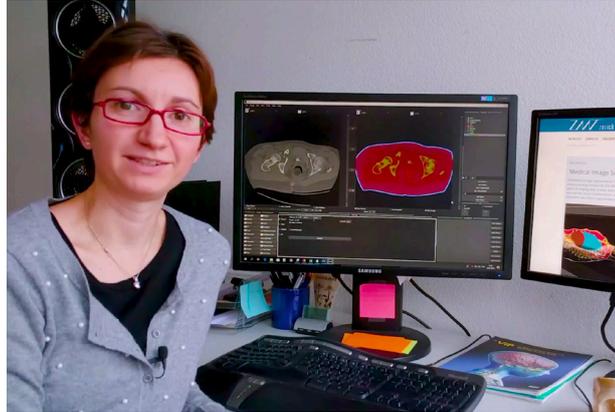


Dear Z43 Partners, Friends, and Followers

The first quarter of 2019 was a busy time for us at Z43! We released an open-source version of iSEG, extended our MRIxViP library, and introduced new tools and procedures for certification of the first devices that operate in 5G networks soon to be rolled out. Read more about these exciting developments below! And don't forget: more detailed information is available on our websites, including announcements about job opportunities and upcoming training workshops.

VIRTUAL POPULATION

IT'IS and ZMT Release Open Source iSEG

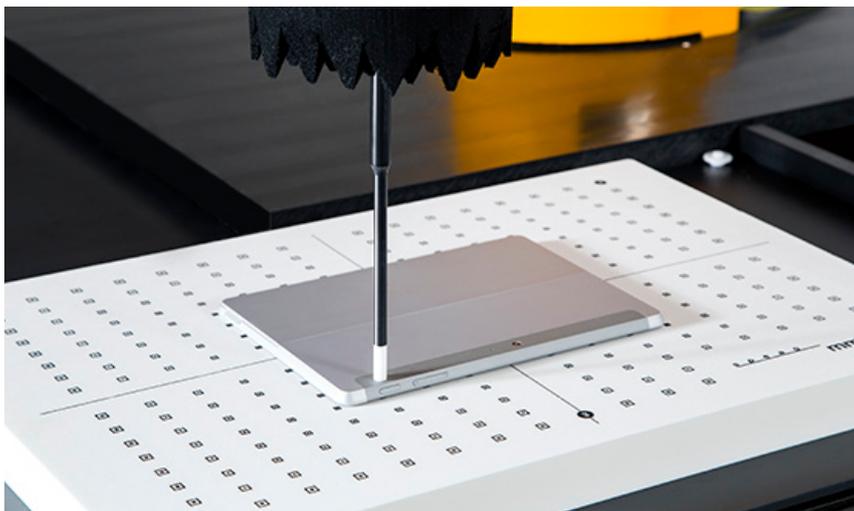


The Medical Image Segmentation Tool Set iSEG, originally developed for the creation of computational anatomical phantoms such as our widely used Virtual Population (ViP), is now open source! Compared to alternative software, iSEG is able to handle enormous 3D image datasets and manage large numbers of different tissues or complex tissue hierarchies, making it the ideal tool-

box for efficient, fast, and flexible generation of anatomical phantoms from various types of imaging data. iSEG is released under the very permissive MIT license on GitHub, which enables users to create their own extensions. To encourage a growing community of researchers and developers to use and extend iSEG for their individual projects, we implemented an easy-to-use plugin mechanism to allow the addition of new algorithms by means of simple user interfaces without having to modify the iSEG core. Instructions and tutorials for first-time users are available on our [GitHub](#) page.

MEASUREMENT

cDASY6 Module mmWave V1.6 and mmWAVE Phantom

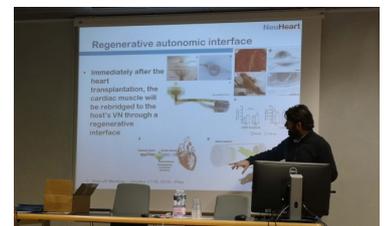


SPEAG released cDASY6 Module mmWave V1.6 in response to the needs expressed by our users for simplified and generalized power density (PD) assessments. Version 1.6 includes an improved graphical user interface and report generator, more flexible grid settings, faster post-processing, and a new much faster "Generic Scan" that provides accurate PD values for valid far-field approximations. The mmWAVE phantom includes absorbers and is suited to evaluate not only the antenna side of devices but now all six faces. This release is considered an intermediate solution that heralds the next big step in compliance testing with V2.0 to be released at the beginning of June.

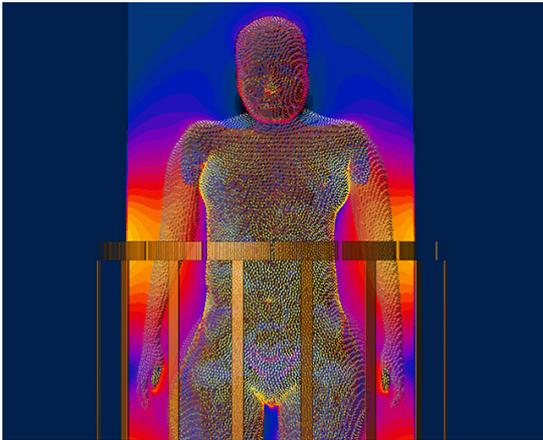
RESEARCH

Kick-Off of FET-PROACTIVE Project NeuHeart

On January 17–18, the consortium of the newly approved European FET-PROACTIVE project "NeuHeart" convened in Pisa for the kick-off event. IT'IS is part of this exciting four-year endeavor with the aim to restore the ability in transplant patients to adapt to the performance-related blood-flow demand of the organism (e.g., when climbing stairs), which is largely lost due to the denervation associated with the transplantation process. To this end, a novel electroceutical implant that re-establishes vagal innervation of the heart and administers targeted neuromodulation to adapt the heart function based on information from novel implantable sensors about real-time cardiovascular performance and requirements will be developed. Ongoing SPARC activities at IT'IS on modeling of heart physiology and the σ^2 SPARC platform for online modelling in bioelectric medicine will directly benefit NeuHeart.



VIRTUAL POPULATION



Release of MRIxViP V2.0 with Improved Patient Coverage

Our MRIxViP library, so far consisting of eight anatomical ViP models, has been expanded with the Korean female phantom Yoon-sun and three morphed models – a slimmer Fats (BMI 29, down from 36) and two heavier Ellas (BMI 26 and 30, up from 22) – to extend population coverage. We have also updated the exposure data for the updated Fats V3.2. MRIxViP V2.0 is even more representative of exposure in patients undergoing a magnetic resonance imaging exam. In combination with IMAnalytics, the extended library facilitates the standardized, effective, and comprehensive evaluation of potential risks from exposure, e.g., in patients with active or passive implants. Get more information at customized@itis.swiss!

MEASUREMENT

FCC Response for Sub-6GHz Testing

This quarter, SPEAG sought guidance from regulators for testing devices designed for operating in the 5G New Radio (NR) non-standalone (NSA) networks. These devices will operate at 5G frequencies for enhanced data throughput but will depend on existing 4G infrastructure for establishment and control of calls. That scenario is valid for 5G NR in both the sub-6-GHz (Frequency Range 1) and mmWave (Frequency Range 2) bands. The simultaneous use of 4G and 5G frequencies leads to an increased number of possible test configurations, resulting in longer time-to-market due to extended compliance testing. SPEAG has worked on procedures that allow the 4G and 5G infrastructures to be combined in post-processing instead of in direct measurements of all possible combinations (download the [application note](#)). The FCC has confirmed through the KDB system that this method is acceptable.



CONFERENCE

TC106 and IEEE ICES TC34 Standards Meetings

Z43 members participated at the TC106 and IEEE ICES TC34 Standards Meetings in Frankfurt and New Jersey in March. The IEC/IEEE 62209-1528 standard, which now includes procedures and requirements for accurate specific absorption rate (SAR) measurement of devices that incorporate several new technologies (4 MHz to 10 GHz), is now at the “Final Draft International Standard” (FDIS) stage at IEC. The introduction of application-specific phantoms allows testing of a wider range of devices, e.g., fitness trackers, head-mounted displays, and any potential Internet-of-Things (IoT) devices. Test reduction methods and protocols for fast SAR systems have been expanded to reduce test time without sacrificing confidence in the results. Two important standards for exposure assessment of 5G mmWave devices, IEC/IEEE 63195 (measurement techniques) and IEC/IEEE 62704-5 (computational electromagnetic (EM) methods), also made progress. These standards will be critical for the fast deployment of 5G devices worldwide and are expected to become published standards in the first quarter of 2021. The group continued to work on the IEEE Guide 1528.7 for EM exposure of IoT devices that will be completed in June.

SOCIAL EVENT

Great Response from Our Customers at MWC19 and Automotive World 2019



SPEAG presented its new 5G design and exposure assessment tools at two important trade shows, the Automotive World Conference in Tokyo in January and the Mobile World Congress in Barcelona in February. At the booths, international customers had the opportunity to directly meet with our experts face-to-face, to provide feedback, discuss their needs, and to develop new projects and collaborations.

RESEARCH

PUBLICATIONS

Advances in Computational Human Phantoms and Their Applications in Biomedical Engineering – A Topical Review

Wolfgang Kainz et al. 2019, IEEE Transactions on Radiation and Plasma Medical Sciences, 3(1), 1–23 (online 03 December 2018)

A Numerical Assessment of the Human Body Effect in the Transmission of Wireless Microphones

EuEugenia Cabot et al., 2019, Microwave and Optical Technology Letters, 61(3), 809–817 (online 05 December 2018)

Theoretical Evaluation of the Power Transmitted to the Body as a Function of Angle of Incidence and Polarization at Frequencies >6GHz and Its Relevance for Standardization

Theodoros Samaras and Niels Kuster, 2019, Bioelectromagnetics, 40(2), 136–139 (online 25 January 2019)

Novel ETV6-RUNX1 Mouse Model to Study the Role of ELF-MF in Childhood B-Acute Lymphoblastic Leukemia: A Pilot Study

Elena Campos-Sanchez et al. 2019, Bioelectromagnetics, accepted for publication