UNIVERSITÄT LEIPZIG
Medizinische Fakultät

iccas

Q1/2025

ICCAS NEWSLETTER

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Dear Reader,

we are pleased to present you the latest newsletter of ICCAS for Q1 2025.

Various conferences, events and presentations attended are briefly presented, as are new publications and personel achievements. We hope you enjoy reading our update and find interesting information.

Andreas Melzer &
Thomas Neumuth

#TECHNOLOGIES_AND_SCIENCE_PRESENTATION

#PROJECT_WORK

#PUBLICATIONS_AND_MISCELLANEOUS

Presentations and Conferences in Q1

January 23th - 25th, 2025 - Ghent, Belgium

EAES Symposium 2025: Innovations in Surgery

In January 2025, the third Symposium on Innovations in Surgery took place in Ghent, Belgium, organized by the EAES Technology Committee under the leadership of Filip Muysoms. Over three days, participants took part in hands-on courses on abdominal, colorectal and upper gastrointestinal surgery. For the first time, a Robotics Encounters course was also offered, in which state-of-the-art robotic surgical systems such as Da Vinci Xi, Hugo RAS and Hinotori could be tested. The symposium featured exciting presentations on the latest developments in robotic surgery, including a lively debate on the importance of hardware versus software. Live broadcasts of robot-assisted operations and insights into flexible endoscopic surgery rounded off the program. Andreas Melzer from ICCAS was among the experts on site. The event not only offered specialist knowledge at the highest level, but also a platform for intensive exchange and networking. We are looking forward to the next meeting in Belgrade!

January 29th - 30th, 2025 - Leipzig

Plastics meets medical technology: Soft robotics - from animal to human

The plastics and medical technology industry met at the Kunststoff-Zentrum (KUZ) on January 29th and 30th, 2025 to discuss the latest developments and innovations. This year's focus was on the fascinating world of soft robotics. Albrecht Bloße and Manuel Rosenau provided exciting insights into this pioneering field with their presentation „Soft robotics - from animal to human". Soft robotics and continuum robotics open up completely new possibilities for reproducing natural processes in great detail. In contrast to rigid mechanics, this technology relies on flexible, adaptable structures. Inspired by nature, in particular by the movement and adaptability of animals, soft robotic systems enable innovative approaches both in everyday industrial applications and in medicine.

The lecture highlighted biological models and showed the technical principles behind soft materials and actuators. The possible applications are diverse - from flexible gripper arms and adaptable prostheses to high-precision humanoid heart models for medical research. These developments open up new horizons for robotics and medical technology and show how science and practice are increasingly benefiting from each other. The KUZ event is an important platform for experts, researchers and companies to discuss current trends and initiate future collaborations. Albrecht Bloße and Manuel Rosenau were looking forward to sharing their knowledge with the participants and discussing the future of soft robotics together.

Albrecht Bloße informs his audience about the topic of soft robotics and its possible applications in his presentation: „Soft robotics - from animal to human".

January 30th, 2025 - Leipzig

New technologies for healthcare: ICCAS @ Research Festival

On January 30th, 2025, the 18th Research Festival for Life Sciences once again provided a platform for interdisciplinary knowledge exchange and the latest research at the Faculty of Medicine's Study Center. With over 190 abstracts submitted, the focus was on digital technologies, artificial intelligence and innovative concepts in the life sciences. ICCAS was also represented with a number of projects and showed how medical technology, AI and telemedicine are already laying the foundations for modern, patient-centered healthcare. The diverse presentations impressively illustrated how interdisciplinary collaboration can contribute to the further development of efficient and innovative medical solutions.

- **Scalable anonymization of medical image data**

A newly developed pipeline combines data protection and research benefits by efficiently processing sensiti-

ve images and making them accessible for AI analyses. Even large data sets can be processed securely without jeopardizing patient privacy. (Project presented by Nadja Baumann.)

- **3D-printed, soft-robotic hand**

The use of flexible materials and pneumatic actuators enables a realistic replication of human gripping movements. This lays the foundation for adaptive prostheses and precision mechanics that can adapt sensitively to different tasks. (Research project presented by Joel Focking)

- **Telemedical care via nomadic wireless networks**

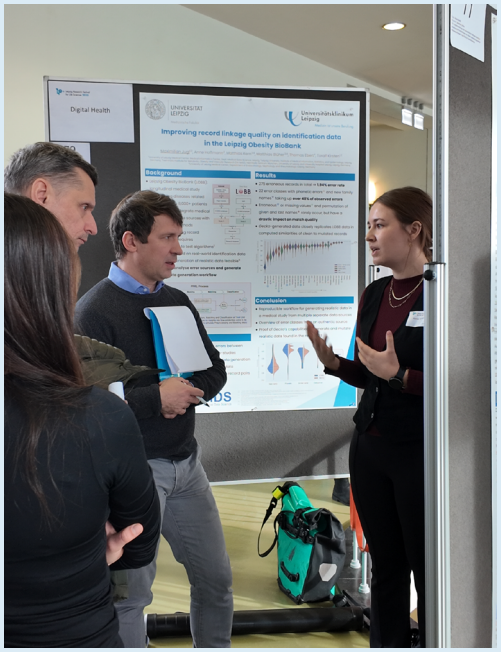
A specially developed architecture ensures a stable data connection even in rural regions. Prioritized transmissions and real-time remote control of medical devices allow tele-physicians to quickly access vital data and make informed decisions. (Presented by David Lepach)

- **Reliable uncertainty assessment for AI-supported diagnoses**

Confidence in automated analyses is strengthened through the targeted evaluation of various methods for error detection. The approach relies on a transparent representation of uncertainties and helps to reduce misdiagnosis. (Presentation by Adrian Lindenmeyer)

- **5G-supported system for emergency care**

A real-time transmission mechanism enables vital patient data to be forwarded directly from the ambulance to the emergency trauma room. This provides hospital staff with crucial information before the patient arrives, significantly improving processes and preparation. (Presented by Anna Schatz)



Anna Schatz convinces the jury of the research festival with her presentation on the possible applications and advantages of 5G-supported systems for emergency care.

March 19th - 20th, 2025 - Würzburg

ICCAS @ 54th DGE-BV Congress in Würzburg: Innovation and interdisciplinary exchange

The 54th Congress of the German Society for Endoscopy and Imaging (DGE-BV) took place in Würzburg from 19th to 20th March 2025- an important forum for new developments in interventional endoscopy, the use of artificial intelligence (AI) and current health policy challenges such as ambulantization and the Nursing Competence Act.

Andreas Melzer opened the congress with a few words of welcome and chaired the CTAC/DGBMT joint session, which focused on the latest technologies in minimally invasive surgery and computer-assisted procedures. The perspectives of the CTAC (Section for Minimally Invasive Surgery) and the technological trends of the DGBMT (Society for Biomedical Technology) were discussed here.

Annekatrin Pfahl presented the current status of hyperspectral and multispectral imaging in endoscopy, which improves the precise analysis of tissue during interventions. Tobias Pabst highlighted the potential of 5G and 6G for the networking of medical devices and their influence on future medical care.

The congress also focused on topics such as the ambulantization of endoscopy as an opportunity for further development, the legal pitfalls in everyday clinical practice and new perspectives in the Nursing Competence Act.

We are delighted about the intensive interdisciplinary exchange and the inspiring impulses that will have a decisive impact on the future of endoscopy and medical technology!

February 6th, 2025 - Leipzig

Project launch and KickOff-Meeting: Rea-FBS

On January 1st, 2025, a new research and development project was launched with the aim of significantly improving the chances of survival after sudden cardiac arrest. The focus is on the development of a portable, non-invasive ultrasound device that measures the blood flow in the common carotid artery in real time during resuscitation. Immediate feedback is intended to optimize the quality of cardiac massage and thus improve the oxygen supply to the brain. In addition, the innovative system will be used to conduct a study to investigate the correlation between the blood flow values determined and the neurological prognosis.

The innovative approach is based on a new Doppler ultrasound method that enables precise vessel localization without complex parameterization. The device should be easy and safe to use by medical professionals and lay helpers and could therefore be used in both clinical and preclinical emergency situations.

The project is being implemented in close cooperation between Leipzig University Medicine and the company GAMPT. The clinical studies will be conducted under the direction of Leipzig University Medicine, while the further development and production of the device will take place in Germany.

The kick-off meeting to coordinate the next steps will take place on February 6th, 2025. A brief introduction of the project partners will be followed by a presentation by the VDI and subsequent discussion. This will be followed by an overview of the Rea-FBS project before the company GAMPT mbH presents its specific tasks and technical approaches. The University Medical Center Leipzig (UML) will then present its role in the project and the planned study design. Finally, the final agreements will be made and a strategy for regular Jour-Fix meetings for further coordination will be defined.

February 11th, 2025 - Leipzig

KliNet5G - Final meeting

The final meeting of the KliNet5G research project took place at ICCAS on February 11th, 2025. Together with the project partners - IMD (Institute for Medical Diagnostics), MM (MotionMiners), TUC (Leipzig University of Technology), .steute, inova and Schölly - the key results of the project were presented.

A particular highlight was the demonstration of the 5G tracking developed, which opened up new possibilities for digital networking in medicine. The partners showed how 5G technologies can be used in clinical environments to optimize processes and improve patient care.

In addition to the presentation of the research results, the discussion focused on the future of 5G campus networks in German medicine. What challenges and potential does this technology bring with it? How can innovative solutions be sustainably integrated into everyday clinical practice? These and other questions were discussed with experts from science and industry.

The KliNet5G project has thus made an important contribution to the digital transformation in the healthcare sector. The final meeting provided an opportunity to reflect on the insights gained and develop perspectives for the further use of 5G technologies.

The project partners met for the final meeting of the KliNet5G project at ICCAS to present their results and show how 5G technology can be used in clinical enviroments.

March 25th-26th, 2025 - Leipzig

CampusOS closing event

The CampusOS project, a network of five 5G projects with the same technological structure that were active in different sectors, will come to an end on March 31, 2025. At the end, all members of the CampusOS lead and satellite projects will meet to present their results and share their progress.

During the event, the results from the CampusOS projects as well as the satellite projects and 5G-OPERA will be presented. There will be a particular focus on practical demonstrators and use cases in an industrial environ-

ment, which offer interesting insights into the application of 5G technologies. There will also be a demo tour where participants can experience the latest developments first-hand.

Another important item on the agenda is the discussion on the exploitation of the results and the promotion of the 5G ecosystem. In this context, the 5G ALOE initiative will also be presented, which supports the existing network and shows new perspectives for technology development.

The event thus offers an excellent opportunity to find out about the progress made in recent years and to set the course for the future use of 5G in the industrial sector.

March 26th, 2025 - Leipzig
ESA Meeting @ ICCAS

The Advanced Concept Team Hibernation of the European Space Agency (ESA) met at the Innovation Center Computer Assisted Surgery (ICCAS) to discuss new approaches at the interface of medicine and space together with scientists from the FUTOR, MORFEUS and 3MP-FUS consortia. The aim of the meeting was to exchange ideas on innovative technologies and their mutual transfer in order to exploit synergies between the disciplines and further expand strategic partnerships.

A central focus was on research into synthetic torpor (sTor)- a key technology for long-term missions in space. ESA's ACT Hibernation team is investigating how sTor can be specifically induced to slow down metabolic processes, minimize muscle and bone atrophy and increase astronauts' resistance to radiation. At the same time, these findings offer promising approaches for medical applications on Earth.

