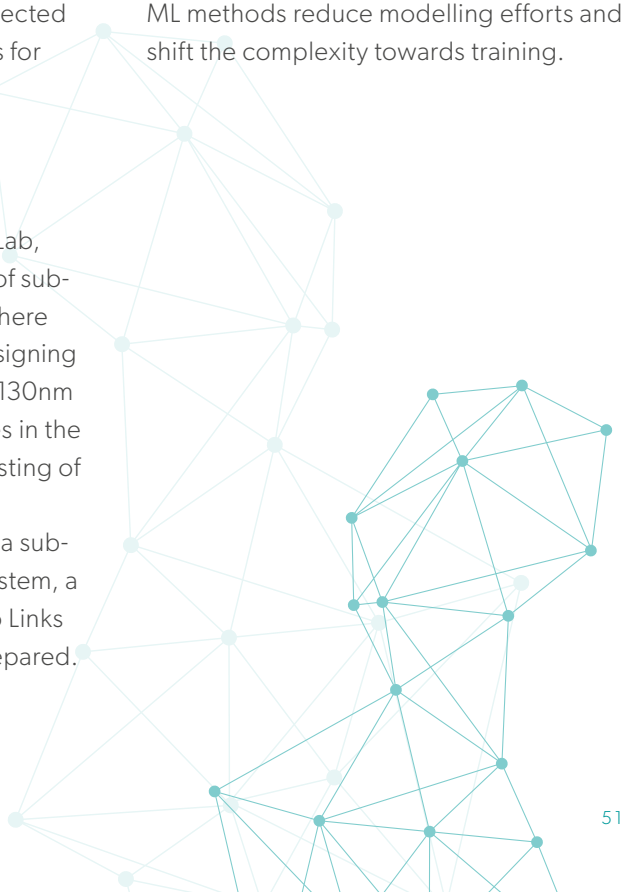
ESPML LAB (SAL & JKU LINZ)

With the project „Machine Learning (ML) for Communications", the eSPML Lab contributes to SAL's focus on 6G technologies in Linz. The following achievements have already been made:

- **Neural Network (NN)-based Data Estimation**
  The so-called DetNet was optimized for use in unique word orthogonal frequency division multiplexing (UW-OFDM). In addition, the Attention Detector and a fully connected NN were developed as data estimators for non-static channel environments.
- **NN-based Modelling and Compensation of RF Components**
  Furthermore, the joint characterization and compensation of hardware impairments such as non-linearities in power amplifiers and I/Q mismatches in RF front ends have been investigated using NNs and deep learning methods. Contrary to classical model-based methods, ML methods reduce modelling efforts and shift the complexity towards training.

MMW LAB (SAL & JKU LINZ)

Since the founding of the LIT/SAL mmW Lab, much preparation work for the research of sub-THz integrated circuits has been done. There have already been first steps towards designing a complete TRX chiplet in IHP's SG13G2 130nm BiCMOS technology. The recent activities in the LIT/SAL mmW Lab include the setup & testing of EDA-Tools and the PDK.
To mark a preliminary path on the way to a sub-THz, >100 Gb/s radio communication system, a technical report on Tb/s mm-Wave Radio Links at sub-THz frequencies has also been prepared.



DES LAB (SAL & TU GRAZ)

Within the DES LAB, SAL and 5 institutes of TU Graz are conducting shared-interest research. In the first project, ZeroBugs, runtime enforcement topics like uncertainty, dynamics, and stochastic systems as well as the application in reinforcement learning (connected to the project AI meets FM) have been researched. Covered security topics focused on physical security of deep neural networks and the usage of AI for side channel attacks and cryptoanalysis. For AI meets FM, work on automata learning for black box systems was conducted – with a focus on deterministic, non-deterministic, and stochastic systems. Furthermore, the powerful open-source library AALpy was developed and successfully published.

GEMC LAB (SAL & TU GRAZ)

One big goal in EMC for power electronics is to recognize EMC problems as early as possible in the design flow and without physically available prototypes. Modelling of the used components and simulations of the power electronic systems including wireless power transfer are necessary. A further goal is the reduction of the size of power converters. EMI filters are a big part of the overall converter volume. By exact modelling of circuits and the usage of active filter methods, this volume can be reduced.
To lay the foundation for these goals, investigations in the complex scientific topics including verification & validation are executed in this cooperation. The application of this fundamental knowledge allows for the reduction of design time and design costs in later power converter designs.

