UNIVERSITÄT LEIPZIG

Medizinische Fakultät

iccas

ICCAS ANNUAL REPORT 2023

#Medical_Technologies_Made_Smart

IMPRINT

EDITOR
Leipzig University
Faculty of Medicine
Innovation Center Computer Assisted Surgery (ICCAS)

Semmelweisstraße 14
04103 Leipzig
Germany
E-Mail: info@iccas.de
Web: www.iccas.de

EXECUTIVE DIRECTOR
Prof. Dr. Andreas Melzer

CONCEPT & LAYOUT
Diana Pretzsch
Christoph Zeumer

COVER
©ICCAS MATTHIAS BRANDT

PHOTOS
©ICCAS I Innovation Center Computer Assisted Surgery
©ICCAS I Swen Reichhold
©ICCAS I punctum Fotografie, Stefan Hoyer
©Universitätsklinikum Leipzig (UKL)
©Eva-Maria Stegemann | SMWK
©SMWK | Ben Gierig
©Hamlyn Symposum on Medical Robotics
©RAES-ESS Internati onal Joint Meeti ng
©Dr. Braun | DLR
©Coppelia Robotics AG | htt ps://www.coppeliaroboti cs.com/
©AdobeStock-180336928 | mast3r
©AdobeStock-271083383 | Kiryl Lis
©Frank Lochau | rotkopf.eu fotografi e

GRAPHIC ARTS
Simon Rosenow
Christoph Zeumer
Diana Pretzsch

Leipzig, April 2024

CONTENTS

#PREFACE

Dear friends, dear colleagues,

2023 was a dynamic year for the Innovation Center for Computer Assisted Surgery (ICCAS) as we continued to make progress in medical research and technology despite global challenges. We would like to take this opportunity to present the outstanding events of the year in a coherent overview in this annual report.

One outstanding event was the launch of the 6G Health project, Europe's first project to integrate 6G technology into medical technology. ICCAS, in its role as deputy consortium leader alongside Vodafone, plays a central role in connecting different fields such as medicine and telecommunications technology, as well as overcoming specific challenges in standardization and approval processes of medical applications.

2023 also marked the launch of further projects: 5G-COMPASS, 5G Pacemaker, VOLTA, RescEU EMT, MIRACLE-5 and CERTAINTY, which underline our ongoing efforts to improve medical care through advanced technologies.

At the same time, our scientists were able to present their latest research findings at the ISTU-EUFUS in Lyon, which is one of the largest events in the field of therapeutic ultrasound and was co-organized by Andreas Melzer. In addition, the „ambulance of the future" was presented to an international audience of experts at DMEA 2023, where numerous questions about the concept and implementation were explained by the employees. In addition, our activities at Dev XChange and the ISTU-EUFUS meeting in April demonstrated our expertise in the secure networking of medical devices and ultrasound technology.

As a founding member of VDE Connected Health, an interdisciplinary initiative of the professional associations VDE DGBMT, VDE ITG and the BMBF 6G platform, ICCAS is making a significant contribution to accelerating the development and implementation of telecommunications technologies in the healthcare sector.

The annual conference of the International Society for Medical Innovation and Technology (iSMIT) in October provided a platform for discussing the latest innovations in the fields of minimally invasive therapies, AI, robotics and image-guided surgery. ICCAS researched the development of new FUS devices and applications with KUKA robotic arms and device integration in the OR.

We received special recognition through our participation in the Regions4PerMed - Best Practice competition in March, in which our participation was recognized with two awards. Our scientists were also successful with their contribution „MERODES“ at the Hamlyn Robotics Symposium in June and won the Best Design Award for the ICCAS.

The presentations at the Open Government Quarter Day on the grounds of the SMWK in Dresden and to the head of the Dresden State Chancellery in June were further recognition of our research work and our contribution to medical innovation in Leipzig as a university location.

Our thanks go to all our employees, partners and supporters for their tireless work and commitment in 2023. Their contribution is crucial to our success and our ability to positively influence the future of medicine.

We wish all readers of this annual report many interesting insights into the activities of ICCAS.

With best regards,

Prof. Dr. Andreas Melzer

Prof. Dr. Thomas Neumuth

#FOREWORD BY THE DEAN

Ladies and Gentlemen,

As an institution that combines computer science, engineering and medicine, the Innovation Center for Computer Assisted Surgery (ICCAS) plays a key role in shaping the location of Leipzig University Medicine and the profile of the Faculty of Medicine. Due to its outstanding contributions and advanced developments, it stands for excellence in research and application, underlining its role as a driving force for innovation within our faculty.

As a research and development partner, ICCAS offers advanced technological solutions and scientific findings that enable direct integration into clinical practice. This symbiosis of research and practical application not only contributes to a qualitative improvement in patient care, but also increases the efficiency and safety of medical procedures. Through intensive cooperation with various specialist disciplines and clinics, ICCAS promotes an indispensable interdisciplinary approach, which is crucial for the development and introduction of new medical solutions. The research work of ICCAS makes a significant contribution to sharpening and further developing the research profile of Leipzig University Medicine.

In addition, ICCAS plays an important role in the education and training of the next generation of physicians and researchers through the organization of workshops, seminars and its active participation in international conferences. These educational initiatives are fundamental to the dissemination of expertise and the promotion of innovation within

the medical community. The recognition that ICCAS receives at conferences is not only a testament to the high quality of its work, but also highlights its contribution to strengthening the reputation of our faculty and Leipzig as a center of medical innovation.

I would like to express my gratitude to each and every individual who has contributed to this outstanding success through their unwavering dedication, personal commitment and urge for research. This includes our scientific partners as well as players from politics and industry. I look forward to the future and hope that ICCAS will be involved in many new research initiatives, all aimed at improving the well-being of patients.

Sincerely,

Prof. Dr. med. Ingo Bechmann
Dean of the Medical Faculty

#TIMELINE

2023

- Start of the 6G-Health-Project, the first Europe-wide project to integrate 6G technology into medical technology
- Thomas Neumuth and his team presented the ICCAS research results on the medicine of the future to Minister of State Sebastian Gemkow
- Andreas Melzer was co-organizer of the second joint meeting ISTU- EUFUS 2023
- Presentation and discussions with Minister of State Oliver Schenk on the developments at ICCAS as a representative of Leipzig as a research location and on the design and further development of the life sciences location
- ICCAS won the „Best Design Award“ at the Hamlyn Robotics Symposium for its contribution „MERODES“
- Launch of the 5G-COMPASS, 5G Pacemaker, VOLTA, RescEU EMT, MIRACLE-5 and CERTAINTY projects

2022

- ISO 13485 recertification for ICCAS has been extended
- ICCAS developed a blue print of a future ambulance with 5G
- ICCAS took part at the BMT 2022 with many program contributions
- ICCAS members participated the 13th International MRI Symposium and held a network meeting for their partners
- More than €13 million in new project volume raised by ICCAS in 2022
- Launch of Projects 3MPFUS, 6G-Health, KliNet5G, MediNet, Tri5G, VISION-CRE, CortexMap, SDC-VAS

2021

- ICCAS is founding member of the first center for robot-assisted and navigated surgery in Saxony
- Minister of State Petra Köpping and now Member of the Bundestag Holger Mann visit ICCAS
- Center for Medicine Innovation (CMI) selected to move to the next phase in the ideas competition „Wissen schafft Perspektiven für die Region“
- ICCAS involved within the framework for the establishment of the Comprehensive Cancer Center (CCC) for Central Germany
- Launch of projects EyeHearU, SCD Controlstation MED, MMMP FUS

VDE DGBMT
BMT 2020
29.09. – 01.10.2020 | Leipzig
54TH DGBMT ANNUAL CONFERENCE
ON BIOMEDICAL ENGINEERING

2020

- 15th anniversary of ICCAS – Greetings and video message by Saxon Minister for Science Sebastian Gemkow
- Institute at the Faculty of Medicine at Leipzig University
- BMT in Leipzig – Opening by Federal Minister of Health Jens Spahn
- New Research Group Biomedical Data Analysis with project Post-Stroke (Prof. Galina Ivanova)
- Avatera Cooperation: Instrument Positioning
- Launch of projects VITALS, KAIT, MSI-Endoscopy, HSI-Laparoscopy, AIQNET, SORLIC, AutoCuff, Brainsaver

2019

- ICCAS organizes the ‘FutureMedTechnologies‘ doctoral workshop and transfer meeting
- Habilitation of Dr. Claire Chalopin
- OR.Net e.V. presents the SDC-Standard at DMEA 2019
- 6th Digital Operating Room Summer School successfully performed
- ICCAS conducts a public discussion on AI in Medicine in the framework of the BMBF’s Year of Science
- Launch of projects MR-Stents, MR Thrombosis, MOMENTUM, MPM and ProDial

2018

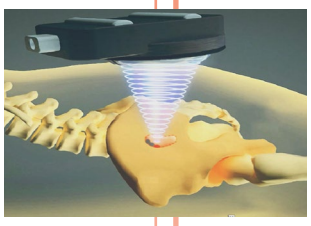
- ICCAS welcomes Saxony's Prime Minister Michael Kretschmer
- 5th DORS inspired international participants
- ICCAS takes part at the Surgical Robot Challenge of the Hamlyn Symposium in London
- ICCAS hosts Steering Committee Meeting of the EUMFH project
- ICCAS invites to the 17th Annual Conference of the CURAC-Society
- Launch of projects ENSEMBLE, COMPASS and LYSiS
- EU Commissioner for Humanitarian Aid & Crisis Management Christos Stylianides visits ICCAS

2017

- ICCAS meets Federal Chancellor Angela Merkel at Digital Summit 2017
- 4th DORS consolidates its unique feature
- EUFUS 2017 & Preconference Workshop Experimental FUS and HIFU take place in Leipzig
- Successful non-invasive treatments with HIFU at Leipzig University Hospital
- PROJECT AREA Life Support Systems with projects IMPACT and EMU launches
- Start of projects European Modular Field Hospital (EUMFH), PA-PA-ARTIS and MoVE

2016

- Final presentation of the flagship project OR.Net
- ICCAS receives ISO 13485 certification
- Federal health minister visits ICCAS
- 3rd DORS
- Project start of Meta-ZIK SONO-RAY



2015

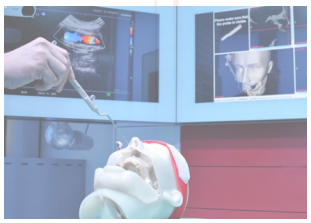
- Launching of cooperation with several scientific and clinical institutions
- 10th anniversary of ICCAS with 2nd DORS and ICCAS International Symposium
- Project OR.Net: Presentation of results in the complete demonstrator
- NEW RESEARCH AREAS: Noninvasive Image Guided Interventions (Prof. Andreas Melzer), Multimodal Intraoperative Imaging (Dr. Claire Chalopin)
- Clinical Advisory Board founded

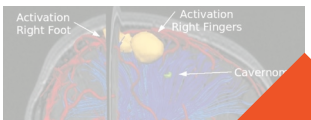
2014

- Prof. Andreas Melzer joins ICCAS as Director as well as Professor of Computer Assisted Surgery
- IT Innovation Award for ‚oncoflow'
- First Digital Operating Room Summer School – DORS 2014

2013

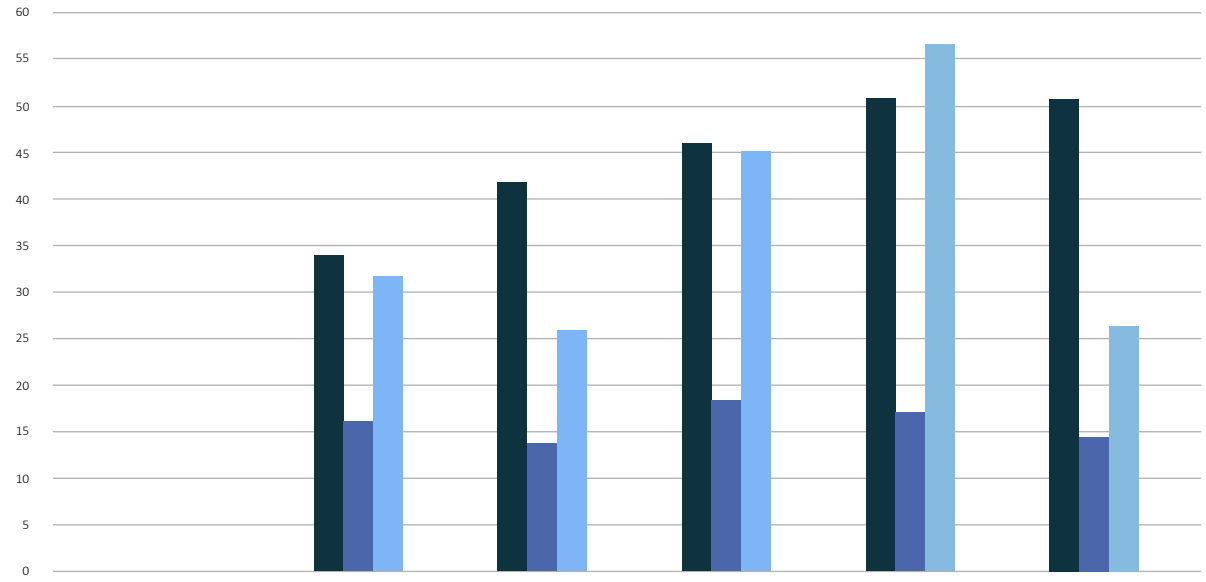
- TPU including ‚oncoflow' launched at Leipzig University Hospital
- PascAL (Patient Simulation Models for Surgical Training and Teaching) – research project by Leipzig University and HTWK Leipzig
- ICCAS plays a key role in the national BMBF research project 'OR. Net – Safe and Dynamic Networks in the Operating Room'
- Honorary Professorship of Biomedical Information Systems at the HTWK Leipzig: Thomas Neumuth
- Project 'HWS – Structural Defect Classification and Modeling of the Cervical Spine' in cooperation with the Institute of Anatomy (Leipzig University) and the Fraunhofer IWU, Dresden
- Researcher exchange programs with University of Southern California, ARTORG Center for Biomedical Engineering Research (University of Bern) and Fraunhofer MEVIS in Bremen





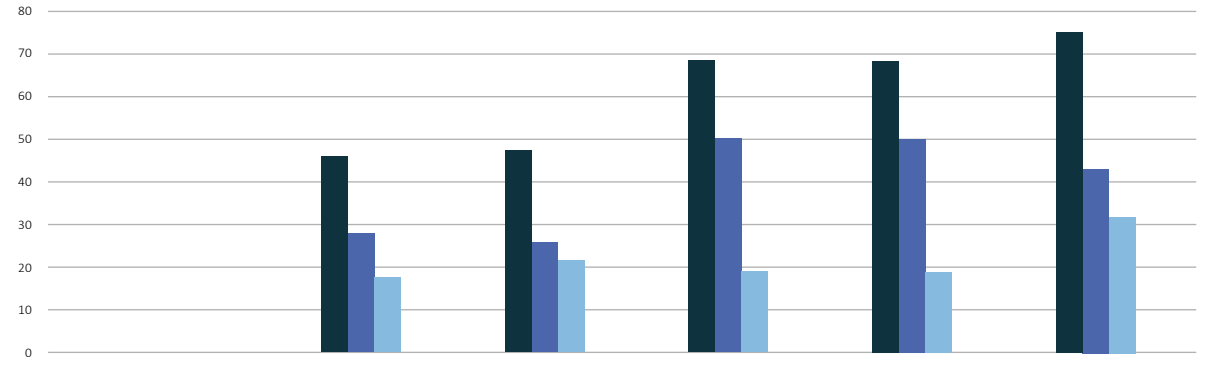
#FACT AND FIGURES

HEADCOUNT



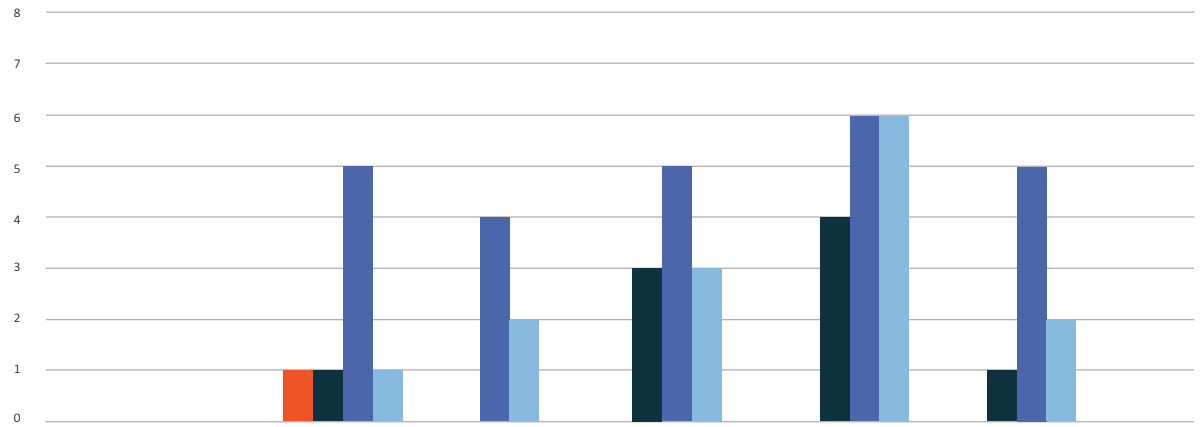
	2019	2020	2021	2022	2023
Research Associates	34	42	46	51	51
Research Assistents	16	14	18	17	14
Guest + Graduates	32	26	45	57	27

PUBLICATIONS



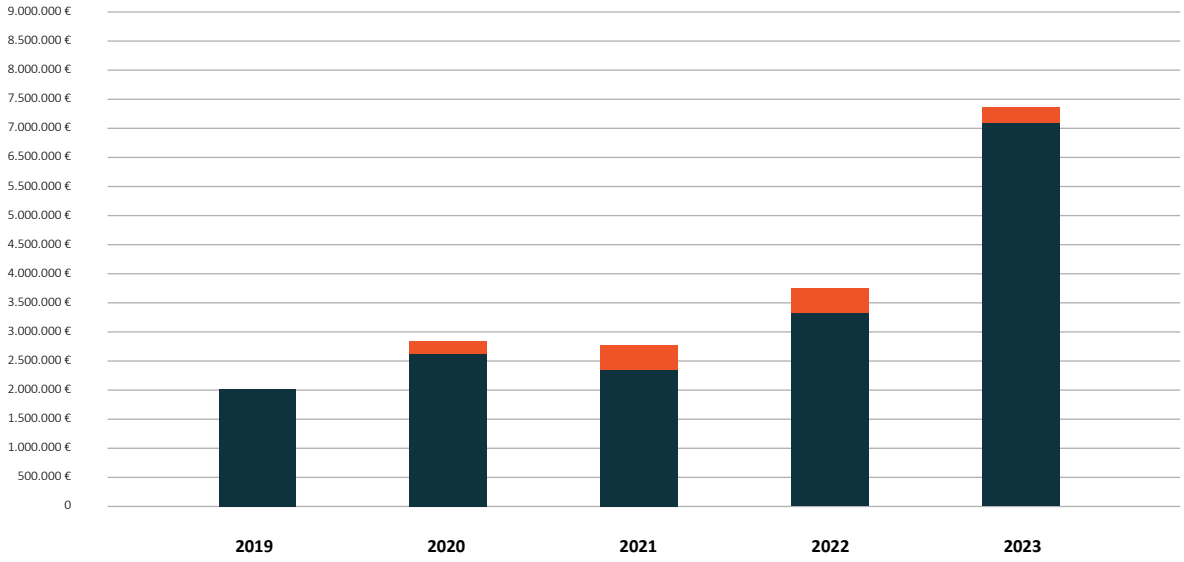
	2019	2020	2021	2022	2023
Total	46	47	69	69	75
Journal Publications	28	26	50	50	43
Conference Proceedings & Book Chapters	18	21	19	19	32

GRADUATIONS



	2019	2020	2021	2022	2023
Habilitation	1	0	0	0	0
Doctoral theses	1	0	3	4	1
Master theses	5	4	5	6	5
Bachelor theses	1	2	3	6	2

FUNDING



6,35 ICCAS' main funding is provided by the BMBF- Federal Ministry of Education and Research. Furthermore, ICCAS receives funding from the BMWi- Federal Ministry for Economic Affairs and Energy for projects related to the ZIM Central Innovation Program for small and medium-sized enterprises. Leipzig University's Faculty of Medicine provides ICCAS with performance-based funding.
Amount of ICCAS industry-funded project output.

#COOPERATIONS

United States of America
Stanford Medical School
Health Tree Foundation
MR Instruments Inc.
Harvard Medical School (HMS), Brigham and Women's Hospital
Memorial Sloan Kettering Cancer Center (MSKCC)
John Hopkins University
FUS Foundation
Children's National Medical Center (CNMC)
University of Guanajuato, Faculty of Electrical Engineering

United Kingdom
University of Dundee, Institute for Medical Science and Technology (IMSaT)
Imperial College, Hamlyn Center
Kings College London

Norway
Norwegian University of Science and Technology, Department of Imaging and SINTEF Medical Tech.

Denmark
Welfare Tech Odense
Danish Emergency Management Agency DEMA

Netherlands
European Society for Blood and Marrow Transplantation (EBMT)
Universitair Medisch Centrum (UMC) Utrecht
Delft University of Technology, Faculty of Mechanical, Maritime and Materials Engineering,
Department of BioMechanical Engineering
European Burns Association

Belgium
ReGEDiM: Research Group on Emergency and Disaster Medicine, Vrije Universiteit
Research Group on Emergency and Disaster Medicine
Belgian First Aid and Support (B-FAST)
Health Food Chain Safety Enviroment
Myeloma Patients Europe AISBL
University of Namur

France
French DG for Civil Protection and Crisis Management
Institut Curie
Theraclion S.A.
Lyonbiopôle- Cluster Auvergne-Rhône-Alpes
Image Guided Therapy (IGT)
IRCAD – France-Research Institute against Digestive Cancer

Luxembourg
Information Technology for Translational Medicine

Switzerland
Roche Pharma AG
Swiss Federal Institute of Technology Zurich (ETH), Computer Vision Laboratory
Health Tech Cluster Switzerland
Inselspital, Bern University Hospital, Department of Ear, Nose and Throat Diseases (ENT),
Head and Neck Surgery

Italy
Universität Trient, Department of Information Engineering and Computer Science
EMT 2 Hospital Regione Piemonte
University of Turin, Department of Surgical Sciences
La Sapienza University
Sant'Anna – School of Advanced Studies, The BioRobotics Institute
Italian Civil Protection Authority

Spain
Hospital Universitario Fundación Jiménez Díaz
EMT, Instituto Nacional de Emergência Médica

#COOPERATIONS

Poland
Wroclaw Medizinische Universität

Czech Republic
Masaryk University

Austria
MEDIFINA GmbH
HeartBalance GmbH
Medical University of Graz, Institute for Medical Informatics, Statistics and Documentation (IMI)

Slovakia
ASSR- Association of Samaritans of the Slovak Republic

Estonia
Estonian Health Board

Romania
Ministry of the Interior
Romanian Association for Endoscopic Surgery and other Interventional Techniques - ARCE
Medis Foundation

Israel
INSIGHTEC Ltd.
The Chaim Sheba Medical Center at Tel HaShomer

Agypt
Menoufia University, Department of Computer Science and Engineering

Congo
Higher Institute of Applied Technology of Kinshasa (ISTA)

China
Chongqing University of Technology (CQUT)
MeDrea Medical Science & Technology Ltd.
Institute for Medical Instrumentation, Shanghai University

Taiwan
IRCAD Lukang

South Korea
National Cancer Center Graduate School of Cancer Science and Policy (NCC-GCSP)

#COOPERATIONS

NOTARZTDIENSTE.DE GmbH
ZBW- Leibniz Information Center for Economics
Draeger AG & Co. KGaA
UniTransferKlinik Lübeck GmbH
University of Lübeck, Institute for Software Engineering and Programming Languages (ISP)
University of Lübeck, Center for Open Innovation in Connected Health
Hamburger Informatik Technologie-Center e.V. (HITeC)
WEINMANN Emergency Medical Technology GmbH + Co. KG
Fraunhofer Institute for Digital Medicine (MEVIS)
OFFIS – Institut für Informatik e.V.
Osnabrück University of Applied Sciences
steute Technologies GmbH & Co. KG
German National Library of Science and Technology (TIB), Leibniz Information Center for Science and Technology
Leibniz University of Hannover
Stiftung Deutsche Schlaganfall-Hilfe
MR:comp GmbH
MRI-STaR- Magnetic Resonance Institute for Safety, Technology and Research
VISUS Health IT GmbH University Hospital Knappschaftskrankenhaus Bochum GmbH, Clinic for Anesthesiology, Intensive Care Medicine and Pain Therapy
MotionMiners GmbH
University Medical Center Göttingen, Clinic for Cardiology and Pneumology
Vodafone Group Services GmbH (VOD)
Bio River e.V.
Janssen Cilag GmbH
Nuromedia GmbH
Singleron Biotechnologies GmbH
ZB MED – Information Centre for Life Sciences
University of Cologne
SurgiTAIX AG
Ilara GmbH
Synagon GmbH
Rheinisch-Westfälische Technische Hochschule Aachen (RWTH)
Helmholtz Institute for Biomedical Engineering, Faculty of Mechanical Engineering, Chair of Medical Technology (mediTEC)
qcmed – Quality Consulting Medical GmbH
LOCALITE GmbH
Fraunhofer Institute for Intelligent Analysis and Information Systems (IAIS)
Telekom Healthcare Solutions GmbH
Fritz Stephan GmbH
tetronik GmbH

IQVIA Commercial GmbH & Co. OHG
University Hospital Frankfurt, Center of Radiolo
Association of Electrical, Electronic and Informa
KfH Kuratorium für Dialyse und Nierentransplan
SIGNUS Medizintechnik GmbH
University Hospital Würzburg
Leibniz Institute for the Social Sciences (GESIS)
Heidelberg University Hospital, Ear, Nose and T
Heidelberg University Hospital, Radiology Clinic
Mediri GmbH
ERNW Research GmbH
Inova DE GmbH
Deutsches Forschungszentrum für Künstliche In
Fraunhofer Institute for Biomedical Engineering
CTC advanced GmbH
HWI pharma services GmbH
Leibniz Institute for Information Infrastructure
HS Analysis GmbH
WIBU Systems A.G.
ADMEDES GmbH
BioRegio STERN GmbH
Technologie-Transfer-Initiative GmbH
Fraunhofer Institute for Manufacturing Enginee
TZM GmbH
GADV – Gesellschaft für Automatisierung mit D
University of Tübingen, Ethics Committee at the
HPZenner Clinical Evaluation GmbH & Co. KG
EPflex Feinwerktechnik GmbH
inomed Medizintechnik GmbH
Schölly Fiberoptic GmbH
TriNetX Oncology GmbH
METRAX GmbH, PRIMEDIC
C.R.S. ii Motion GmbH
MEDAGENT GmbH & Co. KG
KARL STORZ SE & Co. KG
KLS Martin Group – Gebrüder Martin GmbH &
HEBUmedical GmbH
Aesculap AG
MedicalMountains GmbH
BioLago e.V. Konstanz

ogy
ation Technologies (VDE)
ntation e.V

hroat Clinic
:

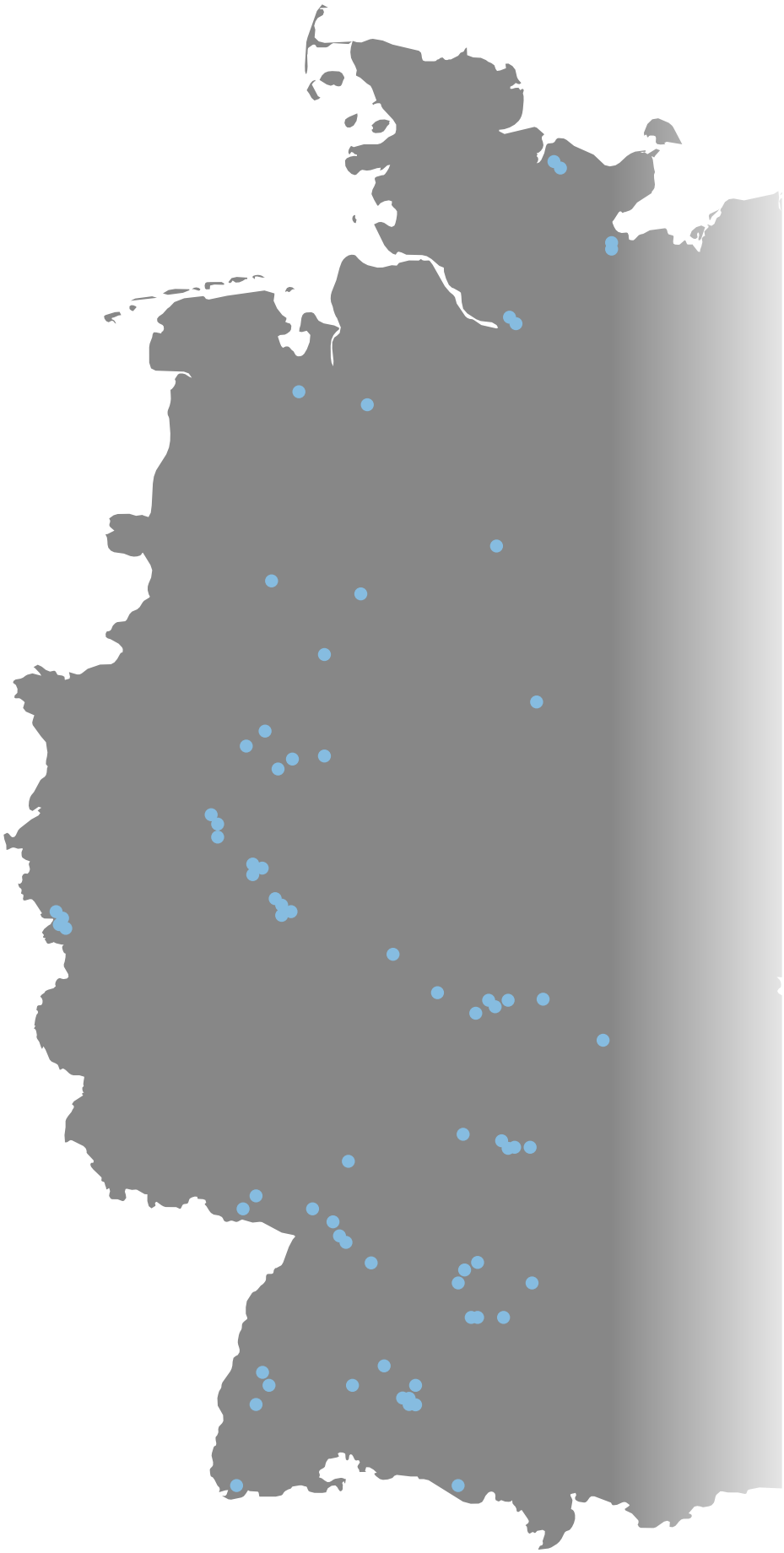
ntelligenz GmbH
g (IBMT)

(FIZ Karlsruhe)

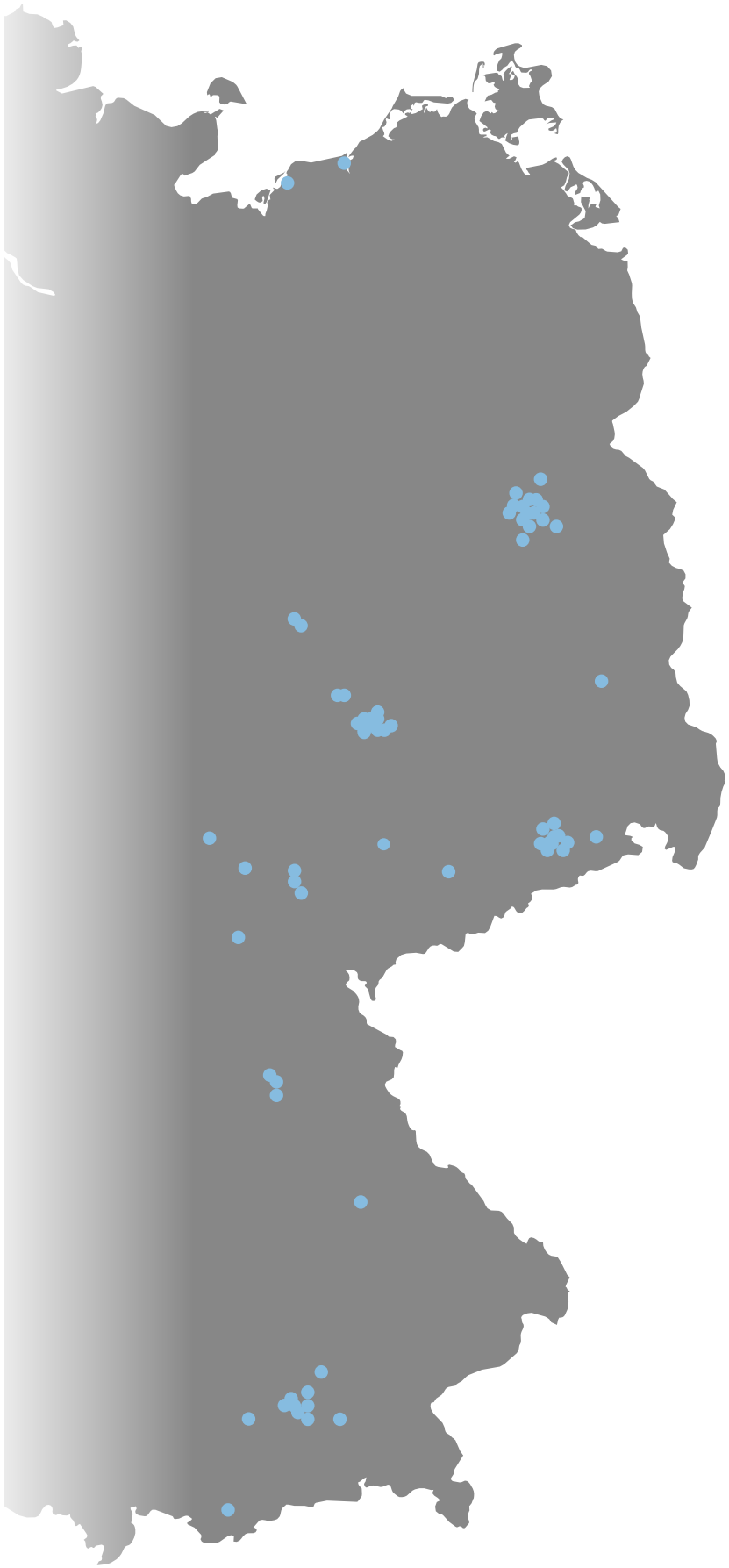
ering and Automation (IPA)

Datenverarbeitungsanlagen mbH
e Medical Faculty

Co. KG



#COOPERATIONS



Diaspective Vision GmbH
Computer Science and Electrical Engineering, Institute for Ap
Technology (IMD)
Optris GmbH
Fraunhofer Institute for Open Communication Systems (FOKUS
SectorCon Engineering ltd
Hospital Charité- University Medicine Berlin
Berlin Cert GmbH
Fraunhofer Institute for Telecommunications, Heinrich Hertz In
airpuls GmbH
Technical University Berlin
Berufsverband für Orthopädie und Unfallchirugie e.V.
Johanniter-Unfall-Hilfe e.V.
Bundesdruckerei GmbH
highstreet technologies GmbH
Freie Universität Berlin, Institute of Computer Science, Hum
group
BIOTRONIK SE & Co. KG Berlin
Berlin Heart GmbH (BH)
Fraunhofer Institute for Computer Architecture and Software T
Dornheim Medical Images GmbH
University Hospital Magdeburg
Martin-Luther-University Halle
GAMPT – Gesellschaft für Angewandte Medizinische Physik un
Flughafen Leipzig/ Halle GmbH
DHL HUB Leipzig GmbH
PHACON GmbH
St. Georg Hospital
Deutsche Rentenversicherung Mitteldeutschland
tecVenture GmbH
Gesundheitsforen Leipzig GmbH
Leipziger Verkehrsbetriebe (LVB) GmbH
University of Leipzig, Faculty of Mathematics and Computer Sc
ence
Raylytic GmbH Leizpig
City of Leipzig Administrative Offices
Max Planck Institute for Cognitive and Neurosciences, Departm
University of Leipzig, Institute for Medical Informatics, Statistics
University of Leipzig, Institute of Anatomy
University of Leipzig, Biotechnological-Biomedical Center
Leipzig University Hospital, Clinic and Polyclinic for Radiotherap
Leipzig University Hospital, Clinic and Polyclinic for Ear, Nose an
Leipzig University Hospital, Polyclinic for Tooth Preservation an
Leipzig University Hospital, Clinic and Polyclinic for Nuclear Me
University Medical Center Leipzig (UML) Intensive Care and Pai
Leipzig University Hospital, Medical Clinic and Polyclinic V- Ang
Kopernikus Automotive GmbH
LeFx GmbH
Universität Leipzig, Sächsischer Inkubator für Klinische Translat
Effigos AG
Fraunhofer Institute for Cell Therapy and Immunology (IZI)

pplied Microelectronics and Data	Leipzig University of Applied Sciences (HTWK), Faculty of Engineering (EIT), Institute of Electronics and Biomedical Information Technology (EBIT)
	Leipzig Heart Center
	ASSKEA GmbH
)	ITP GmbH- Company for Intelligent Textile Products
	Jena University Hospital, Information Technology (IT) Division, Department of ENT
	Fraunhofer Institute for Applied Optics and Precision Engineering (IOF)
	Avateramedical GmbH
stitute (HHI)	Central Medical Laboratory Altenburg
	Chemnitz University of Technology
	Biotype Diagnostic GmbH
	CampusGenius GmbH
	Biosaxony e.V.
	University Hospital Carl Gustav Carus, Clinic and Polyclinic for Neurosurgery
	ID.MED UG
an-Centered Computing working	University Hospital Carl Gustav Carus, Faculty of Medicine, OncoRay- National Center for Radiation Research in Oncology
	Helmholtz Center Dresden Rossendorf (HZDR), Department of Neuroradiopharmaceuticals
	voice INTER connect GmbH
echnology (FIRST)	NXP Semiconductors Germany GmbH
	Advancing Individual Networks (AIN) GmbH
	GTV – Gesellschaft für Technische Visualistik mbh
d Technik mbH	Dresden University of Technology: Center for Information Services and High Performance Computing, Internati- onal Center for Computational Logic, Institute for Artificial Intelligence
	Leibniz Institute: for Ecological Urban and Regional Development, for Information Infra- structure, for Informatics Schloss Dagstuhl, for Social Sciences
	GMC Systems mbh – Gesellschaft für medizinische Computersysteme mbH
	LA2 GmbH
	Siemens Healthcare GmbH
	Fraunhofer Institute for Integrated Circuits (IIS)
	University Hospital Regensburg, Clinic and Polyclinic for Internal Medicine ll
cience, Institute of Computer Sci-	Technical University of Munich (TUM), Department of Mechanical Engineering, Chair of Microtechnology and Medical Device Technology (MIMED)
	Technical University of Munich (TUM), Department of Mechanical Engineering, Chair of Automation and Information Systems (AIS)
	Bayerische Motoren Werke Aktiengesellschaft
nent of Neurology	Reactive Robotics GmbH
s and Epidemiology (IMISE)	Innoroute GmbH
	Siemens AG
	Max-Planck-Gesellschaft zur Förderung der Wissenschaften e.V.
by	Fraunhofer-Gesellschaft zur Förderung der angewandten Forschung e.V.
nd Throat Medicine	University Hospital rechts der Isar, Clinic and Polyclinic for Surgery, Department Visceral Interventions
d Periodontology	
dicine	Collaborate Project Management UG
n Therapy	ExB Labs GmbH
iology	Kumovis GmbH
	Smart Mobile Labs AG (SML)
	Bavaria Medizin Technologie GmbH
ion (SIKT)	Infineon Technologies AG (INF)
	healthcare Consulting GmbH
	TRIGA-S Scientific Solutions

HIGHLIGHTS

February 3rd, 2023 | Leipzig
ICCAS at the SPIN2030 in Leipzig

The Saxon State Ministry of Science, Culture and Tourism presented its agenda for the strategic development in research and education until 2030 at the event SPIN 2030 in the Congress Hall Leipzig. Thomas Neumuth and team members exhibited the research rescue vehicle on site as part of the event. The vehicle is a demonstrator for the mobile use of medical devices. It relies on modern mobile radio standards for networking. In the future, for example, it will be possible to retrieve previously collected patient data directly at the scene of an accident and to transmit information about the patient's condition to the hospital prior to arrival. In critical situations, other physicians can also be connected via video call to support the rescue forces on site. The tools used range from standard tablet computers to technologies such as augmented reality (AR) glasses. These can be used, for example, to superimpose vital signs such as heartbeat or oxygen saturation in real time without the rescue forces losing an overview of the situation on the scene. The knowledge gained should help set new standards in emergency care

Rector Prof. Dr. Obergfell of Leipzig University receives an introduction to the ICCAS ambulance of the future at SPIN2030.

February 10th, 2023 | Leipzig
KickOff - 6G Health Project

The lighthouse project for the use of 6G mobile technology in medical technology- 6G-Health - has been successfully launched: On 08 February, the ICCAS together with its more than 20 consortium partners presented its project plans to the public during a press conference at Leipzig University Hospital. We are particularly pleased that Mr. Brandenburg, State Secretary of the BMBF, was present via video stream and actively accompanied the project presentation.

Afterwards, all project participants started the active project work with a two-day kickoff meeting. The 6G-Health project will be funded by the BMBF with a total of around 10 million euros over the next three years. In its role as deputy consortium leader, ICCAS supports Vodafone in managing the project. The 6G-Health project will research how the next generation of mobile communications (6G) must be positioned for the medical care of the future. It will address issues relating to collaborative work, telemedicine and intelligent systems in healthcare. The core task will be to bring together the various domains involved, including medicine, medical technology and communications engineering, and to introduce the special challenges of developing medical applications into the standardization and approval process at an early stage.

At the Kick-Off meeting of the new 6G Health project, all leading partners met at Leipzig University for a press conference. (f.l.t.r.) Marco Schüller (University Hospital), Thomas Neumuth (ICCAS), Susanne Schlagel (Vodafone), Ralf Irmer (Vodafone).

March 22th, 2023 - Brussel | Leipzig
Regions4PerMed

One of the main activities of the European Regions4PerMed project is to collect and disseminate Best Practices (BPs) that successfully advance the implementation of personalized medicine at the regional level. The Regions4PerMed Best Practice Award was evaluated through an international peer review process and was formally awarded at the project's final conference in Brussels on March 21-22, 2023. ICCAS participated in this competition with three entries. A total of two first places and one second place were won as a result.

The awardees of the competition are:

KA1: Big Data, electronic health records and health governance.

Jan Gaebel – "EOS – Emergency Medical Team Operating System"

KA2: Health Technology and Connected and Integrated Care.

Stefan Franke – "Models for Personalised Medicine – Digital Medical Twins beyond data aggregation",

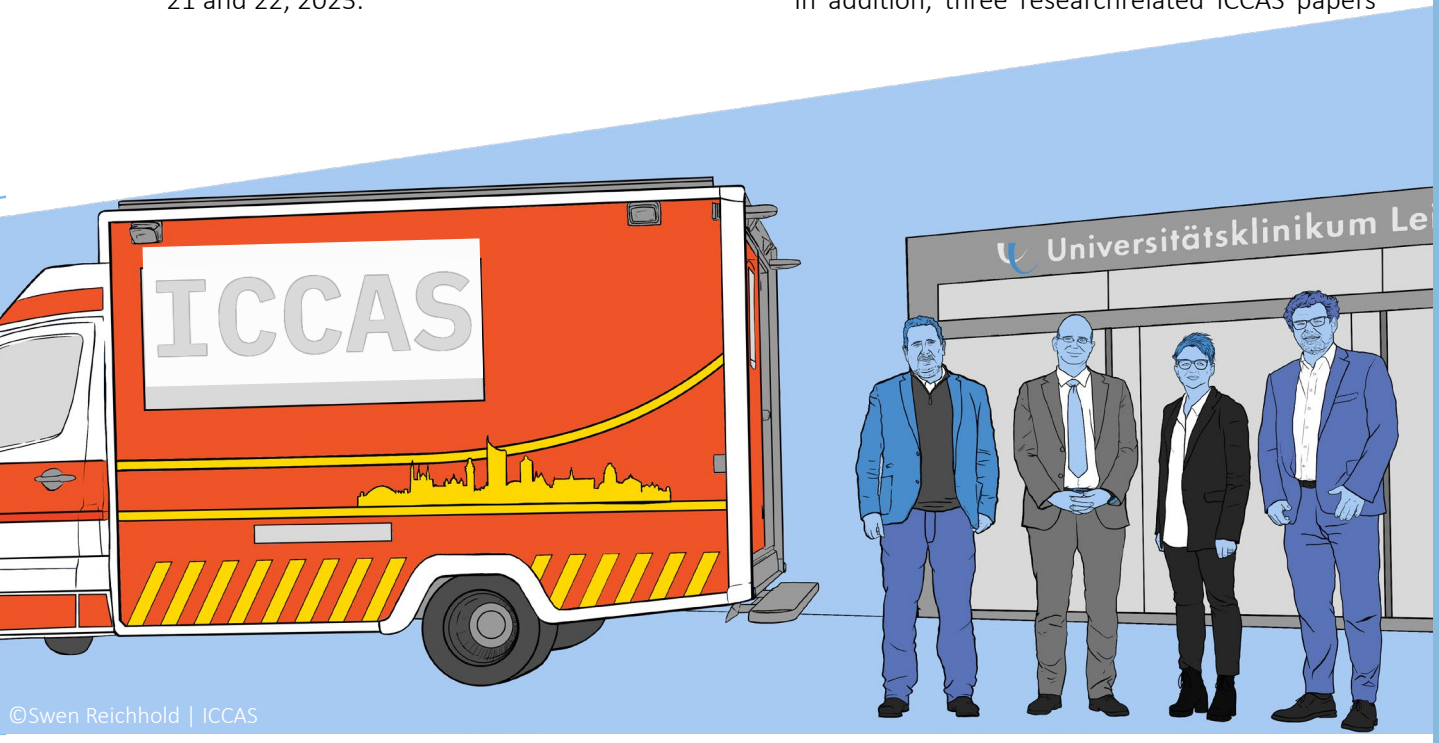
The Best Practice Award was awarded to Jan Gaebel and Stefan Franke at a ceremony during the project's final conference in Brussels on March 21 and 22, 2023.

©Eva-Maria Stegemann | SMWK

The European Regions4PerMed formally presented the Best Practice Award to Jan Gaebel and Stefan Franke at the final conference in Brussels.

April 17th - 20th, 2023 | Lyon
ISTU-EUFUS 2023

Andreas Melzer was co-organizer of the second joint meeting ISTU- EUFUS 2023, which took place in Lyon from April 17th to 20th, 2023, and chaired the session on "Body Clinical Updates (Other Than Brain)". With more than 500 participants from all over the world, the hybrid conference is the largest in the field of therapeutic ultrasound and is dedicated to the presentation and discussion of current topics and challenges of therapeutic ultrasound in scientific and clinical applications. In addition, three researchrelated ICCAS papers



©Swen Reichhold | ICCAS

were presented at the poster session and demonstrations of the BMBF project 3MP-FUS were held jointly with the Fraunhofer IBMT.

May 10th – 11th, 2023 | Leipzig
Future Health Xperience – FHX_2023

Digital, cross-sectoral and useful in the interests of the patient - this vision stood out in the stage programs of the multi-day specialist and networking event as a desirable future for the healthcare system.

During the event, ICCAS presented the MOMENTUM RTW and the technological developments for first aid with 5G for on-site rescue operations. At the same time, Thomas Neumuth gave a lecture as part of the program on the topic "Insights into the Next Big Thing(s) in Health". As a highlight for the participants, we then offered two guided tours through the ICCAS. The participants were given the opportunity to visit the laboratories and the demo operating room live on site.

©SMWK / Ben Gierig

Robot dog SPOT (Boston Dynamics) and the ambulance of the ICCAS presentetd at FHX23.

June 11th, 2023 | Dresden
Hands on Science - ICCAS presents research results on Tag des offenen Regierungsviertels – #TORV23

On the day of the open government quarter - TORV23 in Dresden, the team around Thomas Neumuth presented the research results of the ICCAS on the medicine of the future to the Prime Minister Michael Kretschmer, the Minister of Science Sebastian Gemkow and numerous visitors on the premises of the Saxon State Ministry for Science, culture and tourism in Dresden.

Numerous questions were answered about the ambulance of the future - the MOMENTUM ambulance and the use of our robot dog in emergency care. We arepleased about the great interest in the topics of medicine of the future and hope to be able to give a good insight into the work in Leipzig.

At the Future Health Xperience, an ICCAS employee presented the Momentum project's ambulance and the SPOT robot dog from Boston Dynamics to Minister of State Sebastian Gemkow. (f.l.t.r. Albrecht Bloße. Sebastian Gemkow and Thomas Neumuth)

June 12th, 2023 | Leipzig

Head of the State Chancellery – Minister of State Oliver Schenk - visits LifeScience-Site Leipzig

On June 12th, 2023, Thomas Neumuth, in his capacity as a member of the board of biosaxony and technical director of the ICCAS presented the head of the Dresden State Chancellery - Minister of State Oliver Schenk - the developments on the ICCAS as a representative of the research location Leipzig.

After the presentation of the ICCAS ambulance of the future, a visit to the Medical Forge and the BioCity, intensive discussions with all those involved regarding the design and further development of the Life-Science location in Leipzig followed.

Minister of State Oliver Schenk was shown the ICCAS ambulance of the future during his visit to the LifeScience Site in Leipzig.

CONGRESSES AND FAIRS

January 26th – 28th, 2023 | Malta

EAES Wintermeeting 2023

The EAES Winter Meeting has become the Symposium on Innovation in Surgery, held for the first time in Malta. The meeting included educational, hands-on laparoscopy courses and the latest innovation work from EAES members. Several new technology projects were presented, ranging from tissue perfusion mapping and leak-free trocars to the introduction of artificial intelligence into surgical education.

As part of the meeting, Andreas Melzer provided instructions as Course Director in HandOn for Ultrasound.

April 25th - 27th, 2023 | Berlin

DMEA 2023

Within the framework of DMEA 2023, ICCAS presented the ambulance of the future to an international audience of experts. Numerous visitors were able to inform themselves about the current state of development. As one of the highlights of the conference, numerous questions about the concept and the operation of the ambulance in the MOMENTUM research project were discussed with Max Rockstroh and the researcher team.

The MOMENTUM-Project team (f.l.t.r. Clemens Möllenhoff, Henner Baberowsky, Alexander Prull, Anna Schatz, Christoph Georgi, Max Rockstroh and Tobias Pabst) presented the ambulance of the future at the DMEA.

#SELECTED ACTIVITIES

May 16th – 17th, 2023 | Vienna, Austria
DHealth 2023

Our scientists Anna Schatz and Johannes Keller presented their research results at ICCAS at the dHealth2023 in Vienna. Anna Schatz spoke about the future development of support systems for work processes and needs in the trauma room in relation to the arrival of trauma patients. For this purpose, a requirements analysis was carried out, focusing on the needs of the clinical users in the hospital before the patients' arrival. Her presentation "Data Exchange Between Ambulance and Trauma Center: Interview Study About the Needs of Emergency Trauma Room Staff" ran in Scientific Session 3 - Health Professionals & Information Access.

Johannes Keller presented the results of the Models for Personalized Medicine - MPM project at ICCAS. First, the functionality and the technical background of the Digital Twin were shown, then the various applications of the system, especially those of the project partners, were presented. The presentation "Using Digital Twins to Support Multiple Stages of the Patient Journey" ran in Scientific Session 6: IT along the patient pathway.

June 23th, 2023 | Munich
Andreas Melzer at CARS – Session Chair "Innovations in Surgery with AI Methods and Tools"

As part of CARS 2023 (Computer Assisted Radiology and Surgery Congress) in Munich, Andreas Melzer took over the Session Chair "Innovations in Surgery with AI Methods and Tools". The CARS Congress is the annual international event for scientists, engineers and physicians to present and discuss the most important innovations shaping modern medicine worldwide.

After the successful hybrid CARS conference in Tokyo 2022, the congress took place as a hybrid conference in Munich in 2023.

June 27th – 29th, 2023 | Berlin
Berlin 6G Conference

As part of the Berlin 6G Conference, the prototype of the "ambulance of the future" was presented live at the Conference. Among other things, representatives of the Federal Ministry of Education and Research visited the exhibition area and found out about the work of the ICCAS. Thomas Neumuth also gave a keynote in the "6G in Healthcare" session during the event. He opens the session with the lecture "6G Health: Inspiring innovations for a healthier future". Among other things, the ICCAS sub-project in the national

Thomas Neumuth during his opening speech at the session "6G in Healthcare".

©Hamlyn Symposium on Medical Robotics

Andreas Melzer (all right) and other participants at a lecture round at the Hamlyn Symposium on Medical Robotics.

project 6G Health was presented. During the session, various aspects and future benefits of 6G use in medicine were highlighted.

June 29th, 2023 | London, UK
Hamlyn Symposium on Medical Robotics

At this year's Hamlyn Symposium on Medical Robotics in London, Andreas Melzer represented ICCAS and presented our research results. In addition to his functions as a program committee member, he took part as a panelist in the workshop "Collaborative robotics in the medical field: where we are and where we need to go" with the lecture "Collaborative Robotics for Ultrasound Guided Procedures". Andreas Melzer organized and chaired the clinical forum and hosted the session "Breaking through the Translation Barrier: Clinical Applications of Robotic Tech" and organized the all-day workshop "Endoluminal robots: a journey from unmet medical needs, design challenges, regulatory bodies, and commercial opportunities" along with other scientists. In addition, ICCAS had one more success in the Surgical Robot Challenge. The submitted entry was selected as one of the winners.

June 28th - July 1st, 2023 | Frankfurt
CSI Frankfurt

From June 28th - July 01th 2023, the CSI Frankfurt took place at the Congress Center Messe in Frankfurt, which is dedicated to promoting development in the field of congenital structural heart disease worldwide. Numerous experts in the field are represented, including Andreas Melzer, who presented the topic: "MRI-guided vascular interventions: we're getting there".

June 30th - July 1st, 2023 | Frankfurt
ICCA Stroke

At the same time, this year's ICCA Stroke 2023 also took place at the Congress Center Messe in Frankfurt from June 30th - July 01st, 2023 and led through the various aspects of stroke treatment and stenting of the carotid artery within the two-day interdisciplinary and interactive course.

Experts in the field of stroke treatment gave numerous presentations, with live and recorded cases, debates and practical simulator workshops to provide the latest findings and treatment options on the subject.

For this reason, Andreas Melzer was invited to the congress to give a lecture on "MR-Guided Interventions" and chaired the discussion panel.

#SELECTED ACTIVITIES

September 26th - 28th,2023 | Duisburg

BMT 2023 - 57th Annual Conference of the German Society for Biomedical Engineering

In 2023, ICCAS once again took part in the BMT - Biomedical Engineering Conference with a large number of scientific contributions. This is one of the largest platforms for European scientists, doctors, engineers, researchers, students and young professionals. As every year, the focus is on sharing knowledge and experience on the latest biomedical trends and their results.

Andreas Melzer and other ICCAS scientific staff have made numerous contributions to the BMT. Among other things, Andreas Melzer chaired the meeting and was the initiator and co-founder of the "Medical Robotics" expert committee. He also chaired the sessions Ultrasound, Robotics ans Society I + II and the Joint Session of the DGBMT & DGHNO: "Future of Hearing".