With its research into non-invasive deep brain stimulation, the 3MP-FUS project contributes to a better understanding of the mechanisms of the torpors in the brain and their targeted activation. The FUTOR and MORFEUS consortia are concentrating on the induction of sTor using focused ultrasound in order to open up new therapeutic possibilities in medicine.

A highlight of the meeting was the presentation of new technologies in a live demonstration, including the 5G Ambulance, networked medical devices and FUS neuromodulation. Finally, the participants discussed the further development of a white paper on the induction of synthetic torpor together with ESA.

#PUBLICATIONS_AND_ MISCELLANEOUS

Publications in Q1

First experience in employing a complex digital support system accompanied by personal assistance to improve aftercare in patients with stroke or transient ischemic attack - results of the PostStroke-Manager feasibility study.

The PostStroke Manager study investigated how a digital support system with personal care can improve the aftercare of stroke and TIA patients. An app, a smartwatch, a blood pressure monitor and individual support from so-called "stroke pilots" were used.

Of the 43 participants, 36 completed the study. Most found the system helpful- especially the monitoring of vital signs and the personal support. There were also improvements in neurological impairments, blood pressure and cholesterol levels, while psychological stress and quality of life hardly changed.

There were challenges, particularly for severely affected patients, who were often unable to participate, as well as with technical requirements such as the network connection. Conclusion: The concept works for a selected group of patients, but needs to be developed further in order to be used more widely.

Michalski D, Classen J, Geisler D, Urban D, Schreiber M, Tylcz JB, u. a. First experience in employing a complex digital support system accompanied by personal assistance to improve aftercare in patients with stroke or transient ischemic attack- results of the PostStroke-Manager feasibility study. Sci Rep. 17. Februar 2025;15(1):5804.

doi: 10.1038/s41598-025-89044-7.

Improving preparation in the emergency trauma room: the development and impact of real-time data transfer and dashboard visualization system

In emergency medicine, every second counts. However, pre-registration of patients by the emergency services by telephone is often error-prone and time-consuming. A study has therefore investigated whether a digital dashboard- a clear user interface for displaying important patient

data in real time - can improve preparation in emergency trauma centers (ETR).

The results show: Doctors rated the dashboard as helpful, as it transmits emergency data such as vital signs and patient history directly from the ambulance and presents it visually. This enabled the teams to better prepare for incoming patients. The ability to flexibly adapt certain functions was particularly appreciated. However, some doctors found the initial wealth of information challenging - an intuitive design is required here. A mobile version for specialized professionals was also considered useful.

In the long term, the system could help to make treatment processes more efficient, avoid unnecessary patient transfers and improve digital documentation in clinics. However, further tests and optimizations are necessary before the dashboard can be used in practice.

Schatz A, Osterhoff G, Georgi C, Joeres F, Neumuth T, Rockstroh M. Improving preparation in the emergency trauma room: the development and impact of real-time data transfer and dashboard visualization system. Int J Comput Assist Radiol Surg. Februar 2025;20(2):301–10.

doi.org/10.1007/s11548-024-03256-2

Towards Trustworthy AI in Healthcare: Epistemic Uncertainty Estimation for Clinical Decision Support.

Artificial intelligence (AI) is increasingly being used in medicine to help doctors make decisions in patient care. However, for AI-supported systems to be reliable, they must not only make accurate predictions, but also recognize when they are unsure - because incorrect assessments can have serious consequences.

Two methods were investigated in a study to improve the accuracy and reliability of such predictions: Ensemble Neural Networks (ENN) and Spectral Normalized Neural Gaussian Processes (SNGP). Both were tested on simple data sets as well as on electronic health records of intensive care patients.

The results showed that both methods provided similarly accurate predictions. However, the SNGP method had a decisive advantage: it was better able to assess how certain or uncertain a prediction was. This means that doctors can more easily recognize when they can rely on the AI's recommendation - and when they should critically question the results.

