



ADVANCING HEALTHCARE THROUGH BILATERAL EXCELLENCE

An IGSTC MedTech Portfolio





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**Catalysing Indo-German Research &
Technology Partnership**

Jan 2026

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About IGSTC

The Indo-German Science & Technology Centre (IGSTC) has been established to facilitate Indo-German R&D projects and networking through substantive interactions among Government, academia/research systems and industry to foster innovation for the overall economic and societal developments of both the countries.

IGSTC Aims to

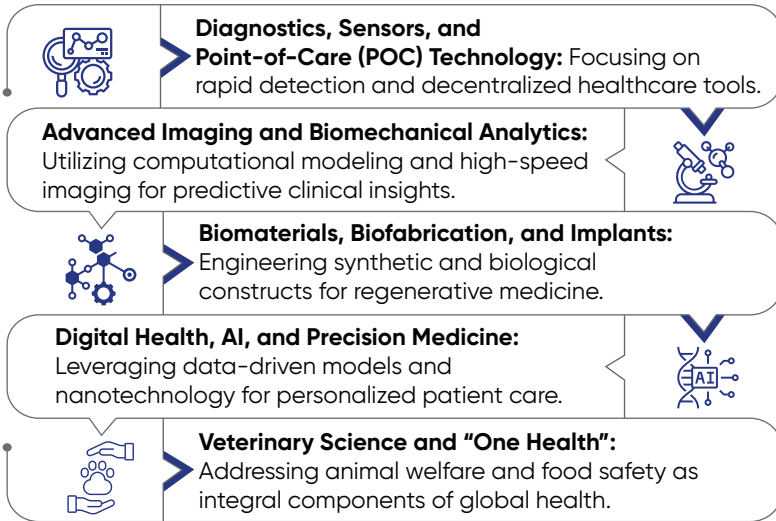
- Play a proactive role in facilitating participation of industry in joint R&D+I projects.
- Provide/assist in mobilizing resources to carry out industrial R&D+I projects.
- Promote electronic exchange and dissemination of information on opportunities in bilateral science & technology cooperation. The Centre will also prepare/compile state-of-the-art reports on topics of interest with the help of highly qualified scientists and technologists from both the countries.
- Provide advice to institutes and industries from both the countries on the possibilities of Indo-German cooperation and help identify suitable partners.
- Facilitate and promote Indo-German collaboration in Science and Technology S&T through substantive interaction among Government, academia and industry
- Encourage Public-Private Partnerships (PPP) to foster elements of innovation and industrial application and cultivate a culture of cooperation between science and industry
- Nurture networking between young and mid-career scientists and technologists to develop a sense of mutual trust, leadership and entrepreneurship.
- Develop cooperation through the identification of scientists and scientific institutions of the two countries.
- Organize workshops, seminars, training programmes and other types of events on topics of mutual interest.

Preface

Through its grant programs like 2+2 Projects, Bilateral Workshops, and specialized fellowships such as WISER, PECFAR, and the Industrial Fellowships (PDIF and PIEF), over the last 15 years, the IGSTC has supported several aspects of research on emerging techniques, which have the potential to elevate diagnostics and treatment to new

levels. Rapid and non-invasive methods of detection, with use of new materials and models for a personalized approach to wellness and health, are primary components of the health system of the future.

Researchers in India and Germany have come together to prioritize exploration of key areas like



Through these individual projects and fellowship outcomes, this document highlights the comprehensive ecosystem IGSTC has built to address modern healthcare challenges through bilateral excellence.

DIAGNOSTICS, SENSORS, AND POINT-OF-CARE (POC) TECHNOLOGY



The project 'Multiplexed, label-free fiber optic biosensor array system for waterborne pathogen detection' (**MultiWAP**) was carried out during 2015-2023, with partnerships from industry and academia from India and Germany: the Indian Institute of Technology Madras, ChemBioSens Pvt. Ltd., Technische Universität Braunschweig and LIONEX GmbH. It sought to develop alternatives to conventional culture-based and molecular diagnostic methods, which can be time-intensive and resource-heavy, making them impractical for real-time monitoring and routine screening. The Array Fiber-Optic Biosensor (ArFAB) developed under this project enables real-time, label-free, and multiplex detection of multiple pathogens within a single, compact system, significantly reducing analysis time and operational complexity.

A major benefit of the **Multi-WAP** platform lies in its scalable and manufacturable design. Automated fiber-probe fabrication standardized disposable cartridges, and the use of off-the-shelf components ensure high reproducibility, reduced production costs, and robustness under real-world conditions—

advantages rarely achieved by existing biosensor technologies. The platform's high sensitivity and specificity enabled by advanced plasmonic sensing, match or exceed laboratory-based techniques while eliminating the need for expensive reagents or extensive sample preparation.

The modular architecture, on which the platform was developed, allows rapid adaptation to new pathogens and application domains without redesigning the core hardware, ensuring long-term flexibility and cost efficiency.

The study uniquely bridges the gap between advanced research and deployable technology, offering a practical, affordable, and sustainable alternative to current pathogen detection solutions.

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ChemBioSens Pvt. Ltd.

“Translating advanced biosensing science into scalable, field-ready diagnostic solutions.”