October 19th - 21th, 2023 | Lukang, Taiwan

34th iSMIT Conference

For the 34th time, the annual conference of the International Society for Medical Innovation and Technology (iSMIT 2023) took place to discuss the latest innovations in the field of minimally invasive therapies, AI, robotics and image-guided surgery.

Andreas Melzer moderated the named lecture "John Wickham" (founder of SMIT) and opened the lectures "John Able" (founder of Boston Scientific), Gerhard Buess (pioneer of endoluminal MIS) and Earl Owen (pioneer of hand transplantation).

He also moderated the "Focused Ultrasound" session and gave a lecture on "Novel Technologies and Applications of FUS". The ICCAS is conducting research into new FUS devices and applications with KUKA robotic arms, including wireless ultrasound devices and in the field of neuromodulation in cooperation with the MPS NCS. Another topic was device integration in the OR, which was also the subject of a presentation by Andreas Melzer.

October 31th - November 03rd, 2023 | Bukarest, Romania

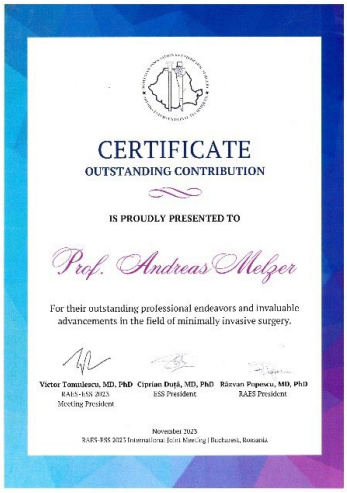
RAES-ESS International Joint Meeting 2023

In Romania, the 12th Annual Meeting of the European Association of Surgery was held for the first time and was accompanied by the traditional national events: the 12th National Congress of the Romanian Association of Endoscopic Surgery and other Interventional Techniques (ARCE), the 14th Romanian Symposium on Bariatric and Metabolic Surgery and the 4th Romanian Symposium on Robotic Surgery.

ARCE actively promotes, both in Romania and internationally, the introduction and application of new medical technologies and procedures, especially in surgery. One focus is on the training of doctors, which leads to improved diagnosis and treatment methods.

Andreas Melzer was director of the "Abdominal Ultrasound for Surgeons" course. Andreas Melzer also gave the renowned "Sergio Duca" plenary lecture on "The journey from minimally invasive surgery to non-invasive surgery" and was chairman of the "iSMIT Session" with the lectures "Advances in imaging guided robotics".

He was honored for his achievements and advances in the field of minimally invasive surgery.



©RAES-ESS International Joint Meeting

November 13th - 16th, 2023 Dusseldorf

Medica Tech Forum 2023: Innovations in Medical Technology

The Medica Tech Forum 2023 is a leading event for medical technology and healthcare innovations, which took place this year from November 13th- 16th. ICCAS was also involved in the 4-day forum with two contributions.

Thomas Neumuth gave a presentation on the

topic: “VDE Connected Health Initiative: The impact of 5G and 6G telecommunication technology on medicine” .

Max Rockstroh gave a presentation entitled: “VDE Connected Health: The importance of connectivity for medical care today and tomorrow”, providing an insight into current healthcare provision and its prospects for the future

IN-HOUSE EVENTS

February 27th, 2023 | Leipzig
Colloquium DLR Dr. Markus Braun

The head of the German Bioscientific Space Program in the Space Agency at DLR, Dr. Braun, gave the lecture on „The Bioscientific Space Program - Research in Space for Man on Earth“ at the ICCAS Kooloquium on February 27, 23. It is impossible to imagine today‘s modern world without space travel. Space travel fascinates, drives the development of innovative technologies and offers solutions to challenges of the future. In particular, research under space conditions on the International Space Station, but also on satellites, rocket and parabolic flights, provides insights and solutions that improve life on Earth and help maintain human health and mobility in an increasingly aging society.

March 22th, 2023 | Leipzig
Status seminar – hybrid

The ICCAS status seminar took place in hybrid form on March 22th, 2023. Numerous guests were interested in the results from the ongoing projects and the planned research activities. Andreas Melzer and Thomas Neumuth discussed future challenges in the fields of computer-assisted surgery, image-guided interventions and model-based medicine. Finally, the participating physicians were also given the opportunity to reflect on the work of ICCAS.

June 15th, 2023 | Berlin
Innovation Day for SMEs

The ICCAS presented at the Innovation Day for SMEs 2023 | innotag2023 of the Federal Ministry of Economics and Climate Protection (BMWK) the results of the research project- SORLIC, which, together with our long-standing cooperation partners, the ACL, the clinic and polyclinic for oral, maxillofacial and plastic facial surgery, University Hospital Leipzig and the development service provider for embedded systems tecVenture.

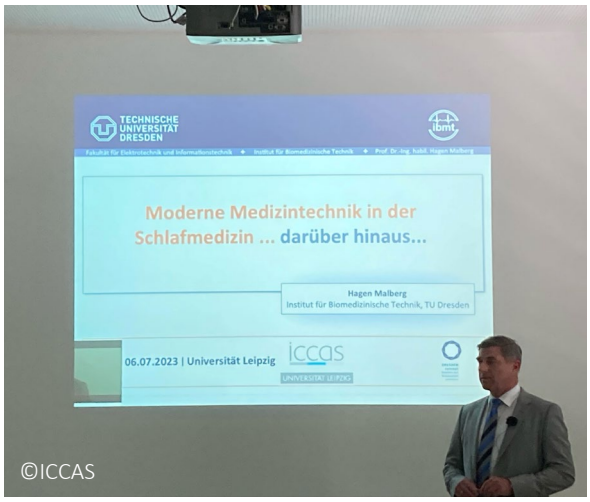
The development results of the research project, a system for the intra-operative planning of flaps in surgery, were shown. The system captures image data outside of the visible range and processes it in order to estimate the position of blood vessels before the intervention, make the result available in real time and display it using augmented reality.

Dr. M. Braun, head of the German Bioscientific Space Program in the Space Agency at DLR, gave his lecture about „The Bioscientific Space Program- Research in Space for Man on Earth“ at the ICCAS Kolloquium.

July 6th, 2023 | Dresden
Guest lecture: Prof. Dr.-Ing. H. Malberg, Director Institute of Biomedical Engineering, TU Dresden

Thomas Neumuth has cordially invited Prof. Dr.-Ing. Hagen Malberg, Director at the Institute of Biomedical Engineering, TU Dresden, to the online guest lecture "Moderne medizintechnische Verfahren in der Schlafmedizin" on July 6th 2023.

This lecture will shed light on the role of sleep medicine in everyday clinical practice, as it is often still given little priority, but is central to the diagnosis of sleep disorders. Telemedical methods are used in the sleep laboratory and increasingly in the home environment. Innovations in medical technology facilitate the transition from clinical to telemedical treatment. There are also new out-of-hospital applications such as smart watches and driver assistance systems that monitor sleep phenomena. The lecture will shed light on these developments and present new research approaches from the Institute of Biomedical Engineering at TU Dresden.



Prof. Dr.-Ing. Malberg by his online-lecture about "Moderne medizintechnische Verfahren in der Schlafmedizin".

June 29th, 2023 | Leipzig
Computer Science Students visit ICCAS

As part of the international Frank van Swieten lectures at the Institute for Medical Informatics, Statistics and Epidemiology (IMISE), 20 bachelor and master students in medical informatics from the Universities of Heidelberg and Amsterdam visited ICCAS and gained an insight into research here in Leipzig. The agenda included a visit to the intelligent operating room, insights into the research work on hyperspectral imaging and robotics research at ICCAS.

July 10th, 2023 | Leipzig
Children from the "MEFALE" Vacation Program visit the ICCAS

This year, ICCAS once again supported the "MEFALE" summer holiday program of Leipzig University Medicine on July 10th 2023 and gave the 10 children aged 10 - 13 years a brief insight into the subject areas and research focuses of the institute in a playful way.

A demo tour was prepared by ICCAS staff for this purpose. This first took the children to the MSI laparoscope, where a blood flow measurement of the internal organs was demonstrated on a surgical dummy. They were also given an insight into robot-assisted surgery. In addition, the presentation „From the idea to clinical application" explained the general development of medical research, the idea of new therapy options using cell culture models and the first clinical studies. The children were also allowed to become junior researchers themselves and fill cell culture flasks with pipettes.

The tour was rounded off with a visit to the Demo OR 2.0, where they were able to try out how to work with a milling machine under an operating microscope and how to visualize structures under the skin with an ultrasound device.

PROJECT WORKS

April 25th - 27th, 2023 | Berlin
Final Project Meeting AIQNET

After three years the consortium partners from clinics, software development and medical technology presented the results of the project at the DMEA, from April 25th - 27th, 2023. As part of the sub-project, ICCAS developed a „Digital Patient Model" that integrates different perspectives on treatment and the patient himself. The goal was to improve AI-based clinical quality and per-

formance assessment based on prior knowledge about the patient or the course of treatment. This includes the aspects of diagnosis and the present disease, information about therapies as well as the specific characteristics of the patient.

At the DMEA in Berlin, the AIQNET ecosystem with its various project partners presented itself once again to an international audience of experts at the end of the project.

May 5th, 2023 | Leipzig
Final Project Meeting MOMENTUM

After a little more than three years, the Momentum research project came to an end with a final meeting in Leipzig. Thereby all involved partners present their research work in lectures and live presentations and discuss current and future challenges with 5G in the medical context and especially in rescue medicine.

The research ambulance of ICCAS had its next big appearance directly after the DMEA2023 in Berlin. We would like to thank all staff members who contributed to the successful research project and look forward to new challenges together with the strong hope that we have contributed to an even better medical emergency care.

June 30th, 2023 | Leipzig
Project PostStroke Completed

The PostStroke project to empower stroke patients has been successfully completed. An innovative digital concept called PostStroke Manager was developed in cooperation between Clinic and Polyclinic for Neurology and ICCAS to improve post-stroke care. The concept includes an IT infrastructure that integrates various applications for patients, physicians, and stroke care providers, as well as mobile sensors (wearables). The PostStroke Manager places the individual patient at the center of the often different treatment structures and helps in many ways to manage the new life situation in the best possible way.

The project is the first of its kind to focus on the care situation of stroke patients and to use modern eHealth and mHealth technologies for this purpose.

October 01st, 2023 | Leipzig
Launch of the new VOLTA Project

The VOLTA project is a follow-up project for the IT platform “KAIT”, which was developed by ICCAS in cooperation with the Department of Hematology, Cell Therapy and Hemostaseology at the University Medical Center Leipzig. This platform is

The entire team behind the MOMENTUM project met for the final event at ICCAS to present their research results.

used to analyze medical information, especially in the context of therapy decisions for patients with multiple myeloma. The aim of "KAIT" is to provide doctors with up-to-date information on therapeutic options to enable them to make informed decisions. This should help to improve the treatment of myeloma patients in Germany, regardless of their location.

November 01st, 2023 | Leipzig
Launch of the RescEU EMT project

The "EMT Operating System" (EOS) is an information system that is specially tailored to the needs of first responder units in disaster relief missions. These will be deployed in the event of disasters such as earthquakes, tsunamis and floods to support the local healthcare system. As part of the "RescEU EMT" project, the system will be expanded to include modular, flexibly deployable units.

EOS supports the entire treatment process from triage to discharge of patients and can be adapted to the individual requirements of the units. It is not only used for electronic patient records, but also offers functions for mission and hospital management on site. The functions of EOS include patient management, treatment documentation, department configuration, visualization of hospital performance indicators and reporting functions. It plays an essential role in monitoring and evaluating the current situation and performance at strategic and tactical levels.

EOS is highly customizable and can meet the needs of specialized teams. It uses structured data entry and storage to ensure information quality and support mandatory reporting.

December 01st, 2023 | Leipzig
Launch of the new Certanty Project

"Certainty: A virtual twin of cellular immunotherapy for personalized cancer treatment."

The Certainity project, launched on December 01st, 2023, aims to develop a "virtual twin" in cancer immunotherapy, particularly for CAR T-cell treatments. This digital model integrates a patient's clinical, molecular and cellular data to simulate disease progression and treatment options, with an initial focus on multiple myeloma. The EU-funded Certainty project, led by Fraunhofer IZI, combines big data, machine learning and computer models to personalize cancer treatment. The project also takes socio-economic factors into account and prioritizes data protection.

December 01st, 2023 | Leipzig
Launch of the new MIRACLE-5 project

"Miracle - 5: Integrated remote support and communication using mixed-reality applications in 5G environments."

The project investigates the use of 5G campus networks for XR-based telemedicine. A technology demonstrator will be developed to test an XR telemedicine application over 5G networks, the effectiveness of which will be evaluated for clinical use. Challenges include data synchronization and low latency.

The partnership between LeFx, ICCAS and Telefonica combines XR visualization and 5G technology. In addition to ICCAS' own 5G network, managed service networks from Telefonica are used. Clinical use cases will be developed and tested by a consortium of Helios Parkkrankenhaus Leipzig and Leipzig University Hospital, with UML contributing its medical expertise and experience with 5G networks

November 08th, 2023 | Leipzig
3MP-FUS Mid-Term Milestone Meeting

The mid-term milestone meeting in 3MP-FUS: Multimodality Multi purpose Multi platform Focused Ultrasound - "Neuromodulation in rare neuropsychiatric disorders with focused ultrasound" took place on November 8th, 2023 at ICCAS.

The collaboration in 3MP-FUS enables the development of a clinical MRI and neuronavigated focused ultrasound system for neuromodulation of neuropsychiatric disorders. ICCAS invited the representative of the Federal Ministry of Education and Research - Melanie Kuffner (VDI Technologiezentrum GmbH, Düsseldorf) - to discuss the latest developments of the project together with technical and medical experts. The highlight was a demonstration showing the integration of Localite GmbH's neuronavigation software with the focused ultrasound system (FUS) for neuronavigation developed by the Fraunhofer IBMT.

MISCELLANEOUS

March 01st, 2023 | Goettingen
Claire Chalopin Receives Appointment in Goettingen at the HAWK

On March 1st, our colleague Claire Chalopin started her new position as professor for data-driven imaging in medicine at the University of Applied Sciences and Arts Hildesheim / Holzminden / Göttingen, Faculty of Engineering and Health. This is the departure of a staff member who has been working on various research topics at ICCAS since 2006. Numerous publications and especially the establishment of the research area - Intraoperative Multimodal Imaging (IMI) - are proof of her scientific achievements. As a guest scientist at ICCAS, she will keep in touch with us despite her new tasks and challenges. We wish our former researcher Claire Chalopin all the best and look forward to further exchange.

June 26th - 29th, 2023 | London, UK
Andreas Melzer's Team Won this Year's Hamlyn Surgical Robot Challenge 2023

Johann Berger, Michael Unger, Albrecht Bloße, Johannes Keller, Jochen Fuchs and Michael Moche from the Imaging Robotics project once again took part in this year's Surgical Robot Challenge at the Hamlyn Symposium on Medical Robotics. They prevailed against 8 other teams with their system MERODES- The Medical Robot Device System, and won the Best Design Award. MERODES consists of 2 KUKA robotic arms for US image-guided interventions for networking robotic systems with the SDC standard. Each year, leading surgical robotics groups from around the world are attracted to this international competition to present innovative new ideas for a range of surgical robotic platforms. Link to this year's winners of the challenge: Surgical Robot Challenge 2023 Winners - Hamlyn Symposium on Medical Robotics Link to this year's winners of the Challenge: Surgical Robot Challenge 2023 Winners- Hamlyn Symposium on Medical Robotics.

View of the Merodes System- The Medical Robot Device System, from Andreas Melzer's Imaging Robotics project group.

#SELECTED ACTIVITIES

June 29th, 2023 | Berlin

VDE, DFKI and ICCAS Established Joint Working Group for Telecommunication Technologies in Healthcare

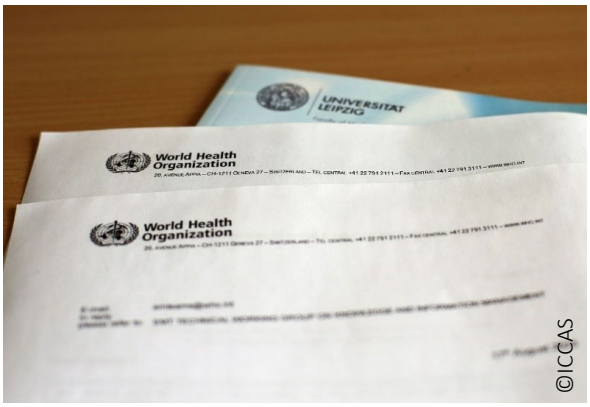
As part of the Berlin 6G Conference, the establishment of the Joint Working Group on Connected Health is announced today as a joint interdisciplinary initiative of the professional societies VDE DGBMT (Biomedical Engineering), VDE ITG (Information Technology) and the BMBF 6G Platform. This groundbreaking initiative establishes a Germany-wide forum for industry-focused 5G and 6G wireless applications in healthcare with the goal of accelerating the development and implementation of telecommunication technologies for healthcare applications and promoting the exchange of knowledge and experience between industry, research and academia.

VDE Connected Health brings together leading medical technology companies, research institutes, universities and government agencies to explore the potential of telecommunication technologies for medical research and practice. Through close collaboration between industry and academia, the aim is to develop innovative solutions that drive medical progress and revolutionize patient care.

August 17th, 2023 | Geneva, Switzerland

Thomas Neumuth Appointed Member of the World Health Organization (WHO - EMT) Technical Working Group on "Knowledge and Information Management (KIM)" for Emergency Medical Teams.

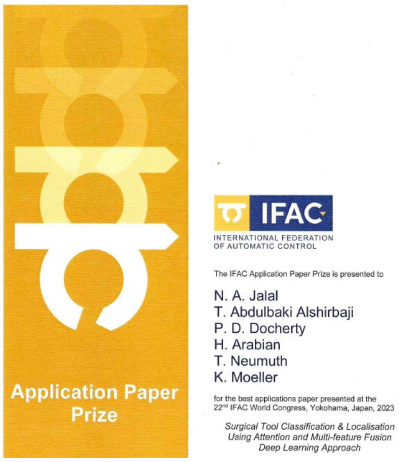
Thomas Neumuth has been appointed as a member of the World Health Organization (WHO) - EMT Technical Working Group on "Knowledge and Information Management (KIM)". This group consists of experts who are committed to improving the effectiveness of Emergency Medical Teams (EMT) in international disaster operations. Thomas Neumuth will represent the rescEU EMT - the European Commission's first pan-European field hospital funded with €106 million - in the working group. The main objective of the working group is to develop a framework and one or more systems with a single data repository for structured and linked data across the EMT lifecycle, to automate and support existing processes and to produce advanced analytics to inform strategic and operational decisions.

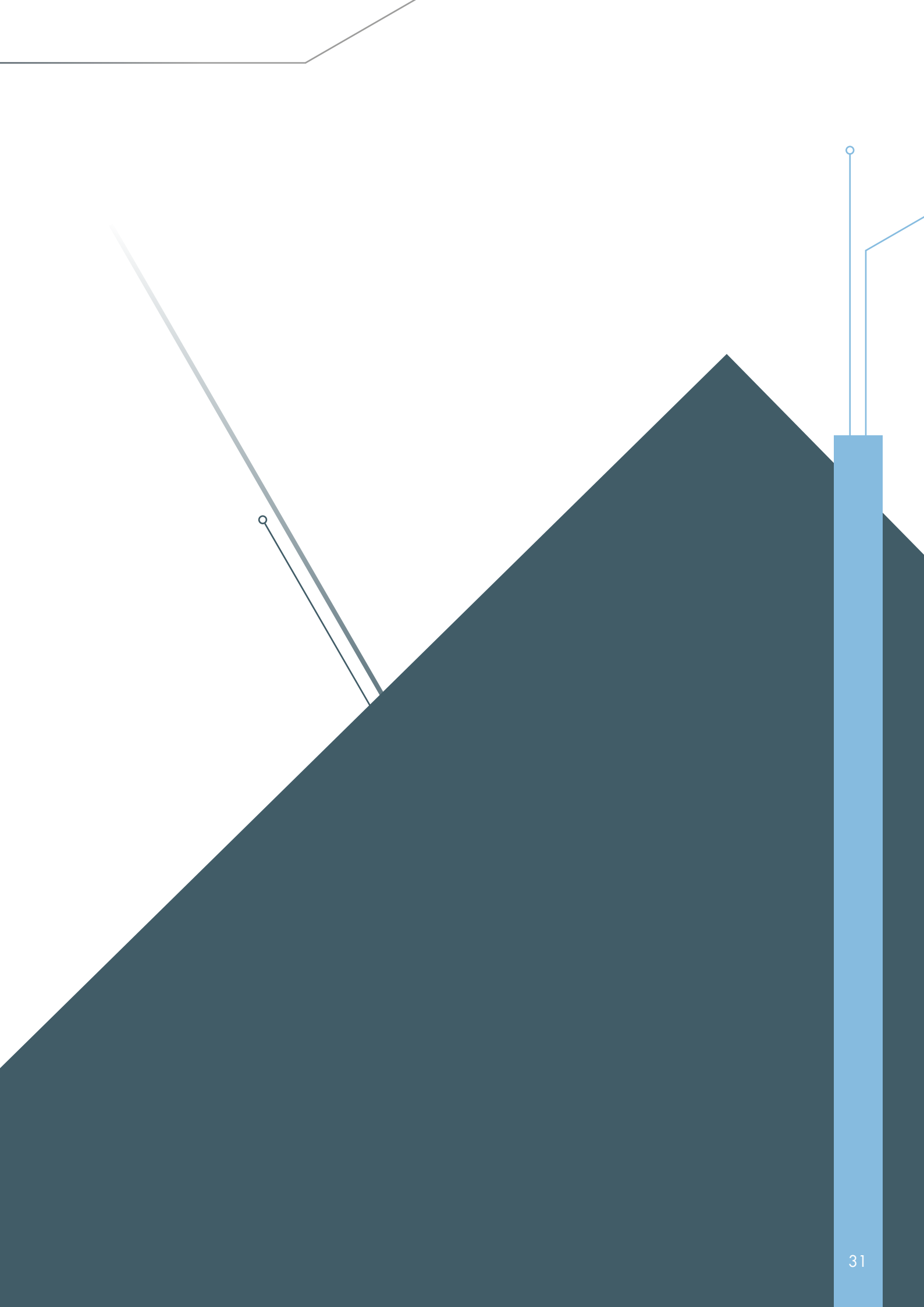


July 9th -14th | Yokohama, Japan

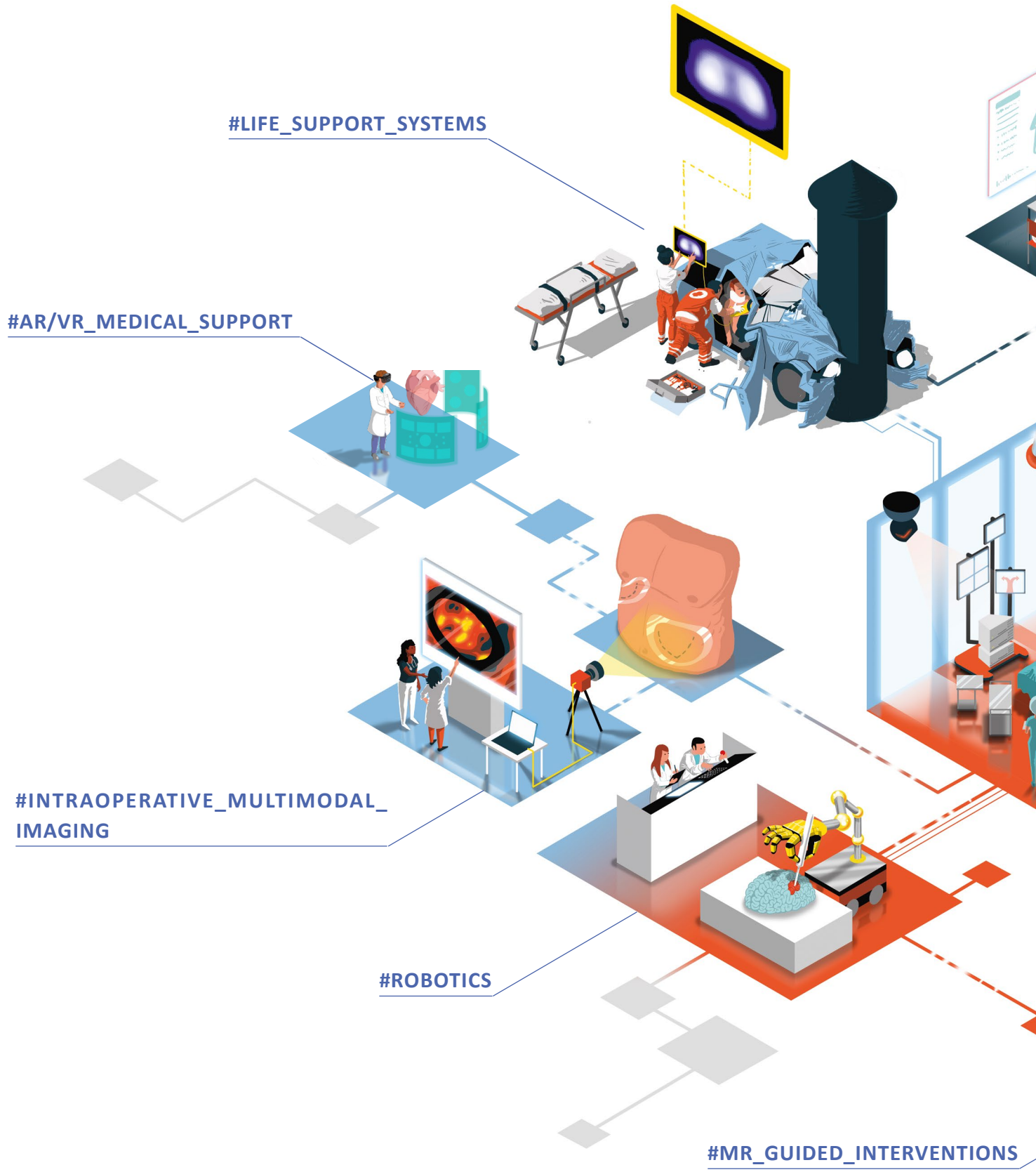
Winner of the Best Applications Paper Prize at the IFAC World Congress

At this year's International Federation of Automatic Control (IFAC) World Congress in Yokohama, Japan, the scientists N.A. Jalal, T. Abdulbaki Alshirbaji, P.D. Docherty, H. Arabian, T. Neumuth, K. Moeller won the Best Applications Paper Prize. The title topic of the paper is „Surgical Tool Classification & Localization Using Attention and Multifeature usion Deep Learning Approach" With the help of this approach in medical image analysis, more accurate and efficient visualization and monitoring of surgical tools can be performed, which can lead to the improvement of surgical procedures and patient safety.

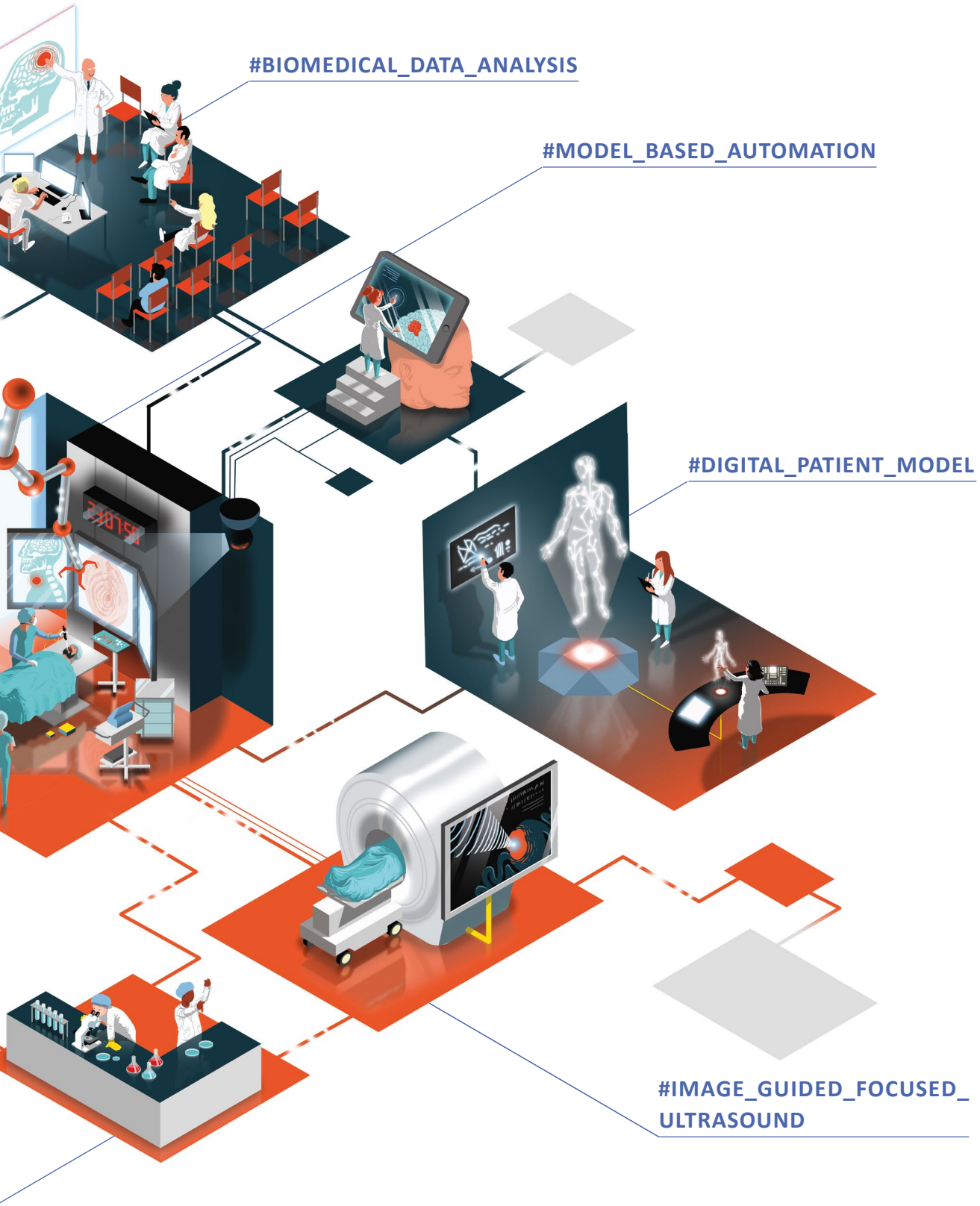




#RESEARCH ACTIVITIES

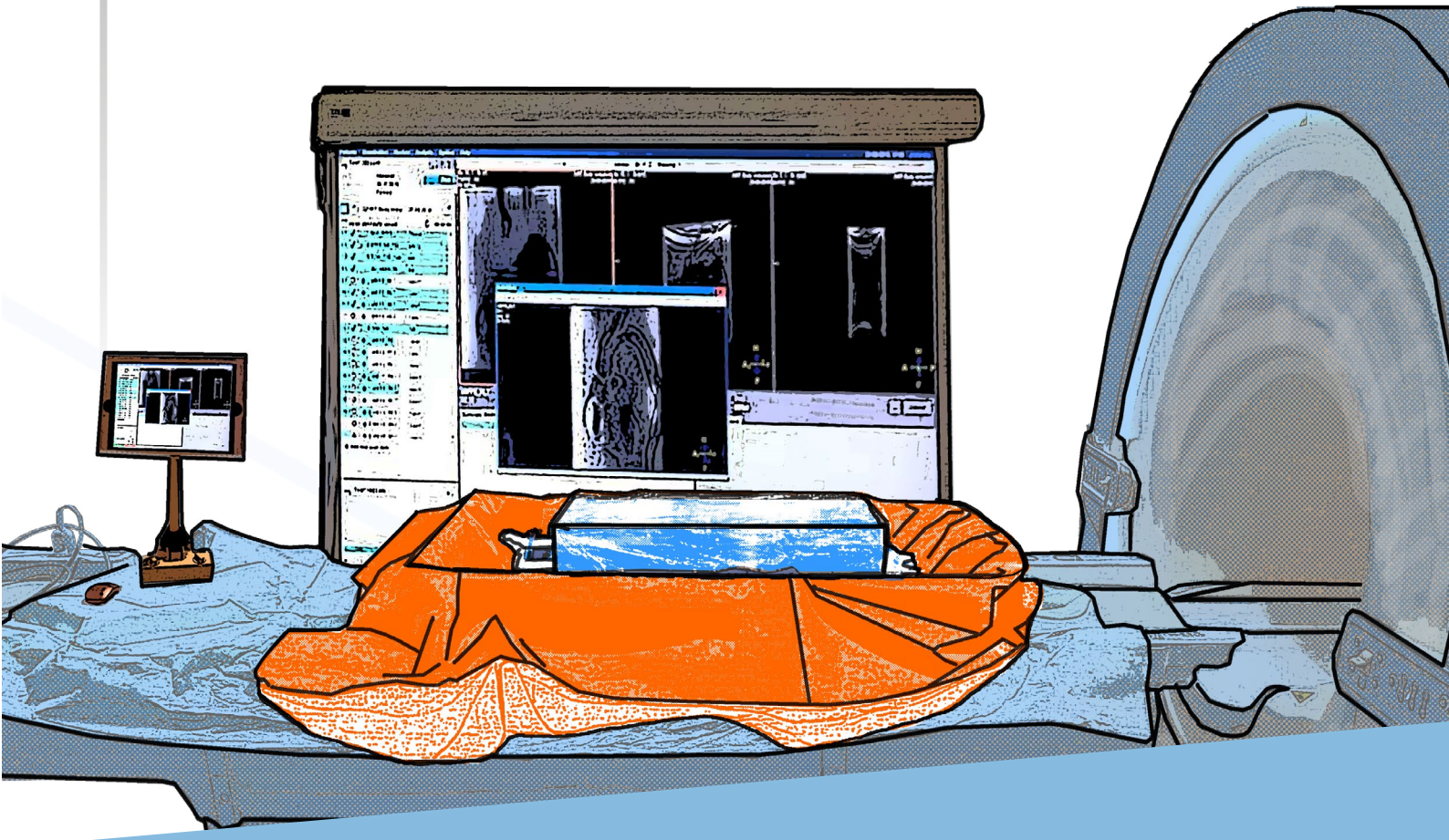


Interrelated research: #Computer_Assisted_Image_Guided_Interventions
#Model_Based_Automation_and_Intelligent_OR
#Intraoperative_Multimodal_Imaging
#Biomedical_Data_Analysis



#2.1 COMPUTER_ASSISTED_IMAGE_GUIDED INTERVENTIONS

The research is focused on advancing new technologies for MRI-guided procedures that enable minimally and non-invasive approaches for diagnosis and treatment. In addition to providing improved soft tissue contrast, MRI offers benefits such as the absence of iodine-containing contrast agents and ionizing radiation. The project‘s goal is to develop innovative MR-compatible instruments, explore suitable medical workflows with limited patient access, and investigate communication within the MR environment. The application of focused ultrasound, transfer of minimally invasive catheter intervention, and robotic-assisted procedures are being developed and evaluated.



Lead

Prof. Dr. Andreas Melzer

ICCAS researches on new technologies for computer-assisted image-guided procedures. This theme is a logic development of the traditional ICCAS research on computer-assisted surgery towards less invasive image-guided surgery and interventions.

Scientific Staff

Denis Bajestani, Johann Berger, Andreas Eger, Till Handel, C. Martin Reich, Leon Schülert, Michael Unger.

Selected Publications

Hu S, Zhang X, Melzer A, Landgraf L.
Ultrasound-induced cavitation renders prostate cancer cells susceptible to hyperthermia: Analysis of potential cellular and molecular mechanisms. Front Genet. 2023; 14: 1122758.
DOI: 10.3389/fgene.2023.1122758

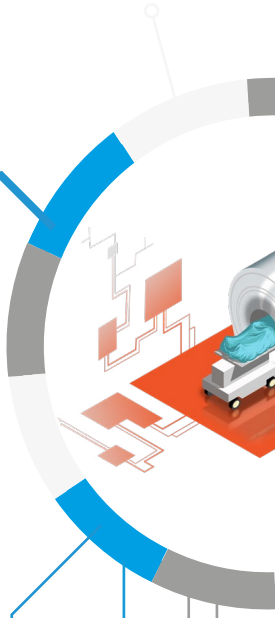
Zhang X, Greiser S, Roy U, Lange F, van Gorkum R, Fournelle M, Speicher D, Tretbar S, Melzer A, Landgraf L.
Evaluation of a Developed MRI-Guided Focused Ultrasound System in 7 T Small Animal MRI and Proof-of-Concept in a Prostate Cancer Xenograft Model to Improve Radiation Therapy. Cells 2023; 12(3): 481
DOI: 10.3390/cells12030481

Keenlyside A, Marples T, Gao Z, Hu H, Nicely LG, Nogales J, Li H, Landgraf L, Solth A, Melzer A, Hossain-Ibrahim K, Huang Z, Banerjee S, Joseph J.
Development and optimisation of in vitro sonodynamic therapy for glioblastoma. Sci Rep 2023; 13(1): 20215
DOI: 10.1038/s41598-023-47562-2

#RESEARCH AREAS

SCIENTIFIC_RESEARCH_AREAS_AND_RELATED_PROJECTS

#2.1 COMPUTER_ASSISTED_IMAGE_GUIDED_INTERVENTIONS



#2.1.1 IMAGE_GUIDED_FOCUSED_ULTRASOUND – IGFUS:

Imaging Robotics | Concepts for Robotic-guided Focused Ultrasound Hyperthermia and Radiation Therapy in the Clinic | Collaborative Project

Prepositioning avatera | Optimizing the Positioning Principles of a Novel Robotic System | Funding: avateramedical GmbH

MRgFUS | Non-invasive Magnetic-Resonance-Guided Focused Ultrasound (MRgFUS) for the Treatment of Uterine Fibroids – Collaborative Project with UKL

3MPFUS | Multi-modality, Multi-purpose and Multi-platform Focused Ultrasoundsystem - Neuromodulation in Rare Neuropsychatric Disorders with Focused Ultrasound | Funding: BMBF

#2.1.2 Magnetic Resonance-Guided Interventions – MRGI:

MR-Thrombosis-Theranostic | MRI-guided Minimally Invasive Diagnostic and Therapy of Thrombosis | Funding: BMBF

MR-Stents | MR-Guided Stent-Implantation |Funding: BMBF

2.1.1 Research Area: Image_Guided_Focused_Ultrasound – IGFUS

Imaging Robotics

The robotics group at ICCAS aims for the integration of robotic systems into the clinical workflow of image-guided interventions. The main goal is the development of a robotic control software that provides enough modularity for medical robots to serve in multiple use-cases and, thereby, improve acceptance in the clinic. Utilizing the KUKA lbr iiwa 7 R800 and Med robotic arms and their collaborative concepts (direct user interaction during automated movement), shall further reduce the complexity of handling the robots during surgical workflows. (Fig. 1) Using the IEEE 11073 SDC standard for medical device connectivity, the ICCAS researchers implemented a first demonstrator with two robot arms. The system communicates with any other SDC medical device in the same network. A feasibility study for ultrasound-guided biopsies was published in the Journal of "Frontiers in Robotics and AI".

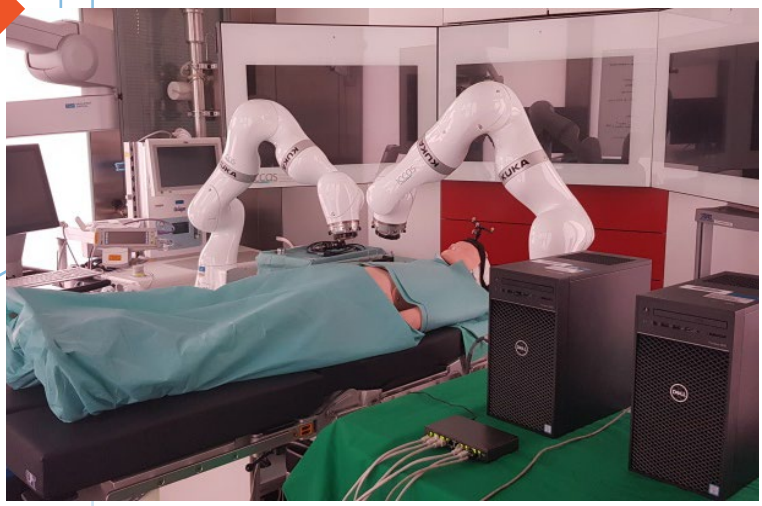


Fig. 1: The setup of two KUKA lbr iiwa 7 R800 robot arms (KUKA AG, Augsburg) in the demonstrator OR at ICCAS Leipzig.

Prepositioning Avatera

Under commission by the avatera medical GmbH (https://www.avatera.eu/home), ICCAS is investigating the possibilities to optimize the positioning principles of a novel robotic system for laparoscopic interventions. In cooperation with the urology department of the University of Leipzig Medical Center, the requirements for the prepositioning of the system at the OR-table were defined and transferred into robotic workspace simulations. The aim of this work is to provide an intuitive procedure for the side-docking process of the robot at the OR-table and an optimized positioning for the robot arms at the patient for the best possible workspace during the intervention. The simulations were performed with a 3D model of the avatera system, provided by ITK Engineering GmbH (https://www.itk-engineering.de/branchen/robotik/), to isolate the best parameters for efficient positioning, including the height of the robot, the docking angle at the OR-Table, the distance to the patient and the work angle of the trocar holders on the patient. (Fig.2)

ICCAS developed a guidance manual for the side docking of the system and investigates currently investigates the feasibility for radical prostatectomies and combined hysterectomy and Lymphadenectomy.

MRGFUS – Magnetic resonance imaging guided focused ultrasound in the treatment of uterus myomatosus

In 2017, Leipzig University Hospital established a treatment center for symptomatic uterine myomas, with a focus on individualized treatment options. The center offers modern therapy options, including MRgFUS (Profound Medical Sonalleve MR-HIFU System), with over 300 patients screened and 71 successfully treated since installation (Fig. 2). Patients are treated in a clinical setting, under analgesia and sedation, and discharged on the next day after treatment without signifi-

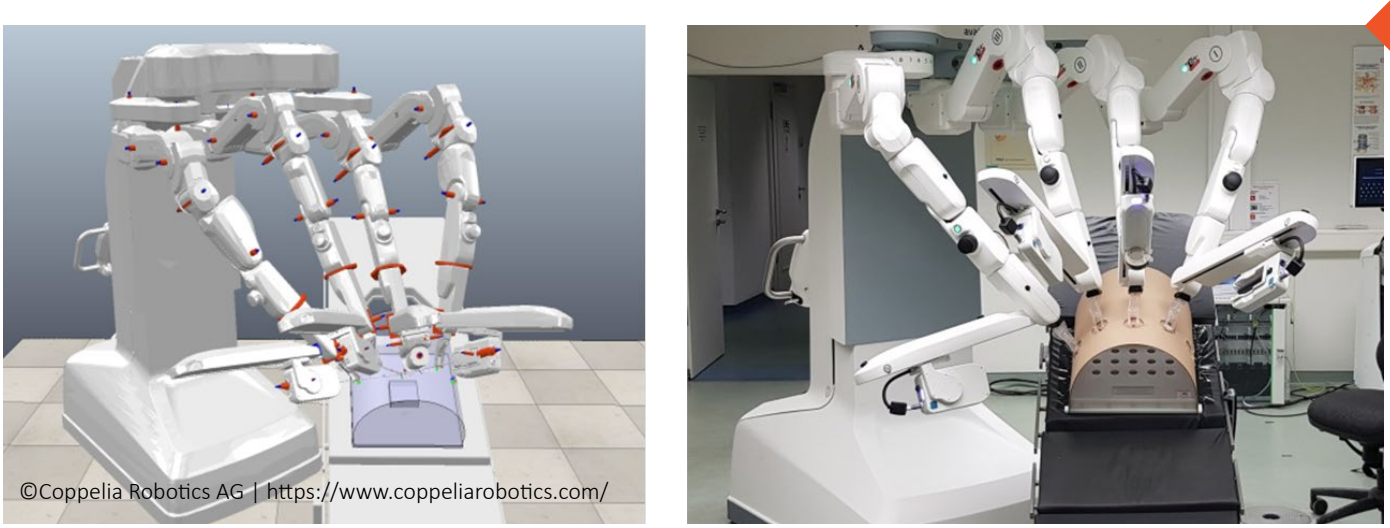


Fig. 2: The avatera robot model in the simulation environment CoppeliaSim.

cant complaints. Approximately 2/3 of patients achieved symptom control, and three successful pregnancies have resulted from the treatment. In addition, the center successfully performed a multisession MRgFUS-treatment of four desmoid tumors of the thoracoabdominal wall with control of growth. The center's focus on individualized treatment options has resulted in successful outcomes for patients with symptomatic uterine myomas.

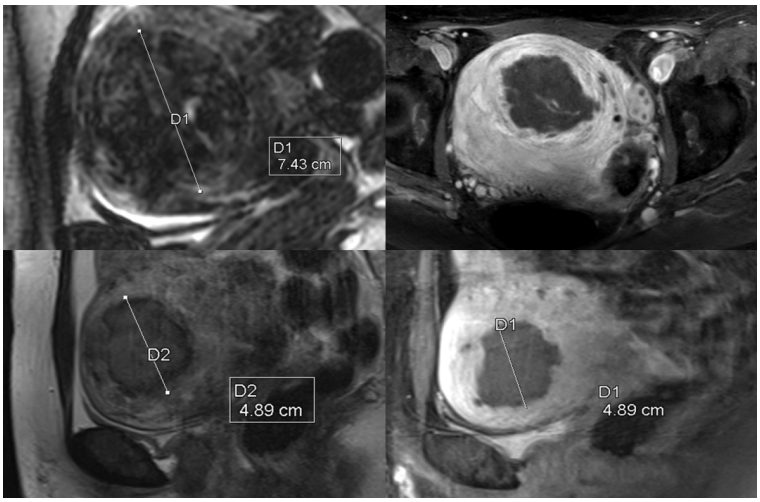


Fig. 3: Diagnostic T2-weighted- and contrast-enhanced- MR- images before, immediately and 6 months after MR-HIFU of a 39-year-old patient with a big intramural fibroid and hyper-/ dysmenorrhea. Volume reduction and complete absence of symptoms 6 months after HIFU treatment was achieved, although the fibroid was not to 100% ablated (71% NPV).

3MP-FUS – Multi-Modality, Multi-Purpose, and Multi-Platform Focused Ultrasound System – "Neuromodulation in rare Neuropsychiatric Disorders with Focused Ultrasound"

Neurological diseases are often accompanied by focal changes in the brain. Approved therapy options aim to normalize the altered brain function through neuromodulation. Deep brain stimulation (DBS) is in use for this purpose, which is a invasive intervention with the possibility for complications. A non-invasive alternative is transcranial magnetic stimulation (TMS). However, TMS has a poor spatial focus without reaching the relevant deep structures of the brain. Focused Ultrasound (FUS) combines the advantage of good focality and depth penetration and thus is a suitable candidate for neuromodulation of deep brain regions such as the globus pallidus internus (GPI) or the thalamus.

The 3MP-FUS project aims to develop a multi-modal, platform-independent FUS system for neuromodulation in dystonia and rare forms of Parkinson's disease. 3MP-FUS utilizes TRUST, a MR-compatible and beam steering capable mobile FUS-system with a 256-channel matrix transducer. Our system integrates optical tracking and MRI imaging for improved targeting and monitoring of circumscribed brain regions.

In 2023, ICCAS analysed the clinical requirements and specified the treatment workflow together with MPI CBS. Experiments to visualize the transducer inside the MRI bore for position control were conducted. Prototypes for the transducer mount were produced and multiple degrees of freedom allow flexible positioning. For MR-based transducer tracking semi-active resonant fiducial markers were improved and investigated for directionality and visibility in T1-weighted GRE sequences. Treatment planning and transducer placement was tested on a phantom using ACCESS head coil and DuoFlex Quadrupole coils (MRInstruments, MN, USA). For optimization of system components MR measurements were performed in a Biograph mMR PET/MRI based on ASTM sequences and HF noise was investigated using a sniffing probe.

To identify the optimal insonation window on the head, phase aberration was investigated in a self-built acoustic scanning tank with fibre optic hydrophone. Free field measurements of the acoustic field were acquired, then human calvarae were placed inside the scanning tank and the re-

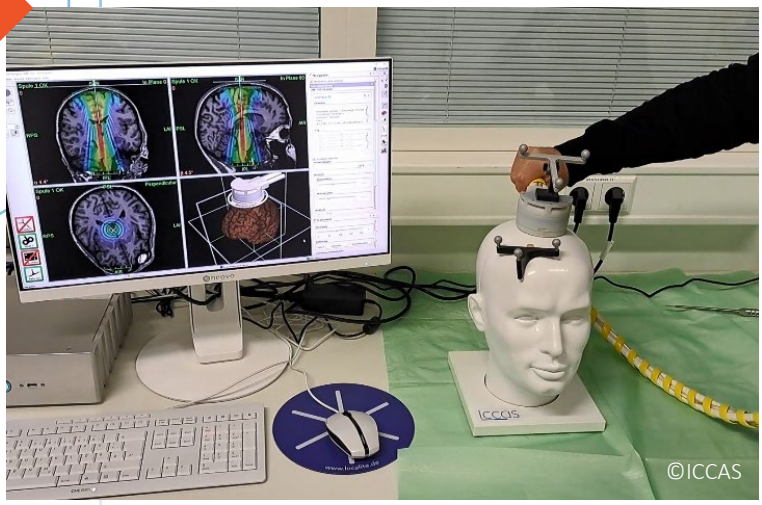


Fig. 4: Neuronavigation of targeted FUS-Modulation. The software shows the acoustic field distribution.

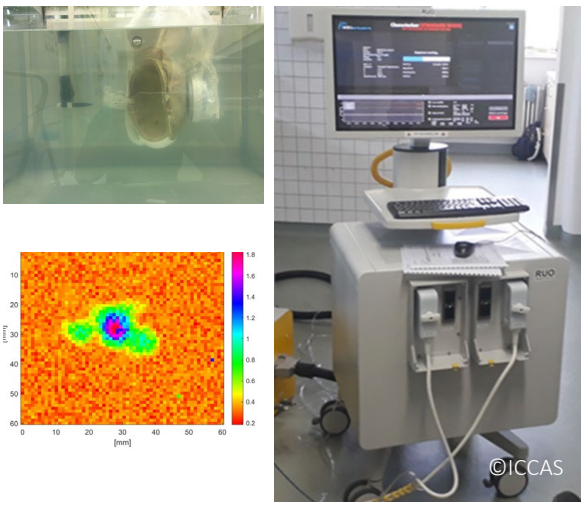


Fig. 5: Acoustic scanning tank for measuring phase aberration with fibre-optic hydrophone. The resulting acoustic field was recorded from the human skull bone in the tank in order to obtain information about the cranial aberration.

sulting acoustic field was recorded. Comparison of both acoustic fields provide insight into the cranial induced aberration and will allow to compensate the distortion in further steps.

The integration of the ultrasound machine in the optical navigation system was successful. The transducer placed on a head phantom visualizes the acoustic field defined by the user. The combined systems enable precise targeting

2.1.2 Research Area: Magnetic Resonance-Guided Interventions – MRGI

MR-Thrombosis-Theranostics – MRI-Guided Minimally Invasive Diagnostics and Therapy of Thrombosis

MR-Thrombosis-Theranostics is an integrated approach that utilizes MR imaging to improve thrombosis diagnosis and treatment. The approach conforms to MR Safety and compatibility regulations and involves iterative development of novel medical instruments and workflows.

With integrated resonant circuits the MR signal is locally enhanced, allowing visualization of thromboembolisms that are trapped in implanted vena cava filters or blocked peripheral arteries. A silicone-based patient model of a human arteriovenous vessel system was used for in-vitro testing of devices and workflows, and testing conditions were made lifelike by incorporating in-vitro blood clots and connecting a pulsatile flow pump system (Fig. 6).

Additionally, a technical setup for interventional MRI was developed to enable real-time control and communication between the physician and technical staff. Successful first procedures were conducted with the patient model, and an animal trial has been authorized for validation using a porcine model.

MR-Stents – MRI-Guided Stent Implantation

The MR-Stents project aims to enable MRI-guided stent implantation, avoiding the risks of ionizing radiation for children with congenital heart disease. The project involves developing devices in collaboration with OEM medical device manufacturers conforming to MR safety and compatibility regulations, including novel MR markers based on paramagnetic nanoparticles or resonant circuits to visualize the stent implantation process.

An MR Safe stenosis-phantom was manufactured to simulate stent implantations and validate developed medical devices and workflows in the MR environment. Animal trials will be conducted using a porcine model to further validate the developed intervention.

The project findings may provide a framework for treating additional use-cases, such as stenting other vascular diseases, the esophagus, liver, and trachea-bronchial system (Fig. 7).

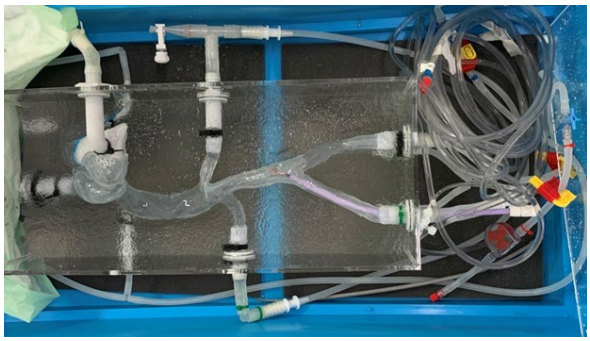


Fig. 6: Silicone-based patient model for simulation of MRI-guided vena cava filter (VCF) delivery with implanted VCF with introduced in-vitro thrombus (white arrows).

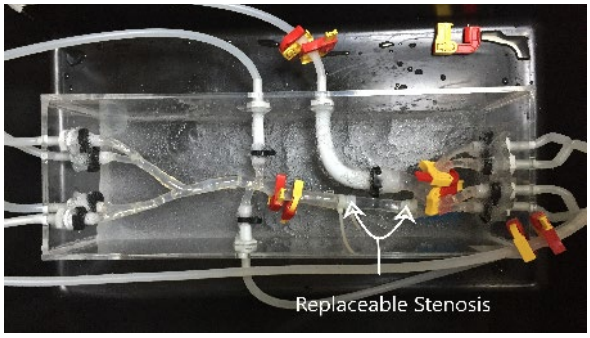


Fig. 7: MR Safe vascular phantom with flow simulation for testing samples in realtime-MRI.

#2.2 MODEL_BASED_MEDICINE AND #INTELLIGENT_OR

Our research focus is the integration of biomedical device technology with medical information systems and data analysis technologies, medical communication technologies, digital twins, and biomedical sensors. Cardinal point of these innovations are “smart” health care technologies, such as operating theatres that adapt to the needs of surgeons or medical technologies using 5G infrastructures for advanced communication. Purpose is the qualitative and quantitative improvement of clinical workflows by refining clinical efficiency and increasing patient safety.

Lead

Prof. Dr. Thomas Neumuth

Modern medicine is no longer conceivable without the use of technology: medicine, information management and biomedical technology converge to an ever greater extent. This development requires a combination of traditional medical devices.

Scientific Staff

Henner Baberowsky, Johann Berger, Richard Bieck, Malte Blattmann, Albrecht Bloße, Stefan Franke, Reinhard Fuchs, Jan Gaebel, Christoph Georgi, Nora Grieb, Johannes Keller, Hyeon Ung Kim, Adrian Lindenmeyer, Ivan Matyash, Clemens Möllenhoff, Juliane Neumann, Alexander Oeser, Tobias Pabst, Alexander Prull, Max Rockstroh, Anna Schatz, Lukas Schmierer, Eric Schreiber, Daniel Schneider, Christian Schulz, Sarah Strobel, Gregor Thürk.