USE LAB (SAL & UNIVERSITY OF KLAGENFURT)

Watch USE LAB video

The joint USE Lab of Silicon Austria Labs and the University of Klagenfurt tackles major research challenges in the domains of ubiquitous sensing, including its seamless integration in the environment, autonomous and networked data collection and information extraction as well as ease of usage, versatility, and dependability. In the process, numerous sensors communicate with each other in a network, whereby information about the entire system can be collected. Areas of application are monitoring the condition of buildings and plants or monitoring air quality with the help of gas sensors.

RFFE LAB (SAL & CUAS)

The RFFE Lab is a research collaboration between SAL and Carinthia University of Applied Sciences (CUAS).
One main target of the RFFE Lab is to significantly extend the frequency range required for 5G/6G communication and to investigate the implementation of RF-DAC principles for mmWave frequencies of up to 30GHz. A capacitive mmWave RF-DAC for 5G digital transmitter application has been realized on a test chip in 28nm CMOS technology and launched in June 2021.

Furthermore, high-speed serial link architectures are investigated, providing potential solutions for future data handling. Of special interest are full-duplex bi-directional data links, using a single channel for transmitting and receiving data. A prototype of a frequency-shaping approach of a voltage-mode transceiver was designed and a finite impulse response (FIR)-filter was implemented as an adaptive model of the line.

POWER HUB (SAL & FH JOANNEUM)

SAL and FH JOANNEUM connect their know-how in the joint „Silicon Austria Labs Power Hub“ at the campus in Kapfenberg.
The core of the cooperation is the development of innovative technologies for power electronics, which are used for the control, conversion, and switching of electrical energy with electronic components.
During the last year, the team succeeded in acquiring two new projects. Additionally, 3 researchers have joined SAL as part of the Power Hub.

SAL Doctoral College

The Silicon Austria Labs Doctoral College (SAL-DC) offers young researchers in the field of EBS a secure future in an excellent research network for EBS with regional, national, and international collaborations. As part of the SAL-DC training program and in addition to their studies in the area of EBS, students will have an opportunity to establish international connections and become future research leaders in an interdisciplinary and intersectoral environment.

Following our mission to "propel ideas to innovations with research excellence and economic impact", a PhD study program within SAL requires a combination of skills, intersectoral and interdisciplinary aspects. Therefore, SAL developed three main pillars:

- Each candidate must enroll in the PhD program offered by the local partner university of one of our SAL locations, depending on the chosen research topic and the corresponding supervising professor.
- Each candidate will be actively involved in knowledge exchange and collaborations among all the SAL-DC students, supported by SAL-DC summer and winter schools.
- Each candidate is encouraged to conduct short- to mid-term internships at academic or industrial partner organizations in order to develop their professional skills and network for future career prospects.

FATEMEH ABBASSI

SAL DC student and Junior Scientist at SAL Villach

By bringing together experts from academia and industry, SAL-DC offers a great opportunity to exchange knowledge and experience and to build a professional network.

EDI MUSKARDIN

SAL DC student and Junior Scientist at SAL Graz

Being a PhD student at SAL-DC enables a high degree of freedom in one's research, as well as expertise from both university and industry alike. Such collaboration fosters the development of academic work with the aim to solve real-world problems. Finally, SAL-DC connects its students in a healthy and supportive environment that leads to growth, both as a person and as a researcher.

CRISTIAN-IONUT TATU

SAL DC student and Junior Scientist at SAL Linz

The SAL-DC kick-off has been a great social experience, where I could meet other PhD students from Austria with different or similar professional backgrounds. It was a great opportunity for networking and finding out what other people are doing as research, with the possibility of finding a match for future collaborations.

SAL-DC KICK-OFF IN PÖRTSCHACH

The official kick-off event for the novel SAL-DC was held on October 5 and 6, 2021. 35 SAL-DC PhD students and supervisors joined the festive event in Pörtschach, Carinthia. In the course of the event, students exchanged information about their doctoral education and additionally worked together on a SAL-DC booklet, which should serve as an overview of the diverse research portfolio of the SAL-DC.

Locations

SAL BUILDING, GRAZ

Four floors on 3,300 m² will provide new offices for around 250 SAL employees in the future. The detailed planning of the SAL headquarters in Graz is done and the team started planning the interior design and brand communication in more detail. A special highlight of the building will be the Forum, where team meetings, science talks and other inspirational presentations are going to take place. The new premises are going to be handed over in February 2023. Builder: BIG www.big.at

HTC 2, VILLACH

In summer 2022, our employees in Villach are going to settle in our additional office and laboratory areas over two floors of the new HTC 2 building. The new premises are not only going to provide space for around 155 employees but also excellent research capabilities.

SCIENCE PARK 4, LINZ

In October 2021, SAL officially opened its new premises in Linz together with special guests such as Federal Minister Markus Achleitner as well as academic and industrial partners.

Throughout the 4th floor of the newly built Science Park 4, SAL Linz provides offices for more than 70 employees from the research divisions Embedded Systems and Intelligent Wireless Systems. Two laboratories and a Forum offer plenty of space for creativity and research.

ASSIC Success Stories

AUSTRIAN SMART SYSTEMS INTEGRATION RESEARCH CENTER

The focus of the research activities of ASSIC is on intelligent systems integration based on micro- and nanotechnologies. With its research activities, ASSIC offers well-founded systems knowledge about components, technologies, materials, assembly, and connection technologies.

Visit us online

WWW.ASSIC.EU

ASSIC Austrian Smart Systems Integration Research Center | operated by SAL

Bundesministerium Digitalisierung und Wirtschaftsstandort
Bundesministerium Klimaschutz, Umwelt, Energie, Mobilität, Innovation und Technologie
FFG Forschung wirkt.
LAND KÄRNTEN
Das Land Steiermark
KWF
SFG NEUES DENKEN. NEUES FÖRDERN.

Read more

METHOD FOR THE DETERMINATION OF THIN-FILM FRACTURE STRENGTH

Determining the fracture strength of thin films is particularly difficult because it is not possible to use classical mechanics approaches. In general, a material deposited in a thin film has different mechanical properties than the same material in bulk. In this project, researchers developed a method to determine the fracture strength of thin films by using notched double clamp bars (DCBs) exposed to thermally induced stresses.

Read more

ATR SENSOR FOR THE MEASUREMENT OF SUGAR AND OTHER MACRO-NUTRIENTS IN LIQUID FOODS

Chronic diseases such as diabetes, hypertension, or cardiovascular diseases are on the rise in our affluent societies. An important step towards limiting the risk of such health problems can be a sensor integrated into a kitchen appliance, such as a juicer or blender, that measures the sugar content of the prepared juice or smoothie. This can be used to accurately quantify the amount of sugar ingested. The sensor can also be used to determine the ripeness of the fruit used and whether the desired level of sweetness has been achieved in a drink or dish. It can also be a very valuable tool for people with special dietary needs. The goal of this project was to bring a highly sensitive sensor into a compact and robust package size to be able to be implemented in future kitchen appliances.

Certifications

ISO 9001:2015

To ensure compliance with all quality-related activities, SAL developed a quality management system which was certified according to DIN EN ISO 9001:2015 in October 2020 by TÜV Austria.

After last year's initial certification, the relevance and efficiency of the quality management system has been continuously developed and improved with further measures.

In the course of the annual surveillance audit by TÜV AUSTRIA CERT, we were able to confirm our ISO 9001:2015 certificate.

"With the ISO 9001:2015 certification, we are oriented towards the possibilities of continuous improvement in the processes and the entire organization. It is our goal to become better and better and to increase efficiency in all areas of the company."

JULIA BOCSKAY
Manager Quality Management & Board Administration

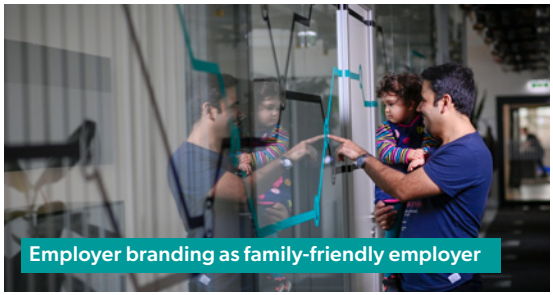
WORK & FAMILY

In the year 2020, SAL was recertified with the certificate „berufundfamilie“ (work and family). During this first year of the recertification, several measures have been implemented in accordance with the defined goals. The following list shows the achieved outcomes:


Home office access


Employee satisfaction


Compatibility of family and work


Employer branding as family-friendly employer


Fruit basket


Mental health

SAL in Numbers

Research

SAL conducts research in the areas of sensor systems, power electronics, intelligent wireless systems, and embedded systems. In these research fields, SAL conducts strategic and contract research and works on funding projects as well as on cooperative research projects with industrial and academic partners.