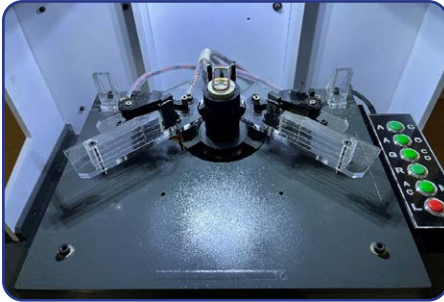
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“

LIONEX GmbH

“Driving regulatory-ready innovation in multiplex diagnostics for real-world impact.”

”



Fiber Bending Machine



Fabricated Array Fiber-Optic Biosensor

Another project ‘Microfluidic based detection of microbial communities and antibiotic responses in the management of diabetic foot ulcers’ (**MIDARDI**), was pursued by the following Consortium:

Manipal University, Achira Labs Pvt. Ltd., Fraunhofer ENAS, Fraunhofer IZI and BiFlow Systems GmbH.

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Achira Labs Pvt. 8

“Empowering rapid, point-of-care diagnostics for smarter infection management.”

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BiFlow Systems GmbH

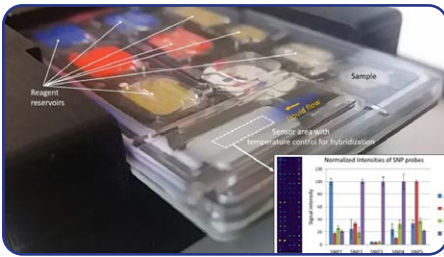
“Integrating precision microfluidics for actionable healthcare solutions.”

”

The **MIDARDI** project offers a clear step forward from current diagnostic approaches for diabetic foot ulcers by bringing fast, actionable molecular testing directly to the point of care. Today, clinicians largely depend on culture tests or centralized molecular laboratories, both of which are slow and often incompatible with the urgent decisions required in DFU management. As a result, treatment frequently begins with broad-spectrum antibiotics, increasing costs and accelerating antimicrobial resistance.

MIDARDI changes this paradigm by combining rapid isothermal amplification, multiplex genetic detection, and integrated microfluidics into a single, disposable Lab-on-a-Chip device. This enables simultaneous identification of multiple infection-causing

pathogens and key antibiotic resistance markers directly from patient samples, without the need for complex laboratory infrastructure. By delivering timely, evidence-based diagnostic information in decentralized and low-resource settings, the project supports personalized therapy, improves clinical outcomes, and promotes more responsible antibiotic use—an advantage that existing solutions are unable to offer.



Microfluidic cartridge to run hybridization array



Portable Fluorescent meter developed in the project

The IGSTC workshop on “Diagnostics and translational genome sequencing in clinical and public health microbiology” was one of the firsts of its kind to kick start brain storming on the integration of genomic technologies into clinical and public health microbiology, focusing on the transition from laboratory research to practical patient care.

Organized by Dr. G.B. Nair (Translational Health Science and Technology Institute, India), Dr. Anusha Rohit (The Madras Medical Mission, India), and Dr. Trinad Chakraborty (University of Giessen, Germany) in March, 2014 in Chennai, this bilateral workshop hosted 24 experts who analysed the details of S&T advancements required to bridge the gap between Next-Generation Sequencing (NGS) capabilities and their real-world application in clinical diagnostics and public health. Deliberation themes revolved around

- Enteric Pathogens: Experts explored the epidemiology and genomic tracking of enteric diseases to improve outbreak response.
- Tuberculosis Genomics: Sessions focused on leveraging sequencing technologies to better understand TB strains and drug resistance.
- Metagenomics in Diagnostics: Discussions highlighted the utility of metagenomics for rapid pathogen identification in complex clinical samples.
- Bioinformatics Challenges: Participants identified computational bottlenecks and data analysis as primary hurdles in the widespread adoption of clinical genomics.

Key Outcomes

- Collaborative Framework: Specific research areas were identified for joint project proposals to be submitted under the IGSTC funding framework.
- Capacity Building: The group proposed the organization of joint summer and winter schools to foster research training and exchange between Indian and German scientists.
- Multidisciplinary Synergy: The workshop emphasized the need for complementary expertise between clinicians, microbiologists, and bioinformaticians to advance personalized medicine.

Participating Institutions and Organizations

India

THSTI: Translational Health Science and Technology Institute
 NICED: National Institute of Cholera and Enteric Diseases
 CMC Vellore: Christian Medical College | The Madras Medical Mission
 P.D. Hinduja Hospital | Tata Medical Center | Apollo Hospital
 Anand Diagnostic Laboratory | SRL: Super Religare Laboratories
 OncQuest Laboratories | XCyton Diagnostics

Germany

University of Giessen | University of Würzburg
 University of Münster | Research Center Borstel
 Robert Koch Institute | Ion Torrent (Life Technologies)

Another Workshop in March 2022 centered on the burning topic of 'Challenging Antibiotic Resistance: Perspectives on novel tools and Diagnostics for Efficient Management'.

Building upon the foundations of the 2014 workshop, this symposium was organized by Prof. Bikramjit Basu (IISc Bangalore, India) and Prof. Aldo R. Boccaccini (University of Erlangen-Nuremberg, Germany) in Berlin. It addressed the critical medical needs of an aging population susceptible to musculoskeletal disorders. The event focused on the challenge of matching synthetic biomaterials to natural bone properties while ensuring long-term biocompatibility.