Selected Publications

Grieb N, Schmierer L, Kim HU, Strobel S, Schulz C, Meschke T, Kubasch AS, Brioli A, Platzbecker U, Neumuth T, Merz M, Oeser A.
A digital twin model for evidence-based clinical decision support in multiple myeloma treatment.Front Digit Health 2023; 5: 1324453
DOI: 10.3389/fdgth.2023.1324453

Schenk M, Neumann J, Adler N, Trommer T, Theopold J, Neumuth T, Hepp P.
A comparison between a maximum care university hospital and an outpatient clinic - potential for optimization in arthroscopic workflows? BMC Health Serv Res. 2023; 23(1): 1313
DOI: 10.1186/s12913-023-10259-3

Schneider D, Eggebrecht T, Linder A, Linder N, Schaudinn A, Blüher M, Denecke T, Busse H.
Abdominal fat quantification using convolutional networks. Eur Radiol 2023; 33(12): 8957-8964
DOI: 10.1007/s00330-023-09865-w

#RESEARCH AREAS

SCIENTIFIC_RESEARCH_AREAS_AND_RELATED_PROJECTS

#2.2 MODEL_BASED_AUTOMATION_AND_INTELLIGENT_OR

#2.2.1 MODEL_BASED_AUTOMATION:

MOMENTUM | Mobile Medical Technology for Integrated Emergency Care and Trauma Medicine | Funding: BMBF

6G-Health | Holistic Development of High - Performance 6G Networking for Distributed Medical Technology | Funding: BMBF

KliNet5G | Clinical Networks via 5G | Funding: BMWK

Tri5G | Mobile Medical Technology in a Trimodal Model Region - 5G-Use Cases for Emergency Care in a Public Mobile Network | Funding: BMDV

SDC - VAS – SDC – Distributed Alert System | Development of a Distributed Alert Systembased on the IEEE 11073 SDC - Standards | Funding: BMWK – ZIM-Program

SDC-CSM – SDC – ControlStation Med | Integration of the New SDC Communication Protocol Family into the Daily Workflow of Technical Staff Members in Clinical Environments – collaborative project with GADV mbH | Funding: BMWI

EyeHearU | Multimodal Acquisition, Simulation and Audiovisual Enhancement for the Individual Training of Basic Functional Laparoscopic Skills | Funding: DFG

EOS - RescEU EMT| Emergency Medical Team Operating System | Funding: F&E

ScaDS.AI | Center for Scalable Data Analytics and Artificial Intelligence – Collaborative project | Funding: BMBF

MediNET | Platform for Networking Medical Technology Products | Funding: STARK

5G-COMPASS | Wireless data transmission in the medical environment via LiFi, WiFi and 5G| Funding: VDI/VDE

Open5G-PaceMaker |Management and configuration of real-time capable 5G networks | Funding: BMDV

Miracle-5 | Mixed-Reality Integrated Remote Assistance and Communication in 5G-Enabled Local Environments | Funding: BMDV

Certainty | A cellular immunotherapy virtual twin for personalized cancer treatment| Funding: EU

#2.2.2 DIGITAL_PATIENT_MODEL:

NFDI4DataScience | NFDI for Data Science and Artificial Intelligence | Funding: DFG

KAIT | Knowledge-Driven and Artificial Intelligence-based Platform for Therapy Decision Support in Hematology | Funding: Janssen Pharmaceutica

VOLTA | Validation Of Model-Based Therapy Decision Support in Hematology | SAB, EFRE validation funding

AIQNET | The Medical Data Ecosystem | Funding: BMWi

GenoMed4All | Genomics and Personalised Medicine for all through Artificial Intelligence in Haematological Diseases | Funding: European Union

SaxoCell | Automation Platform for Cell Product Manufacturing | Funding: BMBF

VISION-CRE | Platform for Evidence-based Modeling of Cognitive Reasoning Processes to Support Therapy Decision-making | Funding: Go-Bio Digital BMBF

PRO-RED | Longitudinal, App-based Assessment of Varying Red Blood Cell Transfusion Strategies and their Association with Patient-Reported and Clinical Outcomes in Lower-Risk MDS Patients | DKH

#2.2.3 LIFE_SUPPORT_SYSTEMS:

VITALS | Visualization of Thorax-related Analysis of Life-Signals | Funding: BMWi – ZIM-Program

Brainsaver | Development of Robust Methods for Sensor Position Evaluation and Interference-free Blood Flow Detection | Funding: BMWi – ZIM-Program

2.2.1 Model_Based_Automation

MOMENTUM – Mobile Medical Technology for Integrated Emergency Care and Trauma Medicine

The emergency medical care of patients outside of specialized medical facilities (e.g., hospital, community health center, medical office) requires readily available medical resources, augmented by accessibility to information and medical expertise.

In the MOMENTUM project, the use of 5G-mobile communications technology was evaluated. Within the ambulance Momentum uses a 5G campus network to connect the various components such as medical devices, a HoloLens and a mobile Edge-Cloud. For the connection to the hospital or telemedical facility a public mobile communications network is used. Based on networking technologies, we developed value added services for both the trauma team in the clinic and the emergency team in the field such as an integrated trauma dashboard with telemedicine capabilities and an edge-based guidance systems for ultrasound. As part of the development work, a patent for the intelligent transmission of critical data in unreliable networks was submitted. This is particularly important in order to keep the quality of experience of the medical staff as high as possible, even under challenging network conditions.

In 2023, the technical developments were completed and the systems were evaluated together with different stakeholders. Multi-center surveys and demo presentations were carried out for this purpose.

The integration of various components available on the market with innovative communication technologies and intelligent data processing both in the ambulance and in the edge cloud was very positively received.

6G-Health – Holistic Development of High-Performance 6G Networking for Distributed Medical Technology

The 6G-Health project brings together the domains of communications engineering and medical technology with medical and technical end users to enable precisely tailored technology development in the field of sixth-generation mobile communications (6G). This not only involves the development of specific 6G technology components, but also the early identification of market

Fig. 8: Presentation of the RTW by project end.

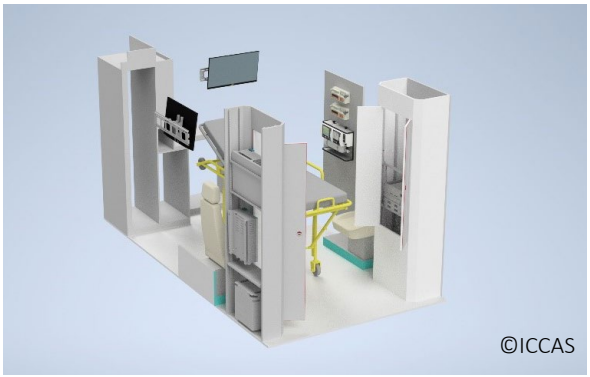


Fig. 9: Internal structure of the networked ambulance as CAD model.

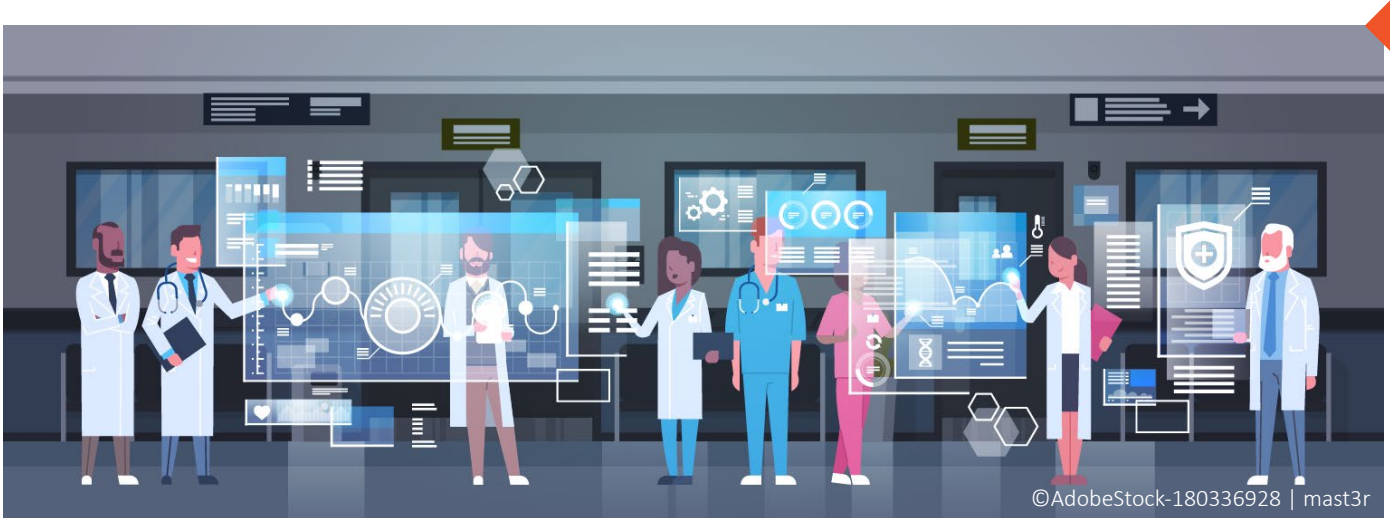


Fig. 10: 6G can contribute greatly to the integration of advanced sensing and processing, and to the seamless integration of all systems involved. This provides the basis for improved technical and clinical systems.

entry barriers and the development of possible countermeasures. These include, above all, the aspects of approval, operation and standardization. Technical core are developments in the area of integration of sensor technology in 6G, the development of technologies for enhanced network intelligence as well as concepts and intelligent distribution of computing resources and efficient pre-processing of data at different pre-processing of data at different levels of the infrastructure.

In its sub-project, Leipzig University Medical Center (UML) is concerned with the transfer of ideas and concepts from the field of 6G research into medical technology applications. From a technical point of view, the main focus is on the investigation of application scenarios for the use of 6G technologies in clinical processes and their optimization. 6G can make a major contribution by providing a flexible, energy-efficient and high-performance infrastructure. Benefits are expected mainly through enhanced sensor technology in clinics including the possibility of Joint Communication and Sensing (JCAS), distributed processing intelligence and significantly reduced power consumption. The medical applications addressed in the project are representative of different classes of medical applications and are intended to highlight a wide range of future challenges and opportunities that can be discussed with communications engineering experts via the 6G platform. In the project, UML sees itself as a mediator between the domains of medicine, communications engineering and medical engineering and, in the sense of a holistic understanding of the project, will consider not only the technical applications but also the requirements for future technologies through standardization and operation. To this end, the work is planned to be closely intertwined with players from the various domains and with experts from the areas of approval, operation, standardization and standardization (see Fig1). The strategic goals of 6G-Health are the development of 6G components for innovative medical applications, analysis of 6G applications with clinical partners, consideration of regulatory, technical and legal frameworks, as well as intensive collaboration with the 6G collaboration with the 6G platform and the 6G hubs to prepare international standardization with a focus on medical technology applications. In the first year of the project, the focus was on identifying the requirements of various technical and clinical areas and translating them into initial architectural concepts. The technical implementation of the project was also prepared in the course of this.

KliNet5G – Clinical Networks via 5G

KliNet5G investigates wireless medical device networking within hospitals using 5G mobile campus networks. The research project aims to modify existing wired communication technologies, e.g. in medical device networks, to 5G wireless solutions. In addition, the benefits for hospital users will be investigated and the results are being bundled into guidelines for hospitals that aim for the installation of 5G campus networks.

The hospital guideline, which includes operator- and cost models for 5G operations, is intended to provide hospitals managers with an informed decision-making basis for the use of 5G campus networks. The manufacturer-guide, which is aimed at medical device manufacturers, includes specific requirements, technological steps for the transfer to 5G technologies.

To reflect a range of medical technology applications, the project considers four use cases: video endoscopy, equipment tracking, constant ECG monitoring via a wearable, and triggering critical functionalities using a foot switch.

In 2023, we collaborated with project partners and consulting firms to design the structure for guidelines and operator models for 5G campus-networks. We defined roles, responsibilities, and formulated technological concepts. Our project partners in the medical technology field implemented first network interfaces and successfully executed trials with various medical devices, including endoscopy equipment, patient monitoring systems, and localization technologies. Furthermore, we have developed concepts for the planning and implementation of 5G campus networks.

Tri5G – Mobile Medical Technology in a Trimodal Model Region – 5G-Use Cases for Emergency Care in a Public Mobile Network

The emergency medical care of patients inside and outside the hospital is based on a complex system of interdependent processes involving many different actors (e.g. doctors, paramedics, nurses) as well as a large number of different medical devices and IT-systems. Especially the treatment outside of specialized medical facilities (e.g., hospital, community health center, medical office) requires the quick and easy availability of medical resources, smooth access to information as well as the availability of medical expertise.

In the Tri5G project, the use of 5G-mobile communications technology is being evaluated based on networking between the ambulance and the hospital or telemedical facility using the tri5G public mobile communications network.

Tri5G settled latency and throughput Tests for Video and Data transmission and data Fusion within public and private mobile 5G networks and within slices of the public network. The correlation between network parameters and throughput was measured. As an essential key element, the application for a public 5G research network was published and the applications collected. The start of a public mobile 5G Network and assistance for this project will be in January 2024.This enables the transmission and processing of medical data in the ambulance as well as further use in clinical systems. The architecture for Iccas Use cases was drawn.

SDC – Distributed Alert System (SDC-DAS) – Development of a Distributed Alert System Based on the IEEE 11073 SDC-Standards

In the research project SDC- Distributed Alarm System (SDC-VAS), the IEEE 11073 SDC communication standard, which enables open, secure and vendor-independent networking of medical devices, is the basis for a novel intelligent distributed alarm system. The deployment of this system is expected to dramatically reduce both alarm fatigue and noise pollution in intensive care units. For this purpose, information from medical SDC devices will be aggregated with data from additional sensors and the clinical information system, integrated, evaluated and then forwarded in the

mosttargeted way possible. In addition, the possibility of alarm prediction based on machine learning algorithms is being investigated. The research will focus on the implementation and extension of the SDC standard, the aggregated data model and the intelligent alarm distribution as well as on machine learning algorithms.

SDC – Control Station Med

"SDC – Control Station Med" is a joint research and development project by GADV mbH and IC-CAS, which started on 1 September 2021. The project, was successfully completed in December 2023, focusses on the integration of the new SDC communication protocol family into the daily workflow of technical staff members in clinical environments. With SDC-CSM, the functionality of SDC-capable devices can be monitored by a central workstation and the foundation has been laid for future predictive maintenance functions. This control station can provide different services such as automatic error handling, documentation, visualising of the system status, or management ratios to facilitate work processes.

Fig. 11: Intensive care units are equipped with a wide range of medical devices. Especially for patients in critical condition, this leads to a high physical and psychological stress due to alarms for the staff.

Functions such as the aggregation and evaluation of technical SDC alarms have already been implemented in a first demonstrator.

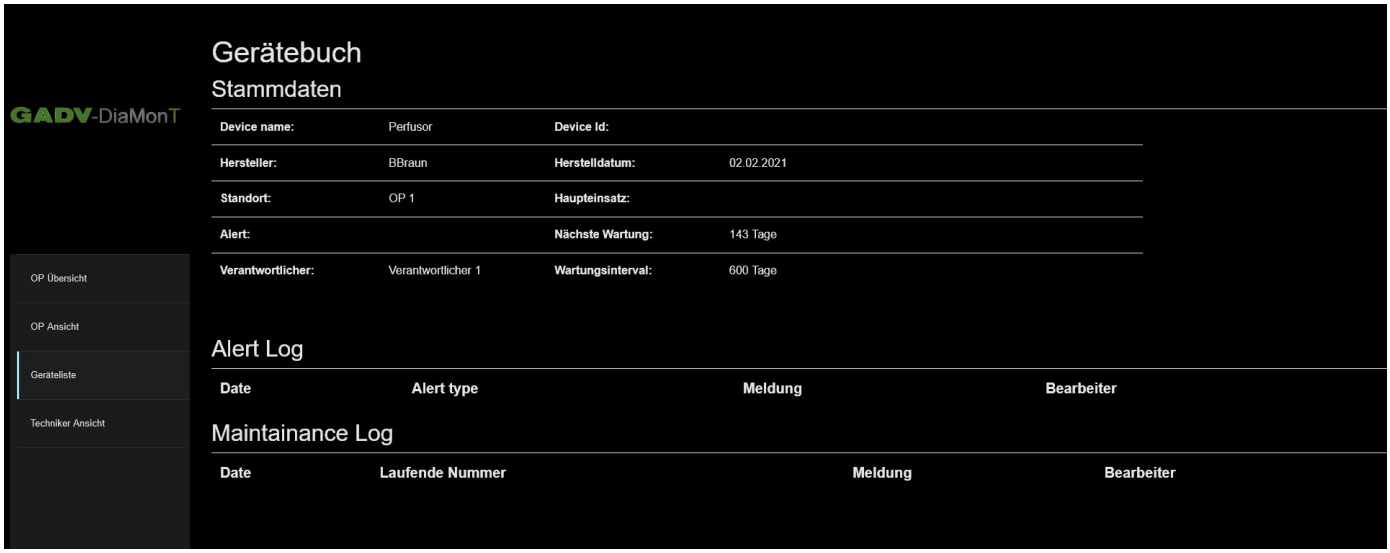


Fig. 12: Exemplary excerpt from the user interface of the control room application. Here, the devices are presented with their current status in operating room 4.

"EyeHearU" – Multimodal Acquisition, Simulation and Audiovisual Enhancement for the Individual Training of Basic Functional Laparoscopic Skills

Minimally-invasive endoscopic surgery is a well-established surgical practice. However, decoupled hand-eye-coordination, limited field-of-view and operating space as well as decreased depth perception, are demanding for both surgeon and equipment. Faced with this complex intraoperative environment, surgeons are required to train their spatial awareness and instrumentation skill from training and live operations. Since training effects on spatial cognition and orientation capabilities vary individually, the quality of laparoscopic training with physical and virtual simulators is dependent on the predisposition of trainees. The training effectiveness and a potential skill transfer to the operating room is generally not predictable.

In this project, we are developing software tools for a novel training assistance systems that acquires multimodal data of individual laparoscopic exercises to predict the current and overall training progression. In response the training system then provides aural and visual feedback cues. A physical simulator extended was extended with multiple sensor components to generate a knowledge base of basic bimanual laparoscopic skills.

At the beginning of 2024, the improved trainers will be employed in a study. The results will be used to evaluate and optimize the assessment algorithms and model-based evaluations for recording training progress and training quality.

RescEU EMT/ EOS – Emergency Medical Operating System

The "EMT Operating System" (EOS) is a field hospital information system, which is tailored to the requirements of Emergency Medical Teams (EMTs) on disaster relief missions. Its idea was created and designed during the EUMFH-Project. The system supports the entire patient treatment process from triage to discharge and is highly configurable to adapt to the needs of the EMT.

Despite EOS being primarily designed as an electronic patient record, it also includes essential functions for EMT mission and field hospital management. Besides patient management and treatment documentation, EOS enables quick de-

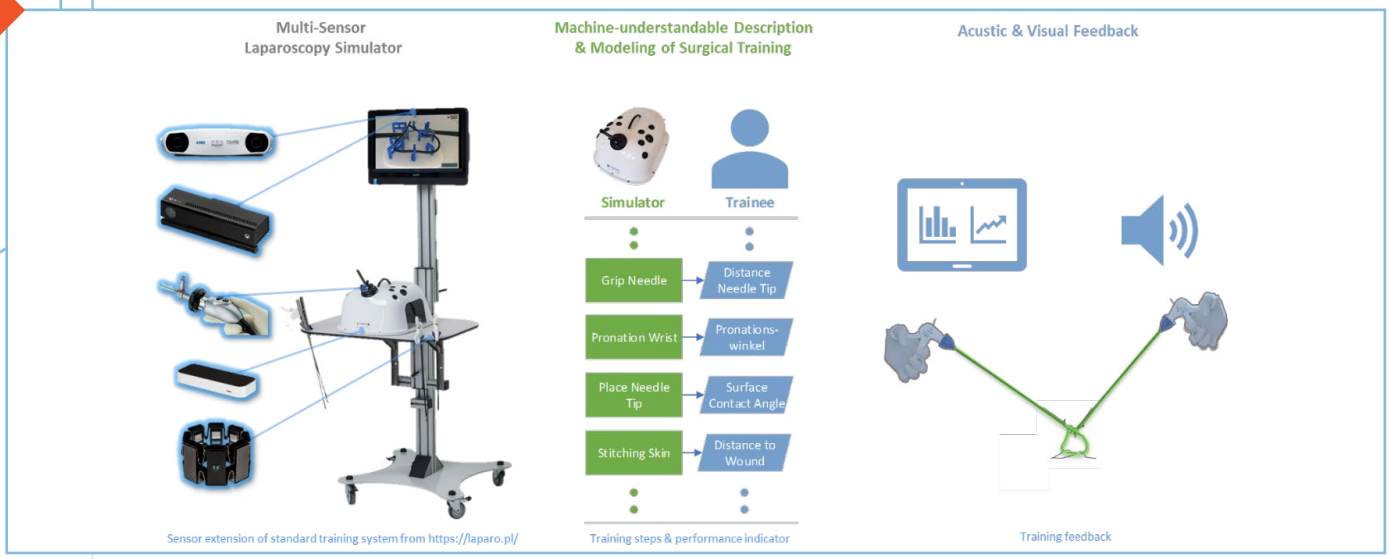


Fig. 13: Overview of the project goals of the audiovisual feedback during laparoscopic training.

partment configuration, visualization of important hospital key performance indicators (patient admissions, triage category count, department workload, etc.), and reporting functionalities (e.g., to local government or WHO).

ScaDS.AI – Center for Scalable Data Analytics and Artificial Intelligence

As one of the recently opened German centers for Artificial Intelligence (AI), ScaDS.AI aims to close the gap between efficient use of large amounts of data in both industry and research and advanced AI methods. For this purpose, the research topics at ScaDS.AI range from foundational AI methodology up to the application of AI in key areas like engineering, environmental systems, industry, and biomedical research, cooperating with many local companies and scientific institutions. Furthermore, increasing the public trust in AI is taken into consideration by integrating ethical and societal perspectives and making research available through the service center and Living Lab.

To push forward AI in the life sciences, ScaDS.AI cooperates with ICCAS by sharing research expertise and computing resources, focusing primarily on model-based, personalized cancer treatments and trustworthy AI-driven clinical decision support.

MediNET – Platform for Networking Medical Technology Products

Digitization and interoperability for location and device-independent access to clinical data will be more firmly established in medicine. The greatest challenges at present are the lack of standardized, interoperable interfaces, the complexity of the clinical IT ecosystem, and the requirements posted by inevitable data protection and security measures. With MediNET, the necessary interconnections between clinics, research and companies will be established.

ICCAS runs a Transfer center to assist regional health care providers and companies with organizational and technical challenges when introducing novel products into the medical environment. Beyond that, ICCAS scientists are developing a technical platform that facilitates clinical studies and innovative treatment strategies with networked medical products.

Based on established international standards and new technologies, the entire spectrum, ranging from mobile point of care devices to clinical information systems, can be addressed. In cooperation with regional companies, the next generation of medical products will be integrated into clinical processes and digital infrastructures in the university hospital.

5G-COMPASS – Wireless Data Transmission in the Medical Environment via LiFi, WiFi and 5G

In the project 5G-COMPASS, different innovative wireless data-transmission technologies are developed to improve data transmission in indoor facilities. The goal in the medical sector is to integrate Light Fidelity (LiFi) and Wireless Fidelity (WiFi) in a way that they are improving data transmission in the hospital, especially the operating room and to improve connectivity and interoperability of medical devices.

To demonstrate the capabilities of those technologies, a LiFi-capable OR-lamp will be integrated in the Demo-OR. Medical devices will transfer data via LiFi to the lamp and thus into the Demo-OR network.

To support manufacturers of medical devices and communication technologies, a test-hardware will be developed. This hardware transfers data from medical devices using WiFi, LiFi and 5G and measures the quality of the transmission. The hardware-architecture has been conceptualized.

OPEN5GPACEMAKER – MANAGEMENT AND CONFIGURATION OF REAL-TIME CAPABLE 5G NETWORKS

Some applications in the areas of Industry 4.0, Agriculture 4.0 and eHealth have very high requirements in terms of reliability and real-time capability that are not met by current wireless network technologies. Especially real-time requirements are a critical factor in the medical device domain and in mobile scenarios. This poses major challenges, particularly for medium-sized companies and non-network experts. The project aims to develop new procedures for the management and configuration of real-time capable 5G campus networks. Proof of the functionality of the overall solution and the assessment of its performance are shown in demonstrators for an Agriculture 4.0 and an eHealth scenario. For this purpose, medical devices will be converted from wired connections to wireless technologies. The solution will be evaluated with regard to the performance of real-time critical eHealth applications. (Fig. 14)

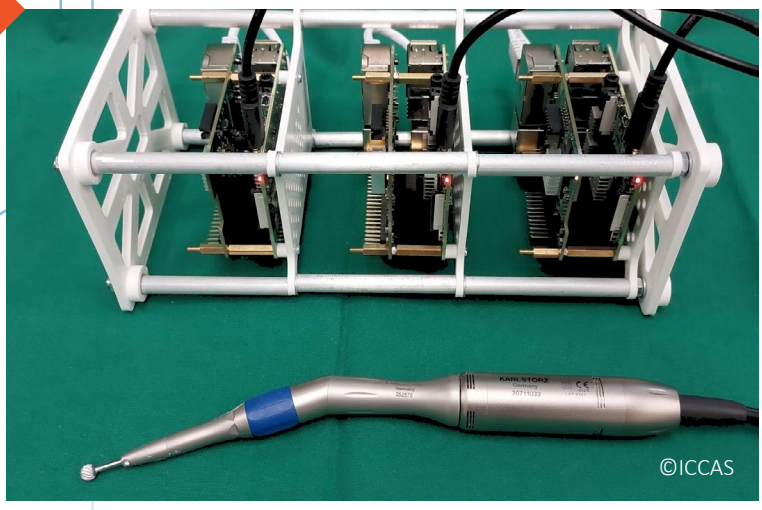


Fig. 14: Integration of medical devices via 5G into a time-sensitive network to meet real-time requirements in a wireless network.

MIRCALE-5 – MIXED-REALITY INTEGRATED REMOTE ASSISTANCE AND COMMUNICATION IN 5G-ENABLED LOCAL ENVIRONMENTS

The project aims to evaluate the performance of modern 5G campus networks for XR-based medical applications. The objective to examine collaborative XR-based telemedicine from a technological and user-centric standpoint, to assess its effectiveness, and suitability for clinical use. To achieve this, a technology demonstrator will be designed and developed to enable testing of an XR-telemedicine application over 5G campus networks. The resulting application will be evaluated by various end-users from relevant clinical fields. Anticipated challenges are synchronization of data coupled with low latency for the targeted cloud and edge-cloud use cases. The partnership between LeFx and ICCAS combines cutting-edge XR visualization with profound experience in campus networks based on 5G technologies for medical applications. Collaboration with Telefonica further enables the employment of modern managed service networks, which can be used in addition to ICCAS's own 5G campus network. These networks will be managed and modified for the intended XR applications. Medical use cases for the technological demonstrator will be developed and tested by a consortium of clinical experts from Helios Parkkankenhaus Leipzig and the Universitätsklinik Leipzig. The UML contributes its extensive medical expertise through collaboration with specialized clinics, its own expertise with the development of AR/XR applications, as well as experience in establishing and operating 5G campus networks.

CERTAINTY – A CELLULAR IMMUNOTHERAPY VIRTUAL TWIN FOR PERSONALIZED CANCER TREATMENT

The EU consortium "CERTAINTY – A cellular immunotherapy virtual twin for personalized cancer treatment" started a 4.5-year research project to

Fig. 15: Presentation with the Microfost HoloLens 2 to show the possibilities of AR for medicine.

implement virtual twin technologies for the personalization of novel cancer therapies. In recent years, immunotherapies have started to establish as an additional treatment option in oncology. Numerous clinical, imaging, molecular and cell analytical data are collected and processed for diagnosis, treatment decisions and follow-up monitoring. The totality of all data within a clinical picture contains enormous potential to improve diagnosis and therapy. ICCAS is developing virtual twins to realize this potential. Using comparative data, virtual twins can then simulate prognoses regarding the course of the disease or various treatment options. Our researchers are developing both the technological infrastructure for virtual twins and the modules for multimodal data evaluation and personalized prediction. In addition, ICCAS develops context-adapted user interfaces that enable seamless integration of virtual twins into clinical approaches and decision-making processes. In this context, ICCAS also supports the implementation of Europe-wide evaluations in close cooperation with our clinical partners.

With CERTAINTY, analysis methods and prediction models that previously were used in isolation are integrated to create a comprehensive, multimodal representation of patients that supports personalized simulations and assist in clinical decision making. To integrate the various modalities and approaches, the EU project develops a modular virtual twin for the treatment of cancer.

In the future, this will support practitioners in selecting the best possible therapy and also relieve the burden on the healthcare system through the more efficient use of costly medications. The initial focus will be on CAR T-cell therapies. The virtual twin is being developed as a backend to example applications for multiple myeloma. It is planned that the virtual twin will comprehensively reflect the individual pathophysiology of patients who are eligible for or are undergoing cellular immunotherapies and will be updated continuously during treatment. A particular focus is on the integration of molecular patterns into the digital calculation models. Other key technologies include the collection and processing of large amounts of data (big data processing), machine learning, personalized in vitro models and software-supported mechanistic models. Another focus of our work is the development of interfaces that ensure data access and interaction between different physical and digital systems, always taking data protection into account. Other aspects taken into account in the project include the integration of socio-economic factors that can influence the course of the disease, as well as future applications for patients.

Funded by the European Union - GA no. No 101136379.

2.2.2 DIGITAL_PATIENT_MODEL

NFDI4DATASCIENCE – NATIONAL RESEARCH DATA INFRASTRUCTURE FOR DATA SCIENCE AND ARTIFICIAL INTELLIGENCE

The project “Nationale Forschungsdateninfrastruktur für Datenwissenschaften und künstliche Intelligenz” (NFDI4DS) intends to represent the Data Science and Artificial Intelligence community in academia. Its research efforts will adapt existing solutions while collaborating with the other NFDI consortia to establish common interfaces. In the initial phase, NFDI4DS will focus on four application areas: language technology, biomedical sciences, information sciences and social sciences. Within the consortium, ICCAS is leading the subproject on biomedical sciences. The subproject is integrating biomedical data into the overall infrastructure that heavily relies on the FAIR data principles. The main challenges include anonymization of case-related data as well as interoperability of data sources, datasets and software components based on standardized interfaces.

KAIT – KNOWLEDGE-DRIVEN AND ARTIFICIAL INTELLIGENCE-BASED PLATFORM FOR THERAPY DECISION SUPPORT IN HEMATOLOGY

The field of hematology faces the challenge of treating a diverse patient population with heterogeneous diseases, often relying on the same therapeutic regimen. With the increasing availability of patient and disease data, physicians must manage and process vast amounts of information during clinical decision-making. The “KAIT” platform aims to address this issue by providing extensive assistance in managing, processing, and representing clinical data. The platform will utilize knowledge engineering, data mining, and machine learning to generate knowledge bases from multimodal information sources.

“KAIT” will assist physicians in deriving optimal treatment strategies for individual patients by actively aiding them in reasoning tasks. By doing so, “KAIT” supports the transition towards personalized therapies in hematology. The platform aims to provide comprehensive assistance to physicians, ultimately enhancing the quality of care for patients (Fig. 16).

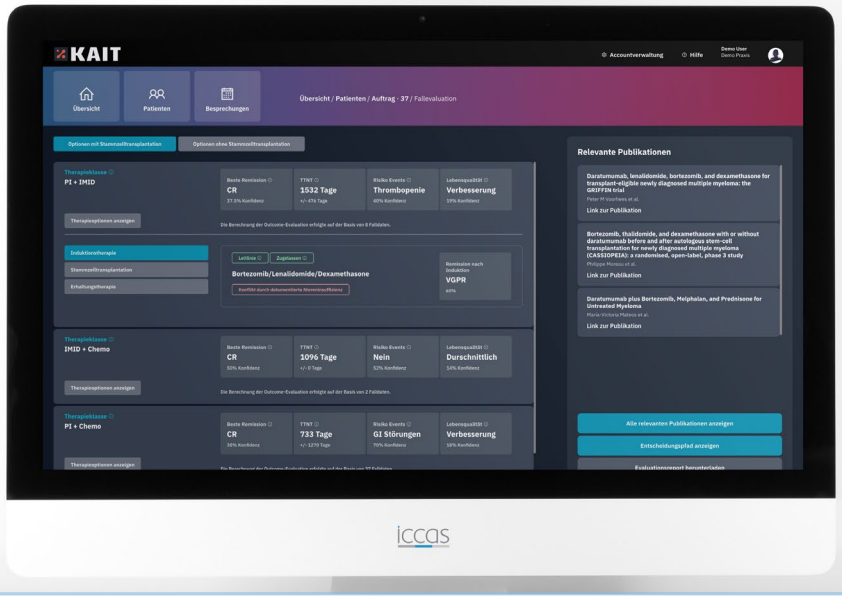


Fig. 16: User interface of the KAIT platform. Based on extensive data analysis, an evaluation of possible therapeutic options for an individual patient is generated.

VOLTA – Validation Of Model-Based Therapy Decision Support in Hematology

Rapid advances in medical and pharmacological research are continually improving cancer treatment methods, which must be increasingly tailored to individual patient characteristics and disease profiles. Since 2020, the ICCAS of the University Medicine Leipzig, in collaboration with the Clinic for Hematology, Cell Therapy, and Hemostaseology, has been developing the IT platform "KAIT" for the analysis of medical information and support of therapy decisions in multiple myeloma (see Fig. 16). The aim is to provide physicians with current knowledge, enabling them to make effective, well-informed decisions. KAIT is intended to play a significant role for myeloma patients in Germany, regardless of their medical care location. Within the VOLTA project, this form of clinical assistance is being further developed, tested, and optimized to establish "KAIT" as a reliable, long-term tool in clinical practice.

AIQNET – The Medical Data Ecosystem

Due to the new Medical Device Regulation of the EU, the requirements for reliable medical device data are continuously increasing. To prove their continuous safety and performance, a market observation of the products based on clinical studies is explicitly required, which also includes a comparative quality and performance evaluation. The acquisition, storage, and analysis of clinical data in compliance with the data protection regulations are essential for this evaluation. Therefore, a medical data ecosystem that ensures compliance with legal and ethical frameworks through state-of-the-art architecture and security technologies was conceptualized and developed in the AIQNET project. Within the framework of the platform, a database was created, which enables both clinics and medical device manufacturers to use clinical data for research and development effectively and in compliance with the EU regulatory framework.

In cooperation with the Division of Spine Surgery at the University of Leipzig Medical Center, ICCAS has developed a "Digital Patient Model". The model integrates different perspectives on the diagnosis and the disease, information on therapies, and the specific characteristics of the patient. With this information base, relevant data is available for clinical trials, which benefits further clinical research on healthcare outcomes. Moreover, prototypic AI-based assistance systems for clinical decision support (e.g. AI-based identification of muscle and fat tissue of the lumbar spine (Fig.17), information visualization (e.g. data fusion in the operating room), and predictive trend analysis have been developed and evaluated.

Thereby, the AI-supported clinical quality and performance assessment could be improved based on previous knowledge about the patient and the treatment.

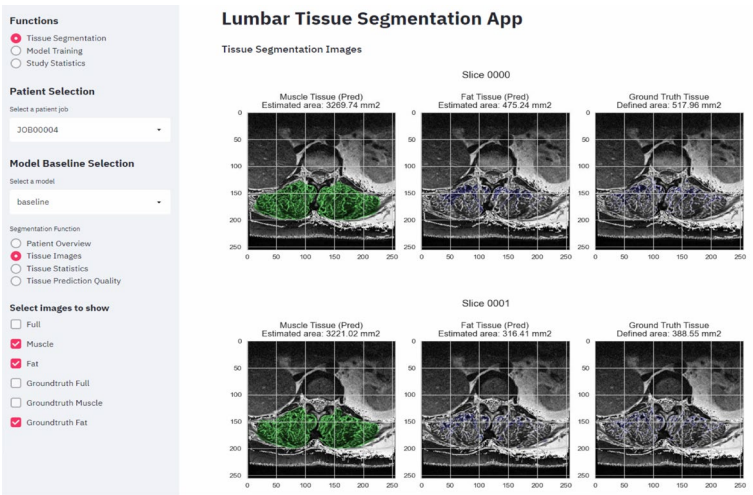


Fig. 17: AI-based Lumbar Tissue Segmentation App – A web interface for clinical exploration of medical image data.

GenoMed4All – Genomics and Personalised Medicine for all through Artificial Intelligence in Haematological Diseases

The GenoMed4All project aims to establish a network infrastructure connecting medical institu-

tions across the EU. The project seeks to promote the exchange of clinical data through a federated learning framework that ensures privacy. By incorporating comprehensive clinical data up to multi-OMICS levels, the project intends to enhance quantitative analysis through machine learning and artificial intelligence methods. The project is focused on hematological diseases, which are increasingly complex due to the use of precision diagnostics and personalized therapies. ICCAS is collaborating with the Clinic and Polyclinic for Hematology, Cell Therapy, and Hemostaseology at the University of Leipzig Medical Center to im-plement federated data integration mechanisms and advanced data standardization based on HL7 FHIR.

SaxoCell – Automation Platform for Cell Product Manufacturing

ICCAS is working on the SaxoCell Systems project, which aims to develop secure mechanisms for tracking necessary resources in the context of Advanced Therapy Medicinal Products (ATMP) development, including findings, cells, and pharmaceutical materials. This is being done using formal process models and interoperable digital resources. A blockchain infrastructure is used to instantiate these digital images and compare them to an ideal process model based on Good Manufacturing Practice (GMP) principles. The goal is to enable seamless traceability for ATMP manufacturing processes, leading to superior and sustainable quality management on the SaxoCell platform.

Vision-Cre – Platform for Evidence-Based Modeling of Cognitive Reasoning Process to Support Therapy Decision-making

Medical decision-making involves a complex consideration of multiple factors and is subject to both, a medical and a regulatory framework where physicians usually rely on indication-specific guidelines to determine the approved treatment options. While these guidelines provide a general framework, they do not account for the vast heterogeneity between patients.

The VISION-CRE project aims to establish a Cognitive Reasoning Engine (CRE) that complements the guideline-based therapy evaluation with a much more granular evidence-based level of outcome assessment. The project focuses on analyzing previously recorded empirical data of the sequence: patient, therapy, and associated outcome to derive valuable conclusions. The overall goal is to assist medical decision-making in a much more personalized and evidence-based way.

PRO-RED – Longitudinal, App-based Assessment of Varying Red Blood Cell Transfusion Strategies and their Association with Patient-Reported and Clinical Outcomes in Lower-Risk MDS Patients

Myelodysplastic neoplasms (MDS) are malignant bone marrow disorders causing ineffective hematopoiesis, cytopenias, genetic instability, and a higher acute myeloid leukemia risk. High-risk MDS receives invasive therapies; low-risk MDS (LR-MDS) primarily involves anemia treated with red blood cell transfusions. PRO-RED, a prospective, longitudinal multicenter study, monitors LR-MDS patients over 6 months for transfusions and routine MDS parameters. Participants use a digital app for bi-daily life quality surveys and monthly standardized MDS-related quality of life and patient-physician trust questionnaires. They also photograph fingernails/eyelids for potential hemoglobin (Hb) analysis. The data will help develop an image-based Hb level algorithm.

2.2.3 Life_Support_Systems

VITALS – Visualisation of Thorax-related Analysis of Life-Signals

The VITALS project targets the development of a system for preclinical use in emergencies that can simultaneously measure and visualize lung and cardiac activity. By synchronized application of electrical impedance tomography (EIT) and electrocardiography (ECG), the small perfusion-related impedance changes of the EIT images are separated from the high-value ventilation-related impedance changes. The separated reconstruction images allow the user to verify that all lung areas have balanced ventilation and perfusion. In the case of existing oxygenation problems, initial conclusions can thus be drawn about the possible cause and accompanying conclusions about respiratory or vascular problems in individual lung areas. In the upcoming year, the developed demonstrator will be prepared and documented for the transfer into a medical product.

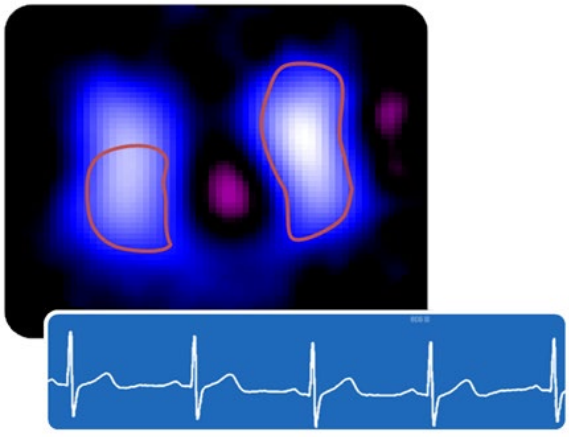


Fig. 18: UP: Reconstructed EIT image with perfused lung areas framed in red; DOWN: ECG curve used for trigger-algorithm.

Brainsaver – Development of Robust Methods for Sensor Position Evaluation and Interference-free Blood Flow Detection

In Germany, at least 50,000 people need to be resuscitated each year, but only about 10% of patients who have received cardiopulmonary resuscitation (CPR) leave the hospital with acceptable neurological outcomes. To improve the resuscitation outcomes, this project will develop a mobile system to monitor carotid artery blood flow during resuscitation. Using an ultrasound wearable specifically designed to detect the carotids in the neck, movements within the vessels are examined non-invasively using Doppler sonography. Based on the evaluation of the waveform in the Doppler spectrogram, the effective arterial flow is calculated and real-time feedback on the resuscitation-measures performed is made possible.

Furthermore, they are currently being used as part of a custom-made product within a study to investigate correlations between patient-specific characteristics and best sensor placement.

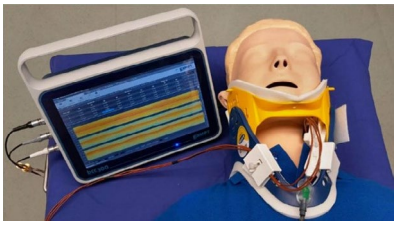


Fig. 19: System of the Phantom with control unit.

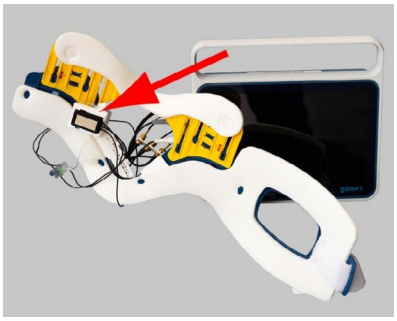


Fig. 20: View from inside, red arrow points to the sensor.

SCIENTIFIC_RESEARCH_AREAS_AND_RELATED_PROJECTS

#2.3 Research Area: Intraoperative_Multimodal_Imaging

MSI - Endoscopic | Endoscopic Multispectral Imaging with Real-time Pulse Oximetry System for Medical Applications | Funding: KARL STORZ SE & Co. KG

HSI - Laparo/Endoscopy | Automated Tissue Recognition and Visualisation with Laparoscopic Hyperspectral Imaging | Funding: KARL STORZ SE & Co. KG

Multiguard | Development of a Multispectral Patient Monitoring System | Funding: BMWI – ZIM-Program

CortexMap | Development of a Novel Navigated Transcranial Magnetic Stimulation System for Non-invasive Mapping of the Motor Cortex| Funding: BMWI – ZIM-Program

LEAD

Prof. Dr. Andreas Melzer

Scientific Staff

Hannes Köhler, Annekatrin Pfahl, Michael Unger.

Selected Publications

Pfahl A, Polat ST, Köhler H, Gockel I, Melzer A, Chalopin C.
Switchable LED-based laparoscopic multispectral system for rapid high-resolution perfusion imaging. J Biomed Opt 2023; 28(12): 126002
DOI: 10.1117/1.JBO.28.12.126002

Thomaßen MT, Köhler H, Pfahl A, Stelzner S, Mehdorn M, Thieme R, Jansen-Winkeln B, Gockel I, Chalopin C, Moulla Y.
In vivo evaluation of a hyperspectral imaging system for minimally invasive surgery (HSI-MIS). Surg Endosc 2023. 37(5): 3691–700.
DOI: 10.1007/s00464-023-09874-2

Cooney GS, Köhler H, Chalopin C, Babian C.
Discrimination of human and animal bloodstains using hyperspectral imaging. Forensic Sci Med Pathol 2023; 0: 0-00
DOI: 10.1007/s12024-023-00689-0

2.3 Intraoperative_Multimodal_Imaging

MSI Endoscope – Endoscopic Real-Time Pulse Oximetry Imaging System for Medical Applications

Multispectral Imaging (MSI) provides information beyond the visual range and might support surgeons to assess the tissue perfusion state in real-time. An endoscopic system was developed in collaboration with Diaspective Vision GmbH and KARL STORZ SE & Co. KG. It was technically evaluated at ICCAS. Furthermore, the calculation and visualization of tissue oxygenation (StO2) and hemoglobin (tHb) as false-color images were developed. Preclinical studies with healthy volunteers were conducted to compare the developed perfusion parameter images to a clinically approved hyperspectral system (HSI) (Fig. 21) and showed promising results for future intraoperative applications.

HSI – Laparo/Endoscopy: Automated Tissue Recognition and Visualisation with Laparoscopic Hyperspectral Imaging

Hyperspectral imaging for minimally invasive surgery (HSI-MIS) was limited, due to missing video, or large set-ups. To address these limitations, compact and rapid laparoscopic HSI with a high spatial and spectral resolution was developed in the LYSIS project.

In four clinical evaluation studies, HSI data were acquired during gastrointestinal procedures with the new HSI-MIS system and quantitatively compared with measurements from an approved HSI system for open surgery (HSI-Open). Different methods for the registration of the HSI data with the colour video were evaluated. Two ongoing clinical studies are investigating HSI-MIS for the classification of tumors in the abdominal cavity and the detection of nerves.

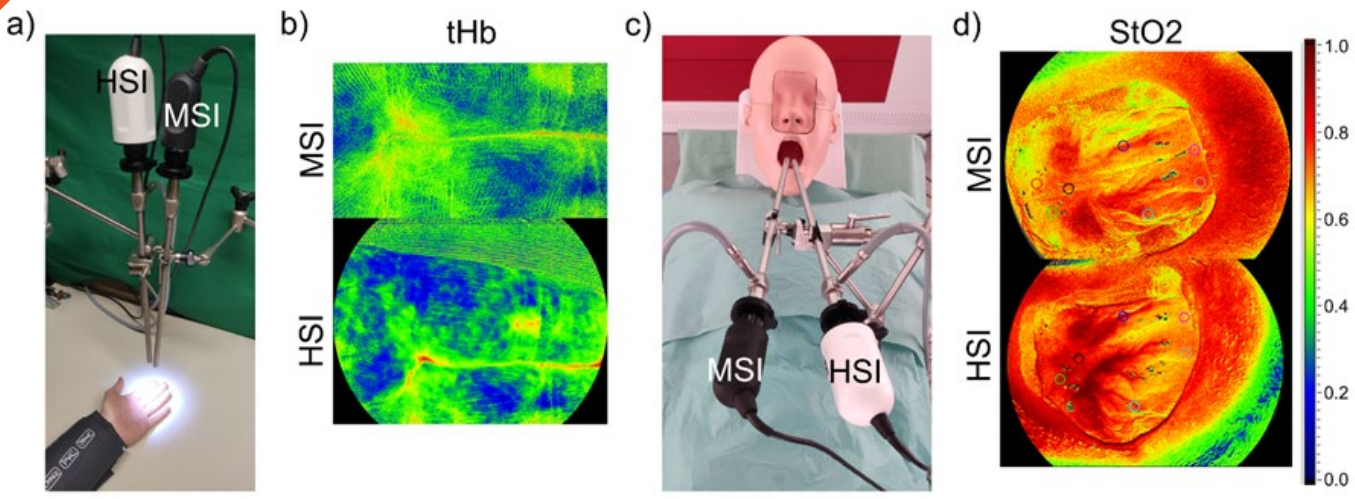


Fig. 21: a) MSI and reference HSI data of hands were acquired during an occlusion study. b) Exemplarily results of the occlusion study. c) Measurements of the underside of the tongue served to estimate the suitability for future organ measurements. d) Exemplarily results of the tongue measurements.

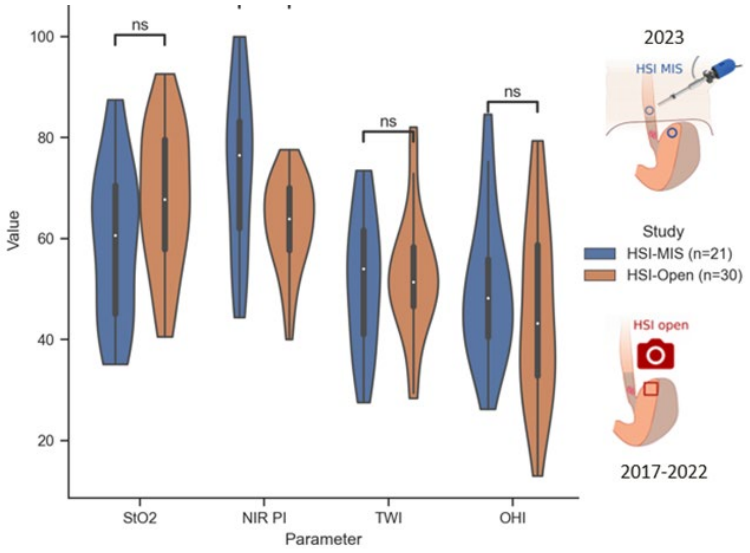


Fig.22: Distribution of the mean tissue parameter values of the gastric conduit (distal anastomotic site) for patients measured by HSI-MIS (2023) and HSI-Open (2017-2022). Significant differences were only found for the NIR-PI (p = 0.012).

MultiGuard – Development of a Multispectral Patient Monitoring System

Tissue perfusion and moisture are physiological parameters that reflect the healthy state of patients. Currently, the standard methods, such as pulse oximetry and transcutaneous electrodes, have limitations especially with respect to the application to premature babies. The devices are in contact with the body and measure the local perfusion. The goal of the MultiGuard project, conducted in collaboration with Diaspective Vision GmbH, is the development of a contactless and non-invasive multispectral system. The system includes a multispectral measurement unit and image processing tools to compute and visualize continuously perfusion and pulsatile parameters, hemoglobin, fat, and water content. The developed system will be evaluated at the neonatology department.

CortexMap – Development of a Novel Navigated Transcranial Magnetic Stimulation System for Non-Invasive Mapping of the Motor Cortex

The aim of the CortexMap project is the development of a novel navigated transcranial magnetic stimulation (nTMS) system for non-invasive mapping of the brain motor cortex of patients with brain tumors. For this purpose, necessary new hardware components and software functionalities will be developed. An electromyography device with 8 or 16 electrodes for the measurement of motor evoked potentials (MEP) will enable faster and more precise examinations. Functionalities to automatically adjust the intensity of the stimulation and post-process the MEP will lead to accurate mapping of the motor cortex. New visualization and data analysis features will support the surgeons for the interpretation of the measurements too. Therefore, the monitoring of patients will become more efficient.

SCIENTIFIC_RESEARCH_AREAS_AND_RELATED_PROJECTS

#2.4 Research Area: Biomedical_Data_Analysis

PostStroke | Mobile, Digital System to Strengthen Relapse Prevention, Health Competence and Self-reliance | Funding: Freistaat Sachsen – eHealthSax

LEAD

Prof. Dr. Thomas Neumuth

Scientific Staff

Prof. Dr. Galina Ivanova, Andreas Schneider, Max Schreiber, Jean-Baptiste Tylcz.

Selected Publications

Tylcz JB, Schreiber M, Michalski D, Classen J, Ivanova G.
Method for the Quantification of Health Related Physical Activity Intensity Using Consumer Mobile Sensors. Applied Sciences 2023; 13(5): 3352.
DOI: 10.3390/app13053352

2.4 Biomedical_Data_Analysis

PostStroke Manager: Mobile, Digital System to Strengthen Relapse Prevention, Health Competence and Self-Reliance

ICCAS, the Clinic and Polyclinic for Neurology and the Department of General Medicine at the University of Leipzig Medical Faculty are developing the PostStroke-Manager, a patient-centered digital concept to improve post-stroke care. The implemented system includes a patient app, wearables as well mobile devices, general practitioner portal, and case manager portal, all embedded in a specially developed IT-infrastructure. The goal is to support stroke patients during their recovery in the first year after the first event. A pilot study is currently underway to test and optimize the system in different sectors, including acute hospitals and home environments. The long-term feasibility study involves over 35 stroke patients, 30 primary care physicians, and two stroke case managers. The PostStroke-Manager is being designed to enhance patient after stroke care and integrate the different involved in the treatment groups.

Fig. 23: Patient kit for analysis and support of patients after a stroke.

#ORGANIZATION

EXECUTIVE DIRECTOR

Human Medicine & Dentistry

Melzer, Andreas

TECHNICAL DIRECTOR

Computer Science, Electrical Engeneering

Neumuth, Thomas

STAFF

Alshirbaji	Tamer Abdulbaki	Biomedical Engineering
Al-Keldi	Qasem	Bioinformatics
Assy	Wael	Medical Informatics
Athner	Katrin	Business Management
Baberowsky	Henner	Media Computer Science
Berger	Johann	Computer Science
Bieck	Richard	Computer Science
Bischoff	Philipp	Computer Science
Birkigt	Jan	Mechanical Engineering
Blattmann	Malte	Computer Science
Bloße	Albrecht	Pedagogy
Bohn	Stefan	Biomedical Engineering
Bredehorst	Anke	Cultural Studies
Cabal Aragón	Jesús Guillermo	Electrical Engineering
Chalopin	Claire	Mecial Imaging
Condori Alagón	Héctor	BioComputer Science and Physics
Dawood	Ayzer	Computer Science
de Hoop	Tom	Human Medicine
Dieckmann	Lisa	Computer Science
Eger	Andreas	Mathematics and Physics
Ferle	Maximilian	Neurosciences
Focking	Joel	Mechanical Engineering
Franke	Stefan	Computer Science
Fuchs	Reinhard	Electrical Engineering and Information Technology
Gaebel	Jan	Computer Science
Galina	Ivanova	Biomedical Engineering and Computer Science
Georgi	Christoph	Computer Science
Gholami Bajestani	Denis	Medical Engineering and Technical Mathematics
Giri	Priya	Mathematics
Glaser	Bernhard	Computer Science
Grieb	Nora	Medical Engineering
Große Meininghaus	Jan-Lukas	Law
Handel	Till	Physics
Hansen	Sophie	Computer Science

Haugrund	Lea	Computer Science
Heine	Jonas	Computer Science
Hikal	Aisha	Human Medicine
Huber	Benjamin	Computer Science
Jalal	Nour Aldeen	Biomedical Engineering
Joeres	Fabian	Computer Science and Engineering
Katalinic	Mika	Human Medicine
Keller	Johannes	Computer Science and Logic
Kim	Hyeon Ung	Computer Science
Kleber	Franz	Medical Informatics
Köhler	Hannes	Medical Engineering
König	Korinna	Meteorology
Krabbes	Frederik	Humanities
Lepach	David	Computer Science
Lindenmeyer	Adrian	Mechanical Engineering
Maktabi	Marianne	Computer Science
Matyash	Ivan	Mechanical Engineering
Melzer	Andreas	Human Medicine and Dentistry
Möllenhoff	Clemens	Business Computer Science
Neumann	Juliane	Computer Science
Neumuth	Thomas	Computer Science and Electrical Engineering
Norden	Natalie	Office Communication
Oeser	Alexander	Media Management
Pabst	Tobias	Computer Science
Pfahl	Annekatrin	Medical Engineering
Pfeiffer	Toni	Computer Science
Pretzsch	Diana	Mediatechnic
Prull	Alexander	Computer Science
Raj	Arunima	Biotechnology
Reich	Martin	Sensorics and Cognitive Psychology
Reske	Andreas	Human Medicine
Richter	Michael	Computer Science
Rockstroh	Max	Computer Science
Rudolph	Marcus	Computer Science
Ruppel	Finn	Computer Science
Schatz	Anna	Cognitive Science
Schenk	Martin	Human Medicine
Schneider	Daniel	Physics
Schöfer	Patrick	Biomedical Engineering
Scholtz	Andreas	Commercial Law
Schreiber	Erik	Computer Science
Schreiber	Max	Mathematics
Schulz	Christian	Computer Science
Schülert	Leon	Training as an MTRA
Steinert	Richard	Mechanical Engineering
Stelzner	Tim	Computer Science
Strobel	Sarah	Biology
Thümmler	Moritz	Electrical Engineering and Information Technology
Thürk	Gregor	Computer Science
Tkachenko	Maria	Software Engineering
Tretbar	Steffen	Medical engineering
Tschachtli	Christine	Office Communication
Tylcz	Jean-Baptiste	Automatic Control
Unger	Michael	Computer Science
Vanajakumar	Gokul	Biomedical Engineering
Vi	Trang	Mechanical and Medical Engineering
Wahl	Tom-Adrian	Computer Science
Wolschewski	Anastasia	Bioinformatics
Zeumer	Christoph	Humanities
Zill	Marcel	Disaster Management and Risk Governance

#ORGANIZATION

ICCAS BOARD

Prof. Dr. Andreas Melzer
- Director | Innovation Center Computer Assisted Surgery

Prof. Dr. Thomas Neumuth
- Technical Director | Innovation Center Computer Assisted Surgery

Prof. Dr. Michael A. Borger
- Head of Department Cardiac Surgery, University of Leipzig Medical Center | Heart Center Leipzig

Prof. Dr. Andreas Dietz
- Director | Department of Otolaryngology, University of Leipzig Medical Center

Prof. Dr. Gerhard Hindricks
- Medical Director and Senior Physician of the Department of Rhythmology | Heart Center Leipzig

Univ.-Prof. Dr. Ines Gockel, MBA
- Chair of the Department of Visceral, Transplant, Thoracic and Vascular Surgery, Department of Operative Medicine (DOPM), University of Leipzig Medical Center

Prof. Dr. Heinz U. Lemke
- Executive Director | International Foundation for Computer Assisted Radiology and Surgery (IFCARS)

ADVISORY BOARD

Prof. Dr. Bernhard Preim (spokesman)
- Head | Visualization Group, Department of Simulation and Graphics, Faculty of Computer Science, Otto von Guericke University Magdeburg

Dr.-Ing. Klaus Irion
- Member of the Supervisory Board | Karl Storz SE & Co. KG

Prof. Dr. Volkmar Falk
- Medical Director | Department of Cardiothoracic and Vascular Surgery, Deutsches Herzzentrum Berlin

Prof. Dr. Ron Kikinis
- B. Leonard Holman Professor of Radiology, Harvard Medical School
- Founding Director, Surgical Planning Laboratory
- Vice-Chair for Biomedical Informatics Research, Department of Radiology, Brigham and Women's Hospital

Robert Krieg Ph.D.
- Siemens Healthcare GmbH | VP in Siemens Healthineers' business line Magnetic Resonance

Prof. Dr. Nassir Navab
- Head | Chair for Computer Aided Medical Procedures & Augmented Reality, Department of Informatics, Technical University Munich

Prof. Dr. Andrea Schenk
- Deputy Institute Director, Fraunhofer MEVIS, Professor for Computer-Assisted Diagnosis and Therapy, Hannover Medical School

Prof. Dr. Dipl.-Ing. Thomas Schmitz-Rode
- Director | Institute of Applied Medical Engineering, Helmholtz-Institute of RWTH Aachen, University & Hospital

CLINICAL COMMITTEE

Dr. Andreas Boehm
- Senior Consultant and deputy head for Ear, Nose and Throat (ENT) at Hospital St. Georg, Leipzig

Dr. Harald Busse
- Medical Physicist at the Department of Diagnostic and Interventional Radiology, University of Leipzig Medical Center

Prof. Dr. Christian Etz
- Senior Physician Aortic Surgery, Heart Center Leipzig; Director of the Saxonian Incubator for Clinical Translation (SIKT), Leipzig University

Univ.-Prof. Dr. Ines Gockel, MBA
- Chair of the Department of Visceral, Transplant, Thoracic and Vascular Surgery, Department of Operative Medicine (DOPM), University of Leipzig Medical Center

Prof. Dr. Rainer Haak
- Director of the Department of Dentistry and Parodontology, University of Leipzig Medical Center

Dr. Dirk Halama
- Head Senior Physician and Deputy Clinic Director at the Department for Head, Neck and Plastic Surgery, University of Leipzig Medical Center

Prof. Dr. Dr. Thomas Hierl
- Senior Consultant for Oral and Maxillofacial Surgery and Plastic Surgery

Prof. Dr. Gerhard Hindricks
- Medical Director and Senior Physician of the Department of Rhythmology | Heart Center Leipzig

Prof. Dr. Albrecht Hoffmeister
- Clinical Director Gastroenterology, University of Leipzig Medical Center

Dr. Philipp Kiefer
- Consultant Surgeon Catheter-assisted Valve Replacement/TAVI, Heart Center Leipzig

Prof. Dr. Martin Lacher
- Director of the Department for Paediatric Surgery, University of Leipzig Medical Center

PD Dr. Dirk Lindner
- Senior Physician at the Department of Neurosurgery, University of Leipzig Medical Center

Dr. Michael Moche
- Director at Department of Cardiac Surgery, Helios Park-Klinikum Leipzig

Dr. Thilo Noack
- Consultant Surgeon of the Clinic for Interventional radiology, Heart Center Leipzig

PD Dr. med Georg Osterhoff
- Deputy Head of Trauma Surgery, Managing Senior Physician, Head of Sarcoma Center & Tumor Orthopedics, Deputy D-doctor

Dr. Tim-Ole Petersen
- Senior Consultant at the Clinic for Diagnostic and Interventional Radiology, Hospital St. Elisabeth & St. Barbara, Halle (Saale)

Dr. Markus Pirlich
- Senior Physician ENT medicine, University of Leipzig Medical Center

PD Dr. Andreas Reske
- Director of the Center of Anaesthesiology, Intensive Care Medicine, Emergency Medicine and Pain Therapy, Heinrich-Braun-Klinikum Zwickau

Prof. Dr.-Ing. Bernhard Sattler
- Head of the Medical Physics Section of the Department of Nuclear Medicine, University of Leipzig Medical Center

Prof. Dr. Sebastian Stehr
- Director of the Department for Anesthesiology and Intensive Care, University of Leipzig Medical Center

#UNIVERSITY COURSES

LEIPZIG UNIVERSITY

Computer Assisted Surgery
Faculty of Mathematics and Computer Science
Introduction to computer-assisted surgery for medical professionals
Lecture and practical course

Project Management
Faculty of Mathematics and Computer Science
Lecture

System Innovation in Medicine
Faculty of Mathematics and Computer Science
Lecture and seminar

Development of Medical Products
Faculty of Mathematics and Computer Science
Lecture

LEIPZIG UNIVERSITY OF APPLIED SCIENCES (HTWK)

Project Management for Engineers
Faculty of Electrical Engineering and Information Technology, Mechanical and Energy Engineering
Lecture and practical course

Systems Engineering
Faculty of Electrical Engineering and Information Technology
Lecture

Studium generale: Engineering technology for the medicine of the future
Faculty of Electrical Engineering and Information Technology, Mechanical and Energy Engineering
Lecture

OTTO VON GUERICKE UNIVERSITY MAGDEBURG

Development of Medical Products
Faculty of Mathematics and Computer Science
Lecture

BACHELOR DEGREES

Benjamin Huber
„Implementierung von modularen Bausteinen für neuronale Netzwerke, Einlesen von medizinisch hyperspektralen Bildern und Vorverarbeitung von Daten für das Training neuronaler Netzwerke zur Erkennung von Gewebe- und Tumorarten."
Leipzig University of Applied Sciences (HTWK)

Milena Wählisch
„Augmented Reality in der medizinischen Reanimation: Analyse zur Verbesserung der Benutzerfreundlichkeit für ein Microsoft HoloLens Interface."
Leipzig University of Applied Sciences (HTWK)

MASTER DEGREES

Annika Haenel
„Erarbeitung von Methoden für die Bewertung der Projektionsgenauigkeit bei der intraoperativen Visualisierung mittels Extended Reality. "
Technical University Chemnitz

Kim Hyeon Ung
„Synthetic Data Generation of Sparse Data using a Semi-GAN-based Method."
Leipzig University

Raphael Luz Y Graf
„Development of an augmented reality visualization for interactive collaborative work on three-dimensional structures."
Leipzig University

Marie-Luise Müller
„Klassifizierung von hyperspektral aufgenommenen histologischen Schnittpräparaten des Pankreas unter Einsatz Künstlicher Neuronaler Netze. "
Dresden University of Applied Sciences (HTW)

Patrick Schöfer
„Classification of intervertebral disc degeneration- A graph-based approach using Geometric Deep Learning and Explainable Artificial Intelligence."
Leipzig University

DOCTORATE DEGREES

Bernhard Glaser
„Erkennung, Simulation und Analyse der chirurgischen Instrumentation."
Leipzig University

TOP 5 PUBLICATIONS

Hikal A, Gaebel J, Neumuth T, Dietz A, Stoehr M.
A Treatment Decision Support Model for Laryngeal Cancer Based on Bayesian Networks.
Biomedicines 2023; 11(1): 110.

Hu S, Zhang X, Melzer A, Landgraf L.
Ultrasound-induced cavitation renders prostate cancer cells susceptible to hyperthermia: Analysis of potential cellular and molecular mechanisms.
Front Genet. 2023; 14: 1122758.

Schneider D, Eggebrecht T, Linder A, Linder N, Schaudinn A, Blüher M, Denecke T, Busse H.
Abdominal fat quantification using convolutional networks.
Eur Radiol 2023; 33(12): 8957-8964

Tkachenko M, Chalopin C, Jansen-Winkeln B, Neumuth T, Gockel I, Maktabi M.
Impact of Pre- and Post-Processing Steps for Supervised Classification of Colorectal Cancer in Hyperspectral Images.
Cancers (Basel) 2023; 15(7): 2157.

Zhang X, Greiser S, Roy U, Lange F, van Gorkum R, Fournelle M, Speicher D, Tretbar S, Melzer A, Landgraf L.
Evaluation of a Developed MRI-Guided Focused Ultrasound System in 7 T Small Animal MRI and Proof-of-Concept in a Prostate Cancer Xenograft Model to Improve Radiation Therapy.
Cells 2023; 12(3): 481

FIRST- AND SENIORAUTORSHIP

Alshirbaji TA, Jalal NA, Docherty PD, Neumuth T, Moeller K.
A comparative evaluation of spatial pooling methods for surgical tool detection.
Current Directions in Biomedical Engineering 2023; 9(1): 214-217

Alshirbaji TA, Jalal NA, Neumuth T, Moeller K.
Fusing CNN features to improve generalisability for surgical tool classification
Proceedings on Automation in Medical Engineering 2023; 2(1): 757-757

Chalopin C, Pfahl A, Köhler H, Knospe L, Maktabi M, Unger M, Jansen-Winkeln B, Thieme R, Moulla Y, Mehdorn M, Sucher R, Neumuth T, Gockel I, Melzer A.
Alternative intraoperative optical imaging modalities for fluorescence angiography in gastrointestinal surgery: spectral imaging and imaging photoplethysmography.
Minim Invasive Ther Allied Technol 2023; 32(5): 222-232

Cooney GS, Köhler H, Chalopin C, Babian C.
Discrimination of human and animal bloodstains using hyperspectral imaging.
Forensic Sci Med Pathol 2023; 0: 0-00

Grieb N, Schmierer L, Kim HU, Strobel S, Schulz C, Meschke T, Kubasch AS, Brioli A, Platzbecker U, Neumuth T, Merz M, Oeser A.
A digital twin model for evidence-based clinical decision support in multiple myeloma treatment.
Front Digit Health 2023; 5: 1324453

Jalal NA, Abdulbaki Alshirbaji T, Laufer B, Docherty PD, Neumuth T, Moeller K.
Analysing multi-perspective patient-related data during laparoscopic gynaecology procedures.
Sci Rep 2023; 13(1): 1604

Jalal NA, Alshirbaji TA, Docherty PD, Arabian H, Laufer B, Krueger-Ziolek S, Neumuth T, Moeller K. Laparoscopic Video Analysis Using Temporal, Attention, and Multi-Feature Fusion Based-Approaches.
Sensors (Basel) 2023; 23(4): 1958

Jalal NA, Alshirbaji TA, Laufer B, Docherty PD, Neumuth T, Moeller K
Computer-assisted generation of anaesthesia report during laparoscopic procedures.
Current Directions in Biomedical Engineering 2023; 9(1): 463-466

Jalal NA, Alshirbaji TA, Docherty PD, Arabian H, Neumuth T, Moeller K.
Surgical Tool Classification & Localisation Using Attention and Multi-feature Fusion Deep Learning Approach.
IFAC-PapersOnLine 2023; 56(2): 5626-5631
Kasparick M, Klotz T, Thürk G, Andersen B, Rother B, Golatowski F, Neumuth T, Rockstroh M.
Silent ICU based on IEEE 11073 SDC.
Current Directions in Biomedical Engineering 2023; 9(1): 303-306

Keller J, Lindenmeyer A, Blattmann M, Gaebel J, Schneider D, Neumuth T, Franke S.
Using Digital Twins to Support Multiple Stages of the Patient Journey.
Stud Health Technol Inform 2023; 301: 227–32.

Landeck T, Schwarz H, Hammermüller S, Noreikat K, Reske S, Gottschaldt U, Nestler C, Wolf SJ, Ramm J, Lange M, Wrigge H, Girrbach F, Brehm W, Reske AW.
High positive end-expiratory pressure ventilation mitigates the progression from unilateral pulmonary contusion to ARDS. An animal study.
J Trauma Acute Care Surg 2023; (0): 0-0

Pathak P, Chalopin C, Zick L, Köhler H, Pfahl A, Rayes N, Gockel I, Neumuth T, Melzer A, Jansen-Winkeln B, Maktabi M.
Spectral Similarity Measures for In Vivo Human Tissue Discrimination Based on Hyperspectral Imaging.
Diagnostics (Basel) 2023; 13(2): 195

Pfahl A, Polat ST, Köhler H, Gockel I, Melzer A, Chalopin C.
Switchable LED-based laparoscopic multispectral system for rapid high-resolution perfusion imaging.
J Biomed Opt 2023; 28(12): 126002

Schatz A, Osterhoff G, Joeres F, Neumuth T, Rockstroh M.
Data Exchange Between Ambulance and Trauma Center: Interview Study About the Needs of Emergency Trauma Room Staff.
Stud Health Technol Inform 2023; 301: 115-120

Schenk M, Neumann J, Adler N, Trommer T, Theopold J, Neumuth T, Hepp P.
A comparison between a maximum care university hospital and an outpatient clinic- potential for optimization in arthroscopic workflows?
BMC Health Serv Res. 2023; 23(1): 1313

Thomaßen MT, Köhler H, Pfahl A, Stelzner S, Mehdorn M, Thieme R, Jansen-Winkeln B, Gockel I, Chalopin C, Moulla Y.
In vivo evaluation of a hyperspectral imaging system for minimally invasive surgery (HSI-MIS).
Surg Endosc 2023. 37(5): 3691–700.

Tylcz JB, Schreiber M, Michalski D, Classen J, Ivanova G.
Method for the Quantification of Health Related Physical Activity Intensity Using Consumer Mobile Sensors.
Applied Sciences 2023; 13(5): 3352.

CO-AUTORSHIP

Zill M, Eimer C, Rogge A, Bathe J, Hoffmann F, Lorenzen U, Reifferscheid F, Hossfeld B, Schimpf J, Grünewald M, Gräsner JT, Seewald S.
[Ethical aspects of mechanical resuscitation in a child: Results of an expert workshop within the BMBF project CLAIRE-Childrens Automated Intelligent Resuscitation].
Med Klin Intensivmed Notfmed 2023; 118(3): 180-184

Arabian H, Abdulbaki Alshirbaji T, Jalal NA, Krueger-Ziolek S, Moeller K.
P-CSEM: An Attention Module for Improved Laparoscopic Surgical Tool Detection.
Sensors (Basel) 2023; 23(16): 7257

Arabian H, Abdulbaki Alshirbaji T, Schmid R, Wagner-Hartl V, Chase JG, Moeller K
Harnessing Wearable Devices for Emotional Intelligence: Therapeutic Applications in Digital Health.
Sensors (Basel) 2023; 23(19): 0-00

Fischer L, Grieb N, Platzbecker U, Vucinic V, Merz M.
CAR T cell therapy in multiple myeloma, where are we now and where are we heading for?
Eur J Haematol 2023; 0: 0-00

Gil-Rios MA, Chalopin C, Cruz-Aceves I, Lopez-Hernandez JM, Hernandez-Gonzalez MA, Solorio-Meza SE.
Automatic Classification of Coronary Stenosis Using Feature Selection and a Hybrid Evolutionary Algorithm
Axioms 2023; 12(5): 462-462

Gulamhussene G, Rak M, Bashkanov O, Joeres F, Omari J, Pech M, Hansen C.
Transfer-learning is a key ingredient to fast deep learning-based 4D liver MRI reconstruction.
Sci Rep 2023; 13(1): 11227

Heuermann K, Bieck R, Dietz A, Fischer M, Hofer M, Neumuth T, Pirlich M.
BIOPASS hybrid navigation for endoscopic sinus surgery- an assistance system.
Laryngorhinootologie 2023; 102(1): 32–9.

Keenlyside A, Marples T, Gao Z, Hu H, Nicely LG, Nogales J, Li H, Landgraf L, Solth A, Melzer A, Hossain-Ibrahim K, Huang Z, Banerjee S, Joseph J.
Development and optimisation of in vitro sonodynamic therapy for glioblastoma.
Sci Rep 2023; 13(1): 20215

Kronreif G, Melzer A, Kanehira E.
In Memoriam: Joachim Kettenbach (1960-2023).
Minim Invasive Ther Allied Technol 2023; 32(5): 273-274

Kunz V, Wildfeuer V, Bieck R, Sorge M, Zebralla V, Dietz A, Neumuth T, Pirlich M.
Keyword-augmented and semi-automatic generation of FESS reports: a proof-of-concept study.
Int J Comput Assist Radiol Surg 2023; 18(5): 961–8.

Laufer B, Hoeflinger F, Docherty PD, Jalal NA, Krueger-Ziolek S, Rupitsch SJ, Reindl L, Moeller K.
Characterisation and Quantification of Upper Body Surface Motions for Tidal Volume Determination in Lung-Healthy Individuals.
Sensors (Basel) 2023; 23(3): 1278.

Laufer B, Docherty PD, Murray R, Krueger-Ziolek S, Jalal NA, Hoeflinger F, Rupitsch SJ, Reindl L, Moeller K.
Sensor Selection for Tidal Volume Determination via Linear Regression-Impact of Lasso versus Ridge Regression.
Sensors (Basel) 2023; 23(17): 0-00

Laufer B, Jalal NA, Docherty PD, Busch C, Krueger-Ziolek S, Hoeflinger F, Chase JG, Reindl L, Moeller K.
Wearable Tidal Volume Determination via one Circumferential Measurement and three Strain Gauges- a Pilot Study.
IFAC-PapersOnLine 2023; 56(2): 7359-7364

Laufer B, Krueger-Ziolek S, Jalal NA, Docherty P, Hoeflinger F, Reindl L, Moeller K.
Symmetry of Respiration Induced Upper Body Movements.
Current Directions in Biomedical Engineering 2023; 9(1): 479-482

Schmidt R, Geisler D, Urban D, Pries R, Franzisket C, Voigt C, Ivanova G, Neumuth T, Classen J, Wagner M, Michalski D.
Stroke survivors' preferences on assessing patient-reported outcome measures.
J Patient Rep Outcomes 2023; 7(1): 124

Schneider M, Rolfs C, Trumpp M, Winter S, Fischer L, Richter M, Menger V, Nenoff K, Grieb N, Metzeler KH, Kubasch AS, Sockel K, Thiede C, Wu J, Woo J, Brüderle A, Hofbauer LC, Lützner J, Roth A, Cross M, Platzbecker U.
Activation of distinct inflammatory pathways in subgroups of LR-MDS.
Leukemia 2023; 37(8): 1709–18.

Thomaßen MT, Köhler H, Pfahl A, Stelzner S, Mehdorn M, Thieme R, Jansen-Winkeln B, Gockel I, Chalopin C, Moulla Y.
In vivo evaluation of a hyperspectral imaging system for minimally invasive surgery (HSI-MIS).
Surg Endosc 2023; 37(5): 3691-3700.

Vogel C, Neumann J, Kießling L, Hempel G, Neumuth T, Kleber C, Osterhoff G.
In vitro evaluation of a computer-assisted decision support system for the primary care of polytrauma patients.
Eur J Trauma Emerg Surg 2023; 49(5): 2187-2192

Zia A, Bhattacharyya KD, Liu X, Berniker M, Wang Z, Nespolo RG, Kondo S, Kasai S, Hirasawa K, Liu B, Austin D, Wang Y, Futrega M, Puget J, Li Z, Sato Y, Fujii R, Hachiuma R, Masuda M, Saito H, Wang A, Xu M, Islam M, Bai L, Pang W, Ren H, Nwoye CI, Sestini L, Padoy N, Nielsen M, Schuttler S, Sentker T, Husseini H, Baltruschat IM, Schmitz R, Werner R, Matsun A, Farooq M, Saaed N, Viera JR, Yaqub M, Getty N, Xia F, Zhao Z, Duan X, Yao X, Lou A, Yang H, Han J, Noble JH, Wu JY, Alshirbaji TA, Jalal N.
Surgical tool classification and localization: results and methods from the MICCAI 2022 SurgToolLoc challenge.
arXiv.org 2023; (0): 0-00

Zimmermann A, Köhler H, Chalopin C, Jansen-Winkeln B, Nowotny R, Schönherr T, Mehdorn M, Uttinger KL, Thieme R, Gockel I, Moulla Y.
The role of intraoperative hyperspectral imaging (HSI) in colon interposition after esophagectomy.
BMC Surg 2023; 23(1): 47.

CONFERENCE PROCEEDINGS

Baberowsky H, Pabst T, Neumuth T, Rockstroh M. Concept for Video Transmission in Non-reliable Medical networks. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Borisova E, Abu Ahmad R, Rehm G, Usbeck R, D'Souza J, Stocker M, Auer S, Gilsbach J, Wolschewski A, Keller J, Schneider D, Neumuth T, Schimmler S. NFDI4DS Transfer and Application. In: Gesellschaft für Informatik (Jahrestagung). Bonn; 2023.

Bost W, Hewener H, Schmitt D, Fournelle M, Becker FJ, Tretbar S. Real-time transcranial phase aberration correction using a ray tracing method. In: 2023 IEEE International Ultrasonics Symposium (IUS). Montreal; 2023.

Eger A, Handel T, Li H, Hewener H, Tretbar S, Schmitz J, Schmittgen A, Jochimsen T, Landgraf L, Melzer A. Introducing a Navigated Platform-Independent 3MP-FUS System for the Stimulation of Deep Brain Regions. In: 34th Annual International Society for Medical Innovation and Technology Conference (iSMIT). Lukang; 2023.

Franke S, Schneider D. Joint Focus Session DGBMT-DFG Nationale Forschungsdaten Infrastruktur NFDI. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Gholami Bajestani D, Reich CM, Melzer A. Development of in vitro phantoms for MRI-guided minimally invasive interventions. In: 34th Annual International Society for Medical Innovation and Technology Conference (iSMIT). Lukang; 2023.

Grieb N, Sia J, Scolnick JA, Cordes S, Kloetzer C, Heyn S, u. a. Single-Cell Multi-Omics of Peripheral Blood Reveals Tiding and Evolution of Responsive and Resistant Clones upon Daratumumab-Based Treatments in Multiple Myeloma and Plasma Cell Leukemia. In: 20th International Myeloma Society Annual Meeting. Athen, 2023.

Handel T, Eger A, Li H, Hewener H, Tretbar S, Schmitz J, Schmittgen A, Jochimsen T, Landgraf L, Melzer A. Towards a multi-platform flexible neuronavigated MRgFUS Neuromodulation system – 3MP-FUS system. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Katalinic M, Schenk M, Franke S, Neumuth T, Stoehr M, Gaebel J. Creation of realistic synthetic cancer registry data with Synthea. In: ENCR-IACR Scientific Conference. Granada; 2023.
Keller J. Medical data standards and semantic data models. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Keller J. The NFDI4DS research data infrastructure for data science and AI. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Keller J. Using digital twins to support multiple stages of the patient journey. In: 17th Health Informatics Meets Digital Health Conference (dHealth). Wien; 2023.

Landgraf L, Kozlowski A, Zhang X, Fournelle M, Becker F, Tretbar S, Melzer A. Focused Ultrasound Treatment in an in vitro 3D Tumour Model with a Developed FUS Well Applicator. In: 22nd Annual International Symposium on Therapeuthic Ultrasound (ISTU). Lyon; 2023.

Landgraf L, Zhang X, Greiser S, Roy U, Lange F, van Gorkum R, Fournelle M, Speicher D, Tretbar S, Melzer A. Evaluation of a small animal MRI-guided focused ultrasound system in 7 T MRI and proof-of-concept rodent study. In: 22nd Annual International Symposium on Therapeuthic Ultrasound (ISTU). Lyon; 2023.

Landgraf L, Zhang X, Greiser S, Roy U, Lange F, van Gorkum R, Fournelle M, Speicher D, Tretbar S, Melzer A. Non-invasive MRI-guided focused ultrasound and radiation therapy – experimental rodent study. In: 31st International Congress of the European Association for Endoscopic Surgery (EAES). Rome; 2023.

Lindenmeyer A. Requirements for AI adoption in clinical practice. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Mielke T, Joeres F, Schott D, Hansen C. Interactive Registration Methods for Augmented Reality in Robotics: A Comparative Evaluation. In: 2023 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct). Sydney; 2023.

Pfahl A, Polat ST, Köhler H, Gockel I, Chalopin C. A laparoscopic multispectral system to visualize tissue oxygenation. In: SPIE European Conference on Biomedical Optics. Munich; 2023.

Reich CM, Gholami Bajestani D, Schmid M, Schauer S, Hegel A, Höger K, u.a. Nitinol catheterization cannula for MRI-guided vascular interventions. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Reich CM, Gholami Bajestani D, Schaefers G, Hammersen V, Schauer S, Schmid M, u.a. MRI-guided vascular interventions: we‘re getting there! In: CSI Education. Frankfurt; 2023.

Reich CM, Gholami Bajestani D, Mulik C, Schaefers G, Hammersen V, Schauer S, u.a. Neue Techniken der MRT-geführten Intervention. In: 52. Kongress der Deutschen Gesellschaft für Endoskopie und Bildgebende Verfahren e.V. Köln; 2023.

Schenk M, Neumann J, Adler N, Trommer T, Theopold JD, Neumuth T, Hepp P. Prozessanalytik und –optimierung in der arthroskopischen Gelenkchirurgie am Beispiel eines Vergleiches zwischen einem Maximalversorgungskrankenhaus und einer ambulanten Klinik. In: 40. AGA Kongress. Berlin; 2023.

Schimmler S, Wentzel B, Bleier A, Dietze S, Karmakar S, Mutschke P, Kraft A, Taffa TA, Usbeck R, Boukhers Z, Auer S, Castro LJ, Ackermann MR, Neumuth T, Schneider D, Abedjan Z, Latif A, Limani F, Abu Ahmad R, Rehm G, Attar Khorasani S, Lieber M. NFDI4DS Infrastructure and Services. In: Gesellschaft für Informatik (Jahrestagung) 2023. Bonn; 2023.

Schott D, Moritz J, Hansen C, Joeres F. The UUXR-Framework: A Draft Classification for Using Extended Reality in Usability and User Experience Research. In: 2023 IEEE International Symposium on Mixed and Augmented Reality Adjunct (ISMAR-Adjunct). Sydney; 2023.

Sorge M, Bieck R, Pirlich M, Dietz A, Kunz V, Wildfeuer V, u. a. Bild- und Textbasierte semi-automatische Erzeugung von OP-Berichten von Nasennebenhöhlen-Operationen. In: 94. Jahresversammlung Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie e.V (DGHNO-KHC). Leipzig; 2023.

Sorge M, Bieck R, Pirlich M, Dietz A, Kunz V, Wildfeuer V, u. a. Image- and text-based semi-automatic generation of surgery reports in paranasal sinus surgery. In: 94. Jahresversammlung Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie e.V. (DGHNO-KHC). Leipzig; 2023.

Stelzner T, Baur D, Neumann J, Berger J, Völker A, Heyde CE. Identification of the lumbar spine using MRI plane-based FiLM normalization and patient batching on semantic segmentation. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

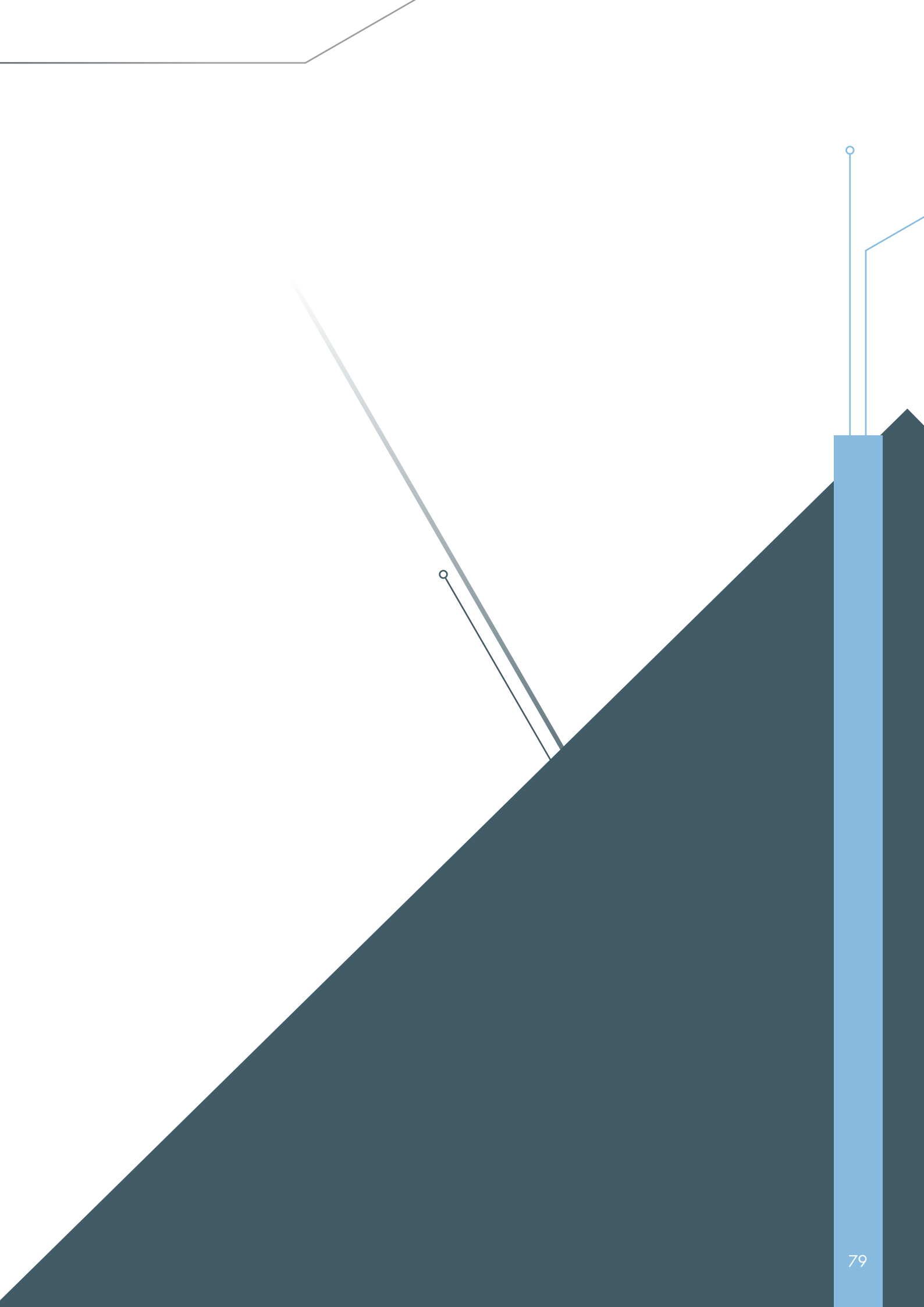
Stöhr M, Hikal A, Gaebel J, Dietz A. Development of a digital patient model to support treatment decisions in head and neck cancer. In: 94. Jahresversammlung Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie e.V. (DGHNO-KHC). Leipzig; 2023.

Vogel C, Neumann J, Kießling L, Hempel G, Neumuth T, Kleber C, Osterhoff G. In-vitro-Evaluation eines computergestützten Entscheidungshilfesystems für die Erstversorgung von Polytraumapatienten. In: Deutscher Kongress für Orthopädie und Unfallchirurgie. Berlin; 2023.

Weßbecher L, Berger J, Neumann J, Lente K, Krüger TV. A practical example of an integrated interoperable neuromonitoring system based on IEEE 11073 SDC and HL7. In: 57th DGBMT Annual Conference on Biomedical Engineering (BMT). Rhein-Ruhr; 2023.

Wiegand S, Chalopin C, Wichmann G, Dietz A, Pirlich M, Maktabi M. Einsatz der Hyperspektralbildgebung im Rahmen der Tumorchirurgie im Kopf-Hals-Bereich. In: 94. Jahresversammlung Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie e.V. (DGHNO-KHC). Leipzig; 2023.

Wiegand S, Chalopin C, Wichmann G, Dietz A, Pirlich M, Maktabi M. Use of hyperspectral imaging in tumor surgery of the head and neck. In: 94. Jahresversammlung Deutsche Gesellschaft für Hals-Nasen-Ohren-Heilkunde, Kopf- und Hals-Chirurgie e.V. (DGHNO-KHC). Leipzig; 2023.



IN-HOUSE EVENTS

January 24th, 2023 – Leipzig

DemoTour for Netzwerk Vitalmonitoring - Sonovum

- Stefan Franke | OR Demonstration
- Momenum Team | Demonstration of the Momentum-Ambulance

January, 25th, 2023 – Leipzig

Comm. Director Dr Schierz of the UKL Polyclinic for Dental Prosthetics and Materials Science visited ICCAS

- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging

January 30th, 2023 – Leipzig

Visit Dr. Gläser ot the SMWK

- Stefan Franke | OR Demonstration
- Stefan Franke | Demonstration Project-MPM – Models for personalised medicine
- Max Rockstroh | Demonstration of the Momentum-Ambulance
- Thomas Neumuth | closing meeting

February 02nd, 2023 – Leipzig

New Director of the Department of Neurosurgery Prof. Güresir takes a look at the ICCAS

- Momentum-Team | Demonstration of the Momentum-Ambulance
- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging
- Johann Berger | Demonstration in Medical Robotics
- C. Martin Reich | Demonstration MR-Interventions
- Lisa Landgraf | Demonstration of FUS- Focused Ultrasound Simulation
- Andreas Melzer & Thomas Neumuth | Closing meeting

February 27th, 2023 – Leipzig

Colloquium Hr. Braun DLR

March 02nd, 2023 – Leipzig

Visit Samsung

- Pabst, Rockstroh & König | Demonstration of the Momentum-Ambulance
- Franke, Rockstroh & König | OR Demonstration

March 09th, 2023 – Leipzig

Visit by Prof Köhne - Director of the Clinic for Orthodontics

March 22th, 2023 – Leipzig

ICCAS Status Seminar and Advisory Board Meeting

Project Presentations from ICCAS´established areas of research – Computer-Assisted-Image-Guided Interventions, Model-based Medicine and Intraoperative Miltimodal Imaging

April 03rd, 2023 – Leipzig

DemoTour for Prof. Deckow - Berufsakademie Sachsen

- Stefan Franke | OR Demonstration
- Matyash & Oeser | Demonstration in Augmented Reality (AR) & Presentation of KAIT
- Johannes Keller | Demonstration Project-MPM – Models for personalised medicine
- Momenum Team | Demonstration of the Momentum-Ambulance
- Thomas Neumuth | closing meeting

April 03rd, 2023 – Leipzig

Visit by State Secretary Kralinski

During the visit of the Permanent Secretary Kralinki, the ICCAs and its research area were presented and he was given demo tours of the areas: OR, Digital Twin, Momentum, 6G-Health. This was followed by a discussion on the following topics:

- Further development of the ecosystem for the MT industry
- Support for the sector diversification of Saxon companies
- Biotech combination products

April 28th, 2023 – Leipzig

Visit EIZO

- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging

May 08th, 2023 – Leipzig

Director of the Clinic for Orthodontics Prof. Köhne takes a look at the ICCAS

- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging
- Johann Berger | Demonstration in Medical Robotics
- Andreas Melzer & Thomas Neumuth | closing meeting

May 11th, 2023 | Leipzig

Future of Health Xperience

- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging
- Johann Berger | Demonstration in Medical Robotics

#EVENTS

May 15th, 2023 | Leipzig

Visit Burmeier and Stiegelmeyer

June 26th, 2023 | Leipzig

Visit Prof. Raabe - BA Bautzen, Medizintechnik

- Stefan Franke | OR Demonstration
- Johann Berger | Demonstration in Medical Robotics
- Thomas Neumuth | Closing Meeting

June 29th, 2023 | Leipzig

IMISE students visiting ICCAS as part of the International Frank van Swieten Lecture

- Stefan Franke | OR Demonstration
- Michael Unger | Demonstration in Hyperspectral Imaging
- Johann Berger | Demonstration in Medical Robotics

July 07th, 2023 | Leipzig

Visit & lecture by Prof Malberg - TU Dresden

Dr.-Ing. Hagen Malberg, Director at the Institute of Biomedical Engineering, TU Dresden, gave an online guest lecture about the topic “Moderne medizintechnische Verfahren in der Schlafmedizin”.

July 10th, 2023 | Leipzig

MeFaLe

- Annekatrin Pfahl | Blood Flow Measurement of Internal Organs
- Johann Berger | Demonstration in Medical Robotics
- Lisa Landgraf | Lecture: “Von der Idee bis zur klinischen Anwendung”.
- Max Rockstroh | OR Demonstration

August 31th, 2023 | Leipzig

Visit by Prof Schönfelder - HTWK Dean of Engineering Sciences

- Stefan Franke | OR Demonstration
- Johann Berger | Demonstration in Medical Robotics
- Momentum-Team | Demonstration of the Momentum-Ambulance
- Thomas Neumuth | Closing Meeting

18th September 2023 | Leipzig

Hr. Heckel and Prof. Köhne - Director of the Clinic for Orthodontics, taken a look at the ICCAS

November 28th, 2023 | Leipzig

Visit Prof. Ziemssen

- Stefan Franke | OR Demonstration
- Hannes Köhler | Demonstration in Hyperspectral Imaging
- Alexander Oeser | Demonstration of KAIT
- Thomas Neumuth | Closing Meeting

December 12th, 2023 | Leipzig

Annual ICCAS Meeting

At the SIKT, the development and breathroughs of the year were presented in a humorous way, showing what can go wrong when implementing computer-aided, integrative technologies and intelligent assistance systems.

CONFERENCES, SYMPOSIA, WORKSHOPS

January 26th - 28th, 2023 | St. Julian, Malta

EAES Wintermeeting 2023

- Andreas Melzer was Course director at Ultrasound course

February 3rd, 2023 | Leipzig

SPIN2030

- Saxon State Ministry of Science, Culture and Tourism presented its agenda for the strategic development in research and education
- Thomas Neumuth and team members exhibited the research rescue vehicle on site as part of the event

March 01st - 03rd, 2023 | Cologne

52. Kongress der Deutschen Gesellschaft für Endoskopie und Bildgebende Verfahren e.V Kongress

- Andreas Melzer member of the Advisory Board
- Andreas Melzer had the Chair to CTAC/DGBMT Joint Session
- Andreas Melzer gave a presentation on: “Magnetresonanztomographie-geführter fokussierter Ultraschall (MRgFUS) Grundlagen, nicht-invasive Interventionen und darüber hinaus”

March 15th - 16th, 2023 | Hannover

Digital Oncology Conference 2023

- Alexander Oeser took part in the session “In-Silico Modeling of Therapeutic Outcomes to Support Decision-Making in Oncology”

March 16th - 18th, 2023 | Online

Medical Device MR Safety Specialist | MRSS

- Andreas Melzer gave a presentation on: “MRI from a clinical view I- Diagnostics & Therapy- Surgery & Interventions (Biopsy, Ablation (RF, Laser), etc.”

April 17th - 20th, 2023 | Lyon, France

22nd Annual International Symposium on Therapeutic Ultrasound; 6thEuropean Symposium of EUFUS Symposium

- Andreas Melzer was co-organizer and had the Section-Chair of Body Clinical Updates
- Andreas Melzer gave presentations on: “Focused Ultrasound Treatment in an in vitro 3D Tumour Model With a Developed FUS Well Applicator”, “Multi-modality, Multi-purpose and Multi-platform Focused Ultrasound System–3MP-FUS for Neuromodulation in rare neuropsychiatric disor-

ders with focused ultrasound" & "Evaluation of a small animal MRI-guided focused ultrasound system in 7 T MRI and proof-of-concept rodent sudy for radiosensitization of prostate cancer"

April 17th - 21th, 2023 | Hannover
Hannover Messe

- Henner Baberowsky, Stefan Bohn, Tobias Pabst, Max Rockstroh, Anna Schatz presented the ambulance ot the Momentum-Project at the fair in Hannover.

April 18th, 2023 | Leipzig
DEVXCHANGE

- Stefan Franke gave a presentation on "Medizingeräte im Operationssaal sicher vernetzen: Ein Standard- Ein Netzwerk- Zwanzig Partner- Läuft?"

April 25th - 27th, 2023 | Berlin
DMEA

- Henner Baberowsky, Albrecht Bloße, Stefan Bohn, Jan Gaebel, Christoph Georgi, Korinna König, Tobias Pabst, Alexander Prull, Max Rockstroh, Anna Schatz presented the ambulance of the Momentum-Project at the fair in Berlin.

May 3rd, 2023 | Dresden
Zur Interministeriellen Arbeitsgruppe Biotechnologie (IMAG)

- Thomas Neumuth was Key-Note-Speaker and gave a introductory lecture to Project "6G-Health"

May 09th - 10th, 2023 | Dresden
IEEE 6G Summit Dresden

- Tobias Pabst and Max Rockstroh were participants at the 6G Summit in Dresden to exchange ideas with national and international experts from the field of communications engineering.

May 16th - 17th, 2023 | Vienna, Austria
DHealth 2023

- Our scientists Anna Schatz and Johannes Keller presented their research results at ICCAS at the dHealth2023 in Vienna.
- Anna Schatz gave a presentation on "Data Exchange Between Ambulance and Trauma Center: Interview Study About the Needs of Emergency Trauma Room Staff"
- Johannes Keller gave a presentation on „Using Digital Twins to Support Multiple Stages of the Patient Journey"

May 17th - 19th, 2023 | Wiesbaden
104. Deutscher Röntgenkongress

- Andreas Melzer presented the advancements in image guided Focused Ultrasound

June 20th - 23th, 2023 | Munich

CARS 2023 - Computer Assisted Radiology and Surgery

- Andreas Melzer was Program Committee Member and had the Session Chair to "Innovations in Surgery with AI Methods and Tools"
- Thomas Neumuth had the Session Chair to "Education and AI"

June 20th - 23th, 2023 | Rome, Italy

31st International Congress of the European Association for Endoscopic Surgery (EAES)

- Andreas Melzer held the Ultrasound Hands-On Course

June 25th - 29th, 2023 | Munich

ECBO 2023 - European Conferences on Biomedical Optics

- Annekatrin Pfahl gave a presentation about "A laparoscopic multispectral system to visualize tissue oxygenation"

June 26th - 29th, 2023 | London, Great Britain

15. Hamlyn Symposium on Medical Robotics Symposium

- Andreas Melzer was one of the Programm Committee Members and panelist at the workshop "Collaborative robotics in the medical field: where we are und where we need to go" with presentation "Collaborative Robotics for Ultrasound guided procedures"
- Andreas Melzer was moderator of Clinical Forum "Breaking through the Translation Barrier: Clinical Applications of Robotic Tech"
- Andreas Melzer was one of the organizers of full-day workshop "Endoluminal robots: a journey from unmet medical needs, design challenges, regulatory bodies, and commercial opportunities"

June 26th - 29th, 2023 | Berlin

Berliner 6G-Konferenzc

- Thomas Neumuth also gave a keynote in the "6G in Healthcare" session
- Christoph Georgi, Tobias Pabst, Alexander Prull, Max Rockstroh, Anna Schatz presented the ambulance of the Momentum-Project at the fair in Berlin.

June 30th - July 01st, 2023 | Frankfurt

ICCA Stroke

- Andreas Melzer was Moderator at the Session "Brain and heart working together: Similarities between cardio and neurovascular disease" and gave a Lecturer for MR guided interventions.

June 28th - July 01st, 2023 | Frankfurt

CSI Frankfurt Messe

- C. Martin Reich presented his Poster about the topic "MRI-guided vascular interventions: we're getting there"

September 12th - 14th, 2023 | Palermo, Italy

XIV Congresso Nazionale AIRMM

- Andreas Melzer gave a presentation on "MR-guided robotic surgery: Where do we stand?"

September 14th - 16th, 2023 | Berlin

41. Kongress für Arthroskopie und Gelenkchirurgie - AGA

- Martin schenk has submitted an abstract with the title “Prozessanalytik und-optimierung in der arthroskopischen Gelenkchirurgie am Beispiel eines Vergleiches zwischen einem Maximalversorgungskrankenhaus und einer ambulanten Klinik”

September 20th - 21th, 2023 | Dresden

KH-IT Herbsttagung 2023

- Max Rockstroh gave a presentation on “The missing link: The future of device networking with SDC”.

September 26th - 28th, 2023 | Duisburg

BMT 2023 - 57th Annual Conference of the German Society for Biomedical Engineering (VDE|DGBMT)

- Andreas Melzer chaired the meeting and was the initiator and co-founder of the “Medical Robotics” expert committee.
- Andreas Melzer chaired the sessions Ultrasound, Robotics ans Society I + II and the Joint Session of the DGBMT & DGHNO: “Future of Hearing”.

September 27th, 2023 | Hoyerswerda

7. Life Science Forum Sachsen

- Thomas Neumuth gave a presentation on the topic: “Medicine of the future from Saxony: How we successfully put high-tech innovations into practice”.

September 28th - 29th, 2023 | Amberg-Weiden

5G-Netzwerktreffen-Gesundheitswesen

- Albrecht Bloße, Clemens Möllenhoff

October 05th - 06th, 2023 | Erlangen

Netzwerkmeeting iMRI

- Andreas Melzer presented the ICCAS research in the field of iMRI

October 19th - 21th, 2023 | Lukang, Taiwan

34th iSMIT Conference – Annual International Society for Medical Innovation and Technology

- Andreas Melzer moderated the named lecture „John Wickham“ (founder of SMIT) and opened the lectures „John Able“ (founder of Boston Scientific), Gerhard Buess (pioneer of endoluminal MIS) and Earl Owen (pioneer of hand transplantation)
- Andreas Melzer moderated the „Focused Ultrasound“ session and gave a lecture on „Novel Technologies and Applications of FUS“

October 20th - 21th, 2023 | Nice, Italy

Annual EMSCO Meeting

- Alexander Oeser gave a presentation entitled “Common artificial intelligence projects in MDS” in the session “Discussion about unmet needs, future clinical trials, future fundamental research”

October 24th - 27th, 2023 | Berlin

DKOU 2023 - Deutscher Kongress für Orthopädie und Unfallchirurgie

- Thomas Neumuth chaired the session “Between science fiction and everyday clinical practice - AI-supported applications in O&U - opportunities, limits and responsibility”.

October 31th - November 03rd, 2023 | Bukarest, Romania

12. National Congress of Romanian Association for Endoscopic Surgery and other interventional Techniques (ARCE)

- Andreas Melzer was director of the “Abdominal Ultrasound for Surgeons“ course.
- Andreas Melzer also gave the renowned “Sergio Duca” plenary lecture on “The journey from minimally invasive surgery to non-invasive surgery” and was chairman of the “iSMIT Session” with the lectures “Advances in imaging guided robotics”.

November 13th - 16th, 2023 | Dusseldorf

MEDICA TECH FORUM 2023

- Thomas Neumuth gave a presentation on the topic: “VDE Connected Health Initiative: The impact of 5G and 6G telecommunication technology on medicine”.
- Max Rockstroh gave a presentation entitled: “VDE Connected Health: The importance of connectivity for medical care today and tomorrow”.

November 16th, 2023 | Yokohama, Japan

Sächsisches Transferforum - TransfERleben/FutureSax

- Hannes Köhler presented the projects in the field of hyperspectral imaging and model-based decision-making.

November 26th - 30th, 2023 | Chicago, USA

Radiological Society of North America (RSNA)

- Andreas Melzer presented the advancements in image guided Focused Ultrasound.

December 09th - 12th, 2023 | California, USA

ASH Annual Meeting and Exposition

- Alexander Oeser participated as an reviewer.

PROJECT AND COOPERATION WORK

February 8th - 9th, 2023 | Leipzig

KickOff and Press Conference 6G Health

- ICCAS together with its more than 20 consortium partners presented its project plans to the public during a press conference at Leipzig University Hospital.
- All project participants started the active project work with a two-day kickoff meeting.

April 5th - 6th, 2023 | Leipzig

KliNet5G Status Seminar

- Status Meeting + Coordination and open Q & A session
- Planning of the 5G setup- what do we need, what technical restraints are there?

April 25th - 27th, 2023 | Berlin

Final Project Meeting AIQNET

- Consortium partners from clinics, software development and medical technology presented the results of the project at the DMEA.
- ICCAS developed a “Digital Patiend Model” that integrates different perspectives on treatment and the patient himself.

May 5th, 2023 | Leipzig

Final Project Meeting MOMENTUM

- All involved partners present their research work in lectures and live presentations and discuss current and future challenges with 5G in the medical context and especially in rescue medicine
- Afterwards, all project participants started the active project work with a two-day kickoff meeting.

June 14th, 2023 | Leipzig

KliNet5G-Project Meeting

- The KliNet5G-Team met with its partners to discuss the current status of the project and present the research results.

June 30th, 2023 | Leipzig

Project PostStroke Completed

- An innovative digital concept called PostStroke Manager was developed by ICCAS together with the Clinic and Polyclinic for Neurology to improve post-stroke care
- PostStroke Manager places the individual patient at the center of the often different treatment structures and helps in many ways to manage the new life situation in the best possible way

November 06th, 2023 | Leipzig

Visit of the KliNet5G Partners (FA MotionMiners)

- Measuring robot produces signal quality „map“ at the ICCAS

November 08th, 2023 | Leipzig

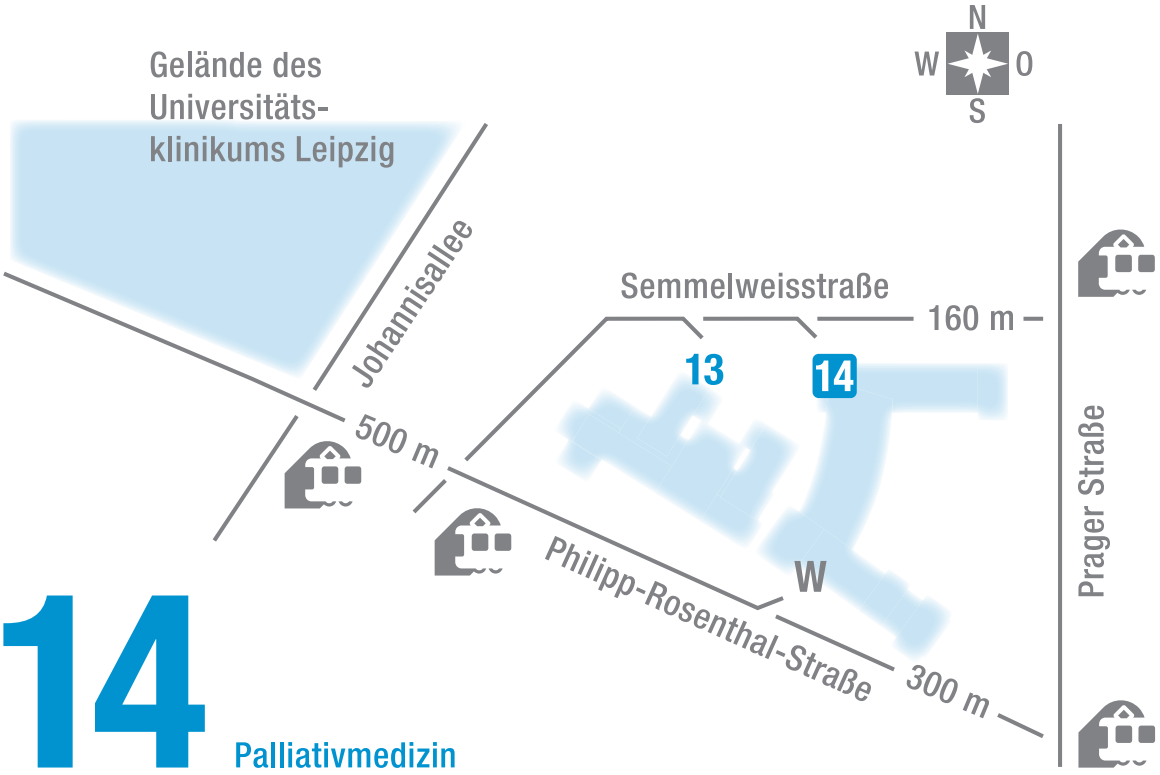
3MP-FUS Mid-Term Milestone Meeting

- Federal Ministry of Education and Research - Melanie Kuffner (VDI Technologiezentrum GmbH, Dusseldorf) visited
- Demonstration that showed the integration of Localite GmbH‘s neuronavigation software with the focused ultrasound system (FUS) for neuronavigation developed by the Frauenhofer IBMT.

November 11th, 2023 | Leipzig

Partner of the EOS-Project Visited the ICCAS

- Future training and education concepts were discussed.



14 Palliativmedizin

UNIVERSITÄT LEIPZIG
Medizinische Fakultät

Gefördert durch:

Bundesministerium für Wirtschaft und Energie

GEFÖRDERT VOM

Bundesministerium für Bildung und Forschung

Europäische Kommission

ZIM impulse für wachstum Zentrales Innovationsprogramm Mittelstand

ZENTREN FÜR INNOVATIONSKOMPETENZ UNTERNEHMEN REGION Die BMBF-Innovationsinitiative Neue Länder

Freistaat Sachsen

Diese Maßnahme wird mitfinanziert durch Steuermittel auf der Grundlage des vom Sächsischen Landtag beschlossenen Haushalts.