	2020	2021
Publications	122	**129**
…in peer-reviewed journals	41	**52**
…at peer-reviewed conferences	65	**71**
Number of newly filed patents	9	**1**
Number of newly granted patents	1	**1**

Research Projects	2020	2021
Number of COMET projects	37	32
Number of other funding projects	21	29
Number of cooperative projects	15	39
Number of active contract research projects	16	12
Number of strategic SAL research projects	25	31

Finances

SAL's operating performance in 2021 was EUR 32.2 million. Sales revenues from funding and industrial projects totaled EUR 12 million. The difference to the operating performance comprises other operating income and received shareholder subsidies.

	2020	2021
Operating performance	21.840	**32.174**
Revenues cooperative research	2.029	**4.263**
Revenues COMET research	4.836	**5.008**
Revenues other funded research	1.801	**1.849**
Revenues contract research	528	**864**
Capital assets	10.681	**17.452**
Investments	6.571	**9.449**

All figures in TEUR

Communications

In 2021, SAL was able to further develop its external presence. Subscriptions to our monthly newsletter, the number of followers on LinkedIn as well as the number of media reports have increased significantly. The SAL Sharepoint, the linchpin for internal communication, has also been expanded.

External Communication	2019	2020	2021
Media reports	140	383	**430**
LinkedIn followers	1.820	3.799	**5.621**
Newsletter subscribers	173	370	**445**

SAL SCIENCE & STORIES – OUR NEWSLETTER ABOUT SAL

Every month, we provide information about current projects, research results, and topics that are relevant to us in our SAL Science & Stories newsletter. To subscribe to our newsletter, please visit our website!

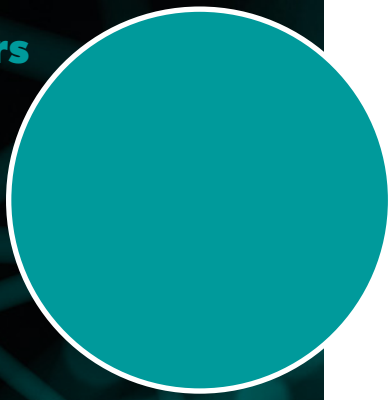
SILICON-AUSTRIA-LABS.COM/NEWSLETTER

Human Resources

In 2021, the number of employees at SAL has grown to 251. Around 90 % of employees hold academic titles, for instance, in physics, chemistry, computer science, electrical engineering, mechatronics or microsystems technology.

Employees	2019	2020	2021
Number of employees (heads)	110	180	**251**
Number of employees (FTE)	96,1	166,14	**233,79**
Number of researchers (heads)	77	138	**197**
Number of researchers (FTE)	70	128,33	**184,33**
Percentage of researchers (heads)	70 %	76,67 %	**78,49 %**
Percentage of women (heads)	37 %	26,67 %	**23,90 %**
Number of international employees (heads)	61	74	**125**

Shareholders



50,1 %
Republic of Austria

24,95 %
Fachverband für Elektro- & Elektronikindustrie (FEEI)

10 %
Steirische Wirtschaftsförderungs-gesellschaft mbh (SFG)

10 %
Federal State of Carinthia

4,95 %
Upper Austrian Research GmbH (UAR)

At a glance

COMPANY TYPE

Public-Private-Partnership
Limited Liability Company (GmbH/Ltd.)

Information as of December 2021.

SUPERVISORY BOARD

Mag. Ingolf Schädler
Chairman of the Supervisory Board

DI Dr. Klaus Bernhardt, MBA
Association of Austrian Electrical and Electronic Industries (FEEI)
Vice Chairman of the Supervisory Board

Mag. Christa Bock
Federal Ministry of Finance

Mag. Dr. Gudrun Bruckner
Chairwoman SAL Workers Council

Ing. Gerd Holzschlag
Steirische Wirtschaftsförderungsgesellschaft mbh (SFG)

Mag. Alexandra Ortner
SAL Workers Council

Andreas Primoschitz
SAL Workers Council

Mag. Ingrid Rabmer
Upper Austrian Research GmbH (UAR)

Dr. Lothar Ratschbacher
Deputy Chairman SAL Workers Council

Mag. Hans Schönegger
Delegate of the Province of Carinthia

Henriette Spyra, MA
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology

Prof. Martin Stutzmann
Technical University Munich

GENERAL ASSEMBLY

RgR Ferry Elsholz
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology

DI Dr. Wilfried Enzenhofer
Upper Austrian Research GmbH (UAR)

Mag. Christoph Ludwig
Steirische Wirtschaftsförderungsgesellschaft mbh (SFG)

Mag. Marion Mitsch
Association of Austrian Electrical and Electronic Industries (FEEI)

Mag. Arnold Sadjak
Office of the Provincial Government of Carinthia

PROGRAM ADVISORY BOARD

Mag. Michael Wiesmüller
Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology
Chairman of the Advisory Board

DI Dr. Klaus Bernhardt, MBA
Association of Austrian Electrical and Electronic Industries (FEEI)
Vice Chairman of the Program Advisory Board

Univ.-Prof. Ph.D. Roderick Bloem
Graz University of Technology, Institute of Microwave and Photonic Engineering

Univ.-Prof. DI Dr. techn. Wolfgang Bösch, MBA
Graz University of Technology, Institute of Microwave and Photonic Engineering

O. Univ.-Prof. DI Dr. Gerhard Friedrich
University of Klagenfurt, Member of the Senate, Dean

O. Univ.-Prof. DI Mag. Dr. Gertrude Kappel
Vienna University of Technology, Head of Research Group

Mag. Dr. rer. nat. Katharina Kern, MBA
Steirische Wirtschaftsförderungsgesellschaft mbh (SFG)

Dr. Rainer Minixhofer
ams AG

DI Dr. Michael Paulweber
AVL List GmbH

DI Dr. techn. Günter Ritzberger
Fronius International GmbH

DI Stefan Rohringer
Infineon Technologies Austria AG

Univ.-Prof. DI Dr. techn. Andreas Stelzer
Johannes Kepler University Linz, Institute for Communications Engineering and High Frequency Systems

DI Dr. techn. Hannes Voraberger
AT & S Austria Technologie & Systemtechnik AG

SCIENTIFIC ADVISORY BOARD

Univ. Prof. Dr. techn. Andreas Kugi
Vienna University of Technology
Chairman of the Scientific Board

Prof. Dr. Clivia Sotomayor Torres
ICREA Barcelona, Catalan Institute of Nanoscience
Deputy Chairwoman of the Scientific Board

Prof. Dr. Hermann Eul
Independent Board Member & Investor

Univ.-Prof. Dr. techn. Johann Walter Kolar
ETH Zurich

Em. O. Univ.-Prof. Dr. phil. Dr. h.c. Hermann Kopetz
TTTech Computertechnik AG, Vienna University of Technology

Univ. Prof. Dr. Willy Sansen
Katholieke Universiteit Leuven/Belgium

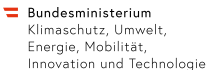
IMPRINT

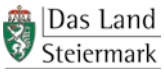
Media owner, editor, publisher
Silicon Austria Labs GmbH
Inffeldgasse 33, 8010 Graz
contact@silicon-austria.com
www.silicon-austria-labs.com

Responsible for the content
Silicon Austria Labs GmbH

Concept and Design
Rubikon Werbeagentur GmbH

Pictures
Helge Bauer, Carolin Bohn, Jürgen Brunner, Markus Schneeberger, Oliver Wolf, Cajetan Perwein, Gernot Gleiss, Steve Haider, Ian Ehm, Land OÖ, Architektur ZT, everySIZE, Caramel Architekten ZT GmbH, HTCV|Gobli, Adobe Stock






SAL
SILICON AUSTRIA LABS
silicon-austria-labs.com
Headquarters Graz
Campus TU Graz
Inffeldgasse 33
8010 Graz, Austria
contact@silicon-austria.com
Villach
High Tech Campus Villach
Europastraße 12
9524 Villach, Austria
Linz
JKU Science Park
Altenberger Straße 66c
4040 Linz, Austria