In summary, methods such as SNGP help to make AI-supported systems more trustworthy and safer. This is an important step towards the meaningful use of artificial intelligence in medical practice.

Lindenmeyer A, Blattmann M, Franke S, Neumuth T, Schneider D. Towards Trustworthy AI in Healthcare: Epistemic Uncertainty Estimation for Clinical Decision Support. J Pers Med. 31. Januar 2025;15(2):58.

doi: 10.3390/jpm15020058.

Miscellaneous in Q1

February 24th, 2025 - Barcelona, Spain

ICCAS @ CELTIC-NEXT Proposers' Brokerage Day 2025

The Innovation Center Computer Assisted Surgery (ICCAS) participated in the CELTIC-NEXT Proposers' Brokerage Day at the Universitat Autònoma de Barcelona on February 24th, 2025. Our employees Tobias Pabst and Alexander Prull were on site to present ICCAS and introduce the latest project ideas.

CELTIC-NEXT is a EUREKA cluster dedicated to the development of pioneering communication technologies to promote a secure, trustworthy and sustainable digital society. By initiating and coordinating international collaborative projects in the field of information and communication technology (ICT), CELTIC-NEXT brings together leading industry players, small and medium-sized enterprises, service providers and research institutions. The aim is to develop innovative ICT solutions and promote their introduction.

With its industry-driven, bottom-up approach, CELTIC-NEXT enables project initiators to explore research topics in the ICT sector with virtually no restrictions. This creates space for both evolutionary and disruptive innovations that contribute to the further development of the digital society.

The Proposers' Brokerage Day provided an ideal platform for exchanging ideas with potential partners and developing new collaborations. ICCAS was looking forward to the dialog with international experts to discuss forward-looking ideas, initiate joint projects and forge new

partnerships. We are convinced that our innovative approaches and research work can make a valuable contribution to the further development of medical technology and digital health solutions.

February 28th, 2025 - Leipzig

ICCAS @ MEFALE 2025: Discover medical technology and shape the future

On February 28th, 2025, the ICCAS- Innovation Center Computer Assisted Surgery at Leipzig University opened its doors to young researchers as part of MEin_Ferien_Abenteuer_LEipzig (MEFALE). Under the motto "Wissenschaft erlebbar und verständlich machen", the young researchers had the opportunity to discover the fascinating world of medical technology up close.

10 young researchers immersed themselves in various areas of research, including hyperspectral imaging (HSI). The young scientists were given an exclusive insight into the innovative technology that ensures more precise diagnoses and safer treatments in medicine. A brief insight into the application of the technology was provided in the demo operating station.

MEFALE is a great opportunity to introduce young talents to the exciting world of medical technology, robotics and ultrasound and to get them excited about the future of science. Not only is knowledge imparted, but also the vision of actively helping to shape the future of medicine.

It was an inspiring and educational experience that gave the young researchers many new perspectives and impressions. ICCAS is pleased to contribute to the promotion of STEM interests and the next generation of scientists with this event.

March 6th-7th, 2025 - Leipzig

Successful scientific colloquium 2025

On March 6th and 7th, 2025, the ICCAS scientific colloquium took place at BioCity Leipzig. The two-day event offered a platform for interdisciplinary exchange, scientific discussions and practical workshops. Andreas Melzer and Thomas Neumuth opened the colloquium with valuable impulses for the research community.

Particular attention was paid to the presentations by our doctoral students, who presented their projects to a wide audience and received valuable feedback. In addition to scientific topics, the program also included practical content such as the preparation of project applications and dealing with grant applications.

The colloquium once again highlighted the importance of interdisciplinary dialog for scientific progress- not only in medical technology, but also within the ICCAS. Many thanks to all participants for two inspiring days!

All employees gathered for this year's Scientific Colloquium at BioCity for interdisciplinary exchange, discussions and practical workshops.

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