Intelligent Wireless Systems

### *Wireless communication and sensing for future products.*

Wireless systems are an essential part of Industry 4.0. New functions in 5G/6G networks and the use of edge computing in combination with wireless sensors are gradually improving the industry of the future and also the way systems are built and IT services are delivered. The 6th generation of wireless communications - 6G for short - enables the transmission of large amounts of data in real time while offering high reliability. This key technology thus plays an important role for wireless "machine-to-machine" communication, in radar systems but also in medical technology and materials testing. At SAL in Linz and Villach, our teams of experts are already conducting intensive research on 6G - the focus includes the targeted use of artificial intelligence with AI chips and algorithms to reduce the complexity, costs and energy consumption of future applications.

"Wireless systems installed in buildings, machines or vehicles will continue to grow strongly. Therefore, it is necessary to further develop intelligent wireless technologies to pave the way to a wireless future."

Thomas Buchegger, Head of Division Intelligent Wireless Systems

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Our Service Portfolio:
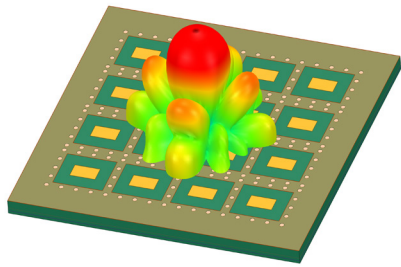
Design & Simulation

» VLSI IC Design: chip level development of digital and analog/RF integrated circuits

» Machine intelligence development for data and signal processing, sorting, analysis and labeling. Analysis of problems, network topology exploration, anomaly detection

» Wireless standards research & development of application protocols, TSN integration and positioning

» HW-platform integration: application integration of ICs and subsystems, platform architecture and feasibility analysis, PCB-level design, impairments optimization, FW development

SOFTWARE - licenses and experts available:

- Ansys
- Keysight
- Matlab
- Altium Designer
- Cadence
- Mentor
- Synopsys

Measurement, Characterization & Testing

» mmW device characterization

» Neural network and machine intelligence deployment: Real time HW and SW solutions for applying machine learning where adequate

» Wireless standards infrastructure services for experimental performance evaluation and configuration optimization (real life conditions)

» Wireless standards training & support services from theoretical aspects to roll out and deployment challenges

Key Equipment

» VLSI IC design flow: Full access to EDA tools

» 300mm Wafer Prober
  o Automated thermal chuck -60°C to +300°C
  o 4 RF Positioners, 10 DC Micropositioners
  o Vibration isolated
  o 12x Digital Microscope
  o Laser Cutter

» 6 GHz bandwidths Oscilloscope with 4 Channel DC – 6 GHz, 20 Gsamples/sec., DSP and digital cursor control

» Spectrum Analyzer with 5GHz analysis bandwiths

» Highest frequency signal generators and network analyzers

» 5G/6G Testbed
  o Fraunhofer FOKUS Core network
    - Software based Core functionalities
    - 3GPP Release 15 and 16
    - Integration with 5G NR SA, non-3GPP
    - Benchmarking and experimentation
    - Support for slice selection
  o Radio area network (RAN) HW
    - Baseband unit and radio heads
    - Designed for indoor campus network
    - Operable for 5G sub-6 frequency
    - Baseband unit and remote radio units
    - GPS for network synchronization
  o Open Air Interface (OAI) with 5G core and RAN (USRP Implementation) developed towards Open RAN specifications
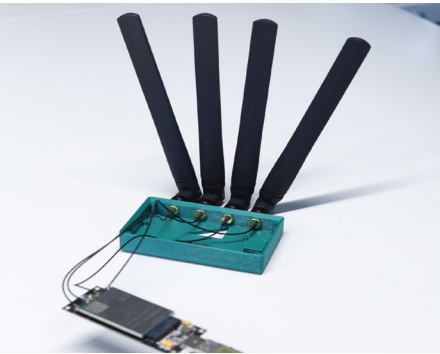
ABOUT SAL

Silicon Austria Labs (SAL) is a top European research center for Electronics and Software Based Systems (ESBS). The application-oriented center offers cooperative research & services at three locations – Graz, Linz and Villach – in the pioneering research areas of Sensor Systems, Microsystems, Intelligent Wireless Systems, Power Electronics and Embedded Systems.

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