Technical Deliberations

- **Biocompatibility:** Discussions centered on the development of synthetic materials that mimic the mechanical and biological properties of natural bone.
- **Translational Research:** Sessions emphasized the path from "bench to bedside," focusing on clinical needs in orthopedics and dentistry.

- **Manufacturing Technologies:** Experts explored advanced fabrication techniques to improve the surface properties and structural integrity of orthopaedic implants.

Key Outcomes & Future Plans

- **Implants for Cranioplasty:** A specific partnership was formed between FAU Erlangen and Jaslok Hospital, Mumbai, to develop patient-specific cranial implants.
- **Synchrotron Studies:** A joint study on neobone formation around implants was initiated involving IISc, IIT Kanpur, and the Max Planck Institute.
- **Commercialization:** A strategic collaboration between Ceramat Pvt. Ltd. and CeramTec Germany was established for the commercialization of advanced bioceramics.
- **Tissue Engineering:** Joint research on vascularization co-culture models was launched between IISc and TU Dresden.

Participating Institutions and Organizations

India

IISc: Indian Institute of Science, Bangalore
 IIT Kanpur: Indian Institute of Technology
 IIT (BHU): Indian Institute of Technology (Banaras Hindu University)
 KGMU: King George’s Medical University
 RUAS: Ramaiah University of Applied Sciences
 Jaslok Hospital and Research Centre, Mumbai
 Ceramat Pvt. Ltd. (A Tata Steel Enterprise)

Germany

University of Erlangen–Nuremberg (FAU)
 TU Dresden: Technische Universität Dresden | Max Planck Institute
 Universities/Hospitals across Frankfurt, Heidelberg, Cologne, Würzburg, Mainz, Potsdam, Bremen, and Berlin
 CeramTec Germany

In February 2024, Mrutyunjay Suar, Kalinga Institute of Industrial Technology and Leon J. Schurgers, RWTH Aachen organized a one-of-its-kind Workshop on ‘Crosstalk between cardiovascular disease and chronic inflammation via the routes of metabolite and immunity’ in Bhubaneswar, India. This bilateral workshop brought together 23 experts (15 from India, 8 from Germany) to explore the complex intersections between cardiovascular health, chronic infections, and metabolic pathways. The event featured participation from industries such as CyCa

Oncosolutions, Huwel Life Sciences, and Val-Infla Pvt. Ltd., alongside premier academic institutions including KIIT University, IISER (Bhopal & Berhampur), AIIMS (New Delhi, Jodhpur, Rishikesh), IIT (Kanpur, Ropar), CSIR-CCMB, IGIB, RWTH Aachen, University of Münster, DKFZ, and AMICARE Institute.

The technical agenda emphasized precision medicine and interdisciplinary research. Key sessions covered Vitamin K metabolism in aging, AI and blockchain applications in healthcare, nano-therapeutics for renal inflammation, and point-of-care diagnostics for tuberculosis.

Participants also discussed innovative platforms for assessing cerebrovascular health and the integration of traditional knowledge into modern precision wellness.

Key Outcomes & Future Plans

A significant milestone was the signing of a Memorandum of Understanding (MoU) between KIIT University and the University of Münster to foster joint research and exchange programs. The event also witnessed the launch of a new healthcare startup, Vallnfla Pvt. Ltd., signifying a push towards commercializing Indo-German biotechnological innovations. Furthermore, Thematic Cohort Action Groups were formed to spearhead joint grant submissions and collaborative research in oncology, cardiovascular diseases, and infectious diseases.

The Workshop on 'Precision Medicine for Global Health' organized during February 2024 by Prof. Mrutyunjay Suar (KIIT University, India) and Prof. Leon J. Schurgers (RWTH Aachen University, Germany) explored the complex intersections between cardiovascular health, chronic infections, and metabolic pathways to advance precision wellness. The

workshop focused on integrating fundamental science with clinical data to develop targeted therapeutic and diagnostic solutions.

Technical Deliberations

- **Metabolic Pathways:** Discussions centered on Vitamin K metabolism in aging and its implications for long-term health.
- **Digital Healthcare:** Experts explored the application of Artificial Intelligence (AI) and blockchain technologies to secure and optimize healthcare delivery.
- **Nano-Therapeutics:** Sessions featured innovative research on nano-therapeutics for treating renal inflammation and cerebrovascular health.
- **Diagnostics:** A key focus was the development of rapid point-of-care diagnostics for tuberculosis and other infectious diseases.

Key Outcomes & Future Plans

- **Strategic Partnership:** A formal Memorandum of Understanding (MoU) was signed between KIIT University and the University of Münster to facilitate joint research and academic exchange.

- Commercialization: The workshop served as the launchpad for a new healthcare startup, VallInfla Pvt. Ltd., highlighting the focus on commercializing biotechnological innovations.
- Collaborative Groups: Participants established “Thematic Cohort Action Groups” to spearhead joint grant applications and research in oncology, cardiovascular, and infectious diseases.

Participating Institutions and Organizations

India

KIIT University: Kalinga Institute of Industrial Technology

IISER Bhopal: Indian Institute of Science Education and Research

IISER Berhampur: Indian Institute of Science Education and Research

AIIMS: All India Institute of Medical Sciences (New Delhi, Jodhpur, Rishikesh)

IIT Kanpur: Indian Institute of Technology

IIT Ropar: Indian Institute of Technology

CSIR-CCMB: Centre for Cellular and Molecular Biology

CSIR-IGIB: Institute of Genomics and Integrative Biology

CyCa Oncosolutions | Huwel Life Sciences | Val-Infla Pvt. Ltd.

Germany

RWTH Aachen University | University of Münster

DKFZ: German Cancer Research Center (Deutsches Krebsforschungszentrum)

AMICARE: Aachen Medicine-Information Technology-Communication-Automation-Research-Engineering Institute



Crosstalk between cardiovascular disease and chronic inflammation via the routes of metabolite and immunity

IGWTRA: The Indo-German Workshop on Translational Research in Andrology was a vibrant forum focused on bridging the gap between basic research and clinical applications in male infertility. Coordinated by Satish Kumar Adiga, Kasturba Medical College, Manipal Academy of Higher Education, Manipal and Stefan Schlatt, University of Muenster in Feb-Mar, 2025 in Manipal, the deliberations emphasized importance of

- Sperm Biology: Experts examined the mechanics of sperm motility, the function of cilia, and the role of ion channels in reproductive health.
- Genetics & Immunology: Sessions covered the genetic and epigenetic foundations of infertility, alongside the impact of

inflammation and immunology on male reproductive success.

- Advanced Models: Presentations explored 3D testicular models and the potential of stem cell-based treatments for azoospermia.
- AI Diagnostics: The workshop featured sessions on AI-driven diagnostics for fertility preservation and the development of clinical decision support tools.

Key Outcomes & Future Plans

- Consortium Formation: A primary recommendation was the establishment of an Indo-German Andrology Consortium to facilitate joint projects and student exchanges.
- Large-Scale Studies: A specific research proposal emerged to

- develop gene panels for male infertility, involving 500 trials (400 Indian and 100 German).
- Semen Parameter Normograms: Participants outlined a project to create region-specific semen parameter normograms tailored to the Indian population.
- Collaborative Funding: The group agreed to pursue joint funding for stem cell-based treatments and AI-driven clinical tools, with a follow-up workshop planned in Germany.

Participating Institutions and Organizations

India

KMC: Kasturba Medical College (Manipal Academy of Higher Education)

AIIMS: All India Institute of Medical Sciences (New Delhi)

NIRRH: National Institute for Research in Reproductive and Child Health (Mumbai)

CCMB: Centre for Cellular and Molecular Biology (Hyderabad)

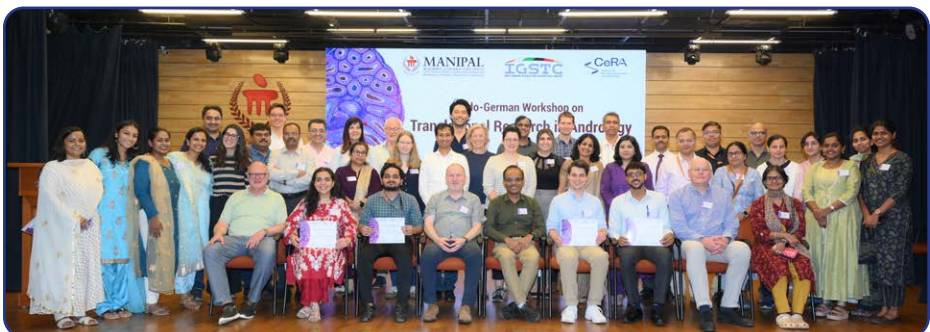
GBU: Gujarat Biotechnology University

InStem: Institute for Stem Cell Science and Regenerative Medicine (Bengaluru)

CMC: Christian Medical College (Vellore) | SAR Healthline

Germany

University of Münster | Justus Liebig University Giessen | Vitromed GmbH



Indo-German Workshop on Translational Research in Andrology, workshop group photo



Dr Shrutidhara with her host Prof. Andreas Dietzel in Braunschweig



Dr Shrutidhara presenting her WISER project at Golden Jubilee Celebration in New Delhi

Dr. Shrutidhara Sarma, Assistant Professor at IIT Jodhpur, WISER 2022 awardee with Prof. Andreas Dietzel from Technische Universität Braunschweig, is tackling a deceptively simple but life-critical problem: how to monitor a newborn's breathing accurately, continuously, and without invasive tubes or bulky machines. Her team is developing an ultrathin, skin-like sensor patch that stretches and relaxes with every breath an infant takes, converting these tiny chest movements into precise electrical signals. At the heart of the work are laminated nanocomposites, carefully engineered layers of metals and carbon-based materials, that dramatically amplify sensitivity

compared to conventional strain gauges, while remaining flexible and robust. The patch has been rigorously tested on an infant CPR manikin to mimic real breathing patterns, including dangerous conditions such as apnea and rapid breathing. Beyond sensing, the system integrates machine-learning algorithms that can interpret breathing patterns in real time and flag distress automatically. By combining materials science, microfabrication, and intelligent data analysis, the project aims to deliver a low-cost, non-invasive respiratory monitoring technology with particular relevance for neonatal intensive care units, especially in resource-constrained settings.

Prof. Dipti Gupta, Professor at IIT Bombay, WISER 2022 awardee with Prof. Jasmin Aghassi-Hagmann at Karlsruhe Institute of Technology, is working at the frontier of “liquid biopsy,” where a simple blood sample can reveal the earliest molecular whispers of cancer. The focus is on extracellular vesicles, nanometre-sized packages shed by tumour cells that carry proteins, RNA and DNA reflecting the disease state. Detecting these vesicles is notoriously difficult; they are tiny, rare, and lost in the biochemical noise of blood. Gupta’s team addresses this by marrying two powerful technologies. From Germany comes a bio-inspired capture strategy, using lipid membranes patterned at the nanoscale and decorated with antibodies that selectively latch onto



Prof. Dipti GUpta with her host Prof. Jasmin Aghassi-Hagmann at Karlsruhe

cancer-associated vesicles. From IIT Bombay comes an ultrasensitive electronic readout; electrolyte-gated organic transistors that can amplify minuscule biological binding events into clear electrical signals. The result is a compact, low-voltage, marker-free sensing platform that can capture and detect cancer-related vesicles directly from blood, without laborious sample preparation. Beyond oncology, the work lays the foundation for a versatile, printed bioelectronic platform adaptable to many diseases, pointing towards fast, affordable diagnostics at the point of care.



Prof. Dipti GUpta with her host Prof. Jasmin Aghassi-Hagmann at Karlsruhe

Dr. Ute Distler of University Medical Center Mainz, WISER 2024 awardee with Prof. Nishith Gupta at BITS Pilani, Hyderabad Campus, is probing how the parasite *Toxoplasma gondii* silently reshapes human muscle cells from the inside out. Although toxoplasmosis is often thought of as a brain or eye infection, the parasite has a strong affinity for skeletal muscle, where it can persist for years and contribute to muscle degeneration. Using state-of-the-art mass-spectrometry based proteomics, Distler and her Indo-German team are mapping, protein by protein, how infected muscle cells respond at different stages of differentiation, from immature myoblasts to fully formed myotubes. By integrating proteomic data with transcriptomic and miRNA profiles, the project has created one of the most comprehensive molecular reference maps of human muscle cells to date. Early analyses reveal distinct molecular signatures linked to infection and muscle cell state, opening the door to identifying host factors the parasite exploits and biomarkers that could signal



Dr. Ute Distler presenting her work at BITS Pilani

infection in muscle tissue. Beyond advancing fundamental parasitology, the work lays a rigorous molecular foundation for future diagnostics and targeted interventions against *Toxoplasma* infections.



Dr. Navneet Kaur, Assistant Professor, Punjab Engineering College (Deemed to be University), Chandigarh, India



Dr. Hesam Amiri, RWTH Aachen University, Aachen, Germany

Metallovesicle-based nano-interfaces, focusing on their synthesis, characterization, and integration onto chip-based platforms. The collaboration generated functional surfaces to study electrical and surface interactions at the nanoscale, supporting future applications in digital sensing, biointerfaces, and advanced health-related micro-devices.



Dr. Mehmet Dinc, Group Leader, Hahn-Schickard-Gesellschaft für angewandte Forschung e.V., Germany



Dr. Snehasis Bhakta, Assistant Professor, Cooch Behar College, West Bengal, India researched cost-effective nanomaterials for selective removal of high-abundance proteins from human serum, a key challenge in proteomics. Their work focused on surface-imprinted nanocomposites to improve detection of low-abundance, clinically relevant biomarkers, strengthening digital and analytical health research tools for biomedical diagnostics.



Dr Pradnya Kamble, ICMR - National Institute for Research in Reproductive and Child Health

Host: LIONEX GmbH

Area of Work: Development of whole blood based IL2-ELISA assay for distinguishing patients with active and latent tuberculosis.



Ms Sonali J. Jain, BITS Pilani, Pilani Campus

Host: LIONEX GmbH

Area of Work: Development of a rapid Sputum/urine-based test using monoclonal antibodies specific to multi-antigens, both carbohydrate and protein of the tuberculosis pathogen.



Mr Paladugu Sri Harsha, Indian Institute of Science Bangalore

Host: Fraunhofer Institute for Microengineering and Microsystems IMM

Area of Work: Bioengineering – Advancing Organ-on-Chip (OoC) technology for commercial scale implementation: strategies for effective translation.



Dr Kuzhandai Shamlee J., IIT Madras

Host: LIONEX GmbH

Area of Work: Development and validation of a rapid immunochromatography test for Urticaria.



Ms Ruchika, CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur

Host: LIONEX GmbH

Area of Work: Development of novel rapid tests for differential diagnosis of bacterial and viral infections.



Mr Nabab Khan, CSIR - Institute of Himalayan Bioresource Technology

Host: LIONEX GmbH

Area of Work: Diagnostics and Therapeutics - Development of ultrasensitive Antibody-Gold Nanoparticles (Ab-AuNPs) conjugate based diagnostic kit for sub nanogram level detection of human blood pathogen biomarkers.



Mr Ravi Raj, CSIR-IHBT

Host: LIONEX GmbH

Area of Work: Isolation of specific monoclonal antibodies and development of a multiantigen based urine test for fast diagnosis of tuberculosis.

ADVANCED IMAGING AND BIOMECHANICAL ANALYTICS



The project 'Re-engineering High-end Audiometric Devices for Robust and Affordable Audiological Testing (Sound4All)' pursued by the Consortium consisting of scientists from Indian Institute of Technology Delhi, All India Institute of Medical Sciences (AIIMS), Elkon India Pvt. Ltd, Technische Universität München, PATH medical GmbH during 2016–2022.

“

Elkon India Pvt. Ltd.

"Engineering affordable hearing screening solutions for large-scale community impact."

”

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PATH medical GmbH

"Transforming clinical audiology expertise into scalable, smartphone-enabled diagnostics."

”

The most valuable advancement of the **Sound4All** project lies in its ability to translate high-end audiometric screening into an affordable, scalable, and user-friendly solution without sacrificing clinical credibility.

Unlike conventional OAE-based devices that are costly, hardware-heavy, and dependent on trained audiologists, **Sound4All** redefines the screening paradigm by combining low-cost, off-the-shelf components with sophisticated smartphone-based signal processing. This approach dramatically reduces system cost and complexity while delivering screening performance comparable to commercial reference systems. By enabling reliable operation by laypersons, the project shifts hearing screening from specialist clinics to schools, factories, and community health settings, where early detection can have the greatest impact. Validated through extensive clinical studies, **Sound4All** demonstrates that advanced diagnostics need not be expensive or infrastructure-intensive to be effective. Supported by IGSTC under the 2+2 Call 2014, the project exemplifies how sustained bilateral collaboration can convert cutting-edge research into inclusive healthcare technologies with wide societal reach.



Prototype with integrated sensors



Assembled probe with injection moulded parts design

The project 'Next-generation dynamic Scheimpflug imaging and biomechanical analytics for in vivo quantification of corneal viscoelasticity (SIBAC)' was conducted by the Indo-German team of researchers from Narayana Nethralaya Foundation, Vellore Institute of Technology, Forus Health Pvt. Ltd., University of Carl Gustav Carus, OCULUS Optikgeräte GmbH.

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Forus Health Pvt. Ltd.

"Enabling accessible, biomechanically informed eye care through intelligent clinical innovation."

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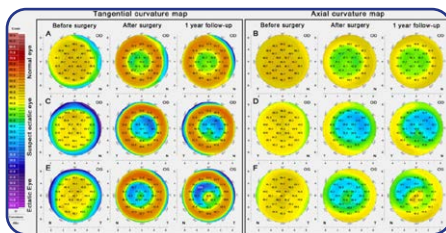
OCULUS Optikgeräte GmbH

"Advancing corneal diagnostics with precision biomechanics and clinically trusted technology."

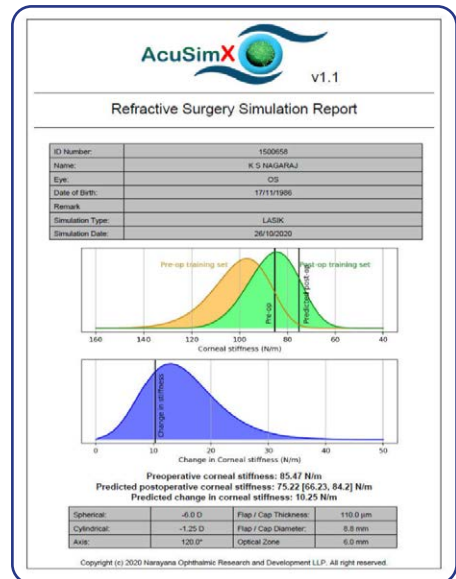
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The **SIBAC** project delivers several clear and measurable benefits over existing corneal diagnostic solutions by moving decisively beyond geometry-based assessment toward true, patient-specific biomechanical evaluation. Conventional clinical technologies primarily assess corneal shape, thickness, and empirical deformation indices, which often fail to detect early biomechanical weakening and provide limited predictive power for refractive surgery outcomes. In contrast, **SIBAC** integrates high-speed dynamic corneal deformation imaging with automated inverse finite-element modelling to directly estimate intrinsic corneal viscoelastic properties in vivo. This enables earlier and more reliable detection of subclinical ectasia, improved risk stratification and patient selection for refractive

procedures, and objective assessment of biomechanical changes induced by surgeries such as LASIK, SMILE, PRK, and collagen crosslinking. By delivering these advanced analyses through a clinically integrated, user-ready software platform compatible with existing diagnostic workflows, **SIBAC** bridges the long-standing gap between biomechanical research and routine ophthalmic practice, offering predictive, personalized clinical decision support that current solutions cannot provide.



Preoperative and postoperative curvature map of the patient developed ectasia after SMILE surgery



Refractive surgery simulation report generated by AcuSimX developed in the project

Dr. Ramesh R. Galigekere and Dr. Manohara Pai (Manipal Institute of Technology, India) and Dr. Arved Huebler (Chemnitz University of Technology, Germany) convened the Workshop on 'Advances in Medical Technology Towards Current Healthcare Necessities' in March 2014 in Manipal, India, for discussions on bridging the gap

between engineering and medicine to develop innovative technological solutions for modern healthcare challenges. Fifty one participants had intense discussions on

Technical Deliberations

- Printed Electronics: Experts discussed the use of printing technologies for the mass

production of low-cost diagnostic devices and sensors in healthcare.

- **Medical Imaging & Signal Processing:** Sessions covered advanced signal processing techniques to enhance medical imaging and diagnostic accuracy.
- **Rehabilitation Engineering:** Deliberations focused on engineering solutions for physical rehabilitation and assistive technologies.
- **Sustainable Healthcare:** Notable presentations included the development of solar-powered medical equipment for resource-limited settings.

Key Outcomes & Future Plans

- **Student Exchange:** A concrete partnership was established to send an intern from Chemnitz University to the Department of Biomedical Engineering at MIT, Manipal.
- **Collaborative Research:** Discussions were initiated for joint research proposals specifically in the fields of printed electronics and biomedical signal processing.
- **Joint Publications:** The organizers committed to publishing a detailed "Proceedings" book featuring selected high-impact presentations from the workshop.

Participating Institutions and Organizations

India

MIT: Manipal Institute of Technology | KMC: Kasturba Medical College

IIT Madras: Indian Institute of Technology | IIT Kharagpur: Indian Institute of Technology

IIT Bombay: Indian Institute of Technology | IISc: Indian Institute of Science, Bangalore

BMSCE: B.M.S. College of Engineering | SJCE: S.J. College of Engineering

NITK Surathkal: National Institute of Technology Karnataka

Philips India | Skanray Healthcare | Forus Health Pvt. Ltd. | KMC Hospital

Germany

Chemnitz University of Technology

University of Applied Sciences Western Switzerland

pmTUC (Chemnitz University of Technology - Print Media Technology)

Indo-German Medical Partnership: Artificial Intelligence & Extended Reality in Healthcare & Expanding Avenues in Robotics Surgery: Coordinated by Prof Anita Dhar, All India Institute of Medical Sciences and Prof. Stefanie Speidel, National Center for Tumor Diseases (NCT) Dresden, TU Dresden, University Hospital Dresden in July 2025, in Dresden, Germany, this bilateral workshop focused on the intersection of engineering and medicine to address next-generation healthcare challenges.

Scientific Deliberations revealed around

- AI-Enhanced Diagnostics: Experts discussed innovative applications such as AI-enhanced imaging for breast cancer and multimodal integration in cardiology, including the development of an “ECG Dashboard”.
- Surgical Innovation: Sessions highlighted AI-driven 3D anatomical reconstruction, real-time surgical scene understanding, and intraoperative navigation for procedures like prostate resection.
- Advanced Training: Participants explored the use of Virtual Reality (VR) and Extended Reality (XR) for medical training and surgical skill assessment.
- Wearable Technology: Discussions also covered wearable monitoring technologies for continuous patient health tracking.

Key Outcomes & Strategic Alliance

- Institutional Partnership: A major highlight was the signing of a Letter of Intent (LoI) between Prof. Ursula M. Staudinger (Rector of TUD) and Dr. M. Srinivas (Director of AIIMS New Delhi), marking a new strategic alliance.
- Future Research: The event concluded with concrete plans to develop co-funded research proposals for agencies such as IGSTC and DBT.
- Clinical Translation: Discussions focused on translating these technological innovations into real-world clinical solutions to improve patient outcomes.

Participating Institutions and Organisations

India

All India Institute of Medical Sciences (AIIMS), New Delhi
All India Institute of Medical Sciences (AIIMS), Kalyani
All India Institute of Medical Sciences (AIIMS), Raipur
All India Institute of Medical Sciences (AIIMS), Bhubaneswar
Lady Hardinge Medical College, New Delhi
VMMC & Safdarjung Hospital, New Delhi
ESIC Medical College, Faridabad
Medica Superspecialty Hospital, Kolkata
Indo-German Science & Technology Centre (IGSTC)
SS Innovation International Pvt. Ltd., Gurugram
GE Healthcare (India)

Germany

Technische Universität Dresden (TU Dresden)
National Center for Tumor Diseases (NCT Dresden)
University Hospital Dresden | Hannover Medical School (MHH Hannover)
University Hospital Essen | RWTH Aachen University Hospital
Otto-von-Guericke University Hospital Magdeburg
Technical University of Munich (TUM) | University Hospital Heidelberg
German Cancer Research Center (DKFZ)
Helmholtz-Zentrum Dresden-Rossendorf (HZDR)
NVIDIA Corporation (Germany) | Brainlab AG
GE Healthcare International (Germany)



Indo-German Medical Partnership: Artificial Intelligence & Extended Reality in Healthcare & Expanding Avenues in Robotics Surgery workshop group photo



Dr Saikat Kumar Shome, Principal Scientist, CSIR–Central Mechanical Engineering Research Institute (CMERI), Durgapur, India

Dr Amartya Ganguly, Senior Scientist, Munich Institute of Robotics and Machine Intelligence (MIRMI), Technical University of Munich, Germany

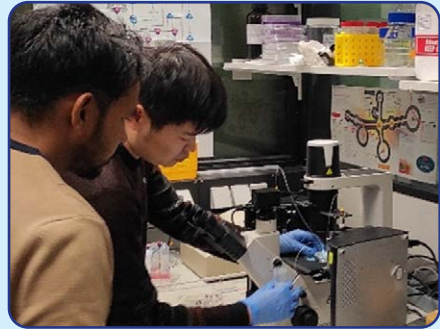


Digital control approaches for myoelectric prosthetic hands, using muscle electrical signals and biomechanical hand models for real-time control. The work supports digital health and tele-rehabilitation by improving how prosthetic devices respond to patient inputs, with relevance for remote rehabilitation and personalized assistive care.

Dr Uma Shanker, Assistant Professor,
Central University of Punjab,
Bathinda, India

Dr Amit Khurana, Postdoctoral
Fellow, RWTH University Hospital,
Aachen, Germany

Advanced experimental tools for translational liver research, focusing on liver cell models, 3D spheroids/organoids, and imaging techniques to study chronic liver diseases. The collaboration strengthened digital and laboratory-based health research workflows by enabling improved disease modelling and analysis, supporting future applications in drug testing, clinical research, and personalized liver disease management.



Dr. Medhavi Vishwakarma, Assistant Professor at the Indian Institute of Science, WISER 2023 awardee working with Dr. Jacopo Di Russo at RWTH Aachen University.

Investigating how lung scarring conditions, such as idiopathic pulmonary fibrosis, may contribute to cancer initiation. Using advanced 3D lung tissue models and live imaging, the study examined early cancer-related cell changes, and enabling improved understanding of disease progression.

BIOMATERIALS, BIOFABRICATION, AND IMPLANTS



The Workshop on 'Strategies for improved bone replacement materials and orthopaedic implants: design – manufacturing – technologies' was one of the early events organized by Prof. Dr. Bikramjit Basu (Indian Institute of Science, Bangalore) and Prof. Dr. Michael Gelinsky (TU Dresden) in February, 2014 at Technische Universität Dresden (TU Dresden), Germany. The objective was To explore innovative design and manufacturing technologies for orthopedic implants and bone replacement materials.

Technical Deliberations

- **Advanced Materials:** Experts discussed the development of novel B-type Ti-Nb-based alloys with reduced stiffness and the suitability of cellular metals for long-term implants.
- **Additive Manufacturing:** Sessions explored the 3D powder printing of drug-loaded implants and the biofabrication of alginate-based matrices.
- **Bio-inspired Systems:** Deliberations included the additive manufacturing of bio-inspired blood vessel systems for vascularized bone tissue regeneration.

- **Biomechanics & Testing:** Technical talks covered tribological contact analysis for hip prostheses and mechanical test methods for joint implants.

Key Outcomes

- **Technological Exchange:** The event facilitated deep technical exchange on the use of finite element modeling to assess orthopedic applications of cellular metals.
- **Research Consolidation:** Expertise was consolidated in specialized fields such as calcium phosphate-based materials for advanced drug delivery.
- **Collaborative Roadmap:** The workshop laid the foundation for the long-running BIODENT series of symposia, fostering sustained Indo-German engagement in biomaterials.
- **Policy Guidance:** Participants recommended that IGSTC issue specific calls for joint projects to translate these engineering innovations into clinical reality.

Participating Institutions and Organisations

India

IISc Bangalore: Indian Institute of Science

NIT Rourkela

HOSMAT Hospital, Bengaluru

Apollo Gleneagles Hospital, Kolkata

Jadavpur University, Kolkata

SCTIMST, Trivandrum

Excel Matrix Biological Devices Pvt. Ltd., Hyderabad

Data Metallurgical Company (Kolkata)

Germany

TU Dresden: Technische Universität Dresden

University of Erlangen

University of Bremen

University of Würzburg

University of Rostock

Leibniz IFW Dresden: Leibniz Institute for Solid State and Materials Research

Fraunhofer IWU: Fraunhofer Institute for Machine Tools and Forming Technology

Fraunhofer IGB: Fraunhofer Institute for Interfacial Engineering and Biotechnology

IMA GmbH Dresden: Institute for Material Testing and Equipment Analysis



Strategies for improved bone replacement materials and orthopaedic implants: design – manufacturing – technologies” workshop group photo

Prof. S. Swaminathan, SASTRA Deemed University, India and Prof. Dr. Jochen Salber, University Hospital of the Ruhr–University Bochum, Germany organized an Indo-German Workshop on Biofabrication: Emerging biomaterials, machines & digital tools (IGBMDT) in Feb 2023 in Thanjavur, Tamil Nadu, India. This bilateral workshop focused on the transformative potential of biofabrication in modern healthcare, bridging the gap between engineering innovations and clinical reality.

Technical Deliberations

- Emerging Materials: Experts discussed innovations in silk-based bioprinting, hybrid aerogels, and specialized bio-inks for tissue engineering.
- Advanced Biofabrication: Sessions highlighted Laser-Induced Forward Transfer (LIFT) for high-precision cell isolation and melt electrowriting for creating complex vascular structures.
- In Vitro Models: Deliberations covered the development of co-culture models (e.g., osteoblast-osteoclast) for advanced drug testing and disease modeling.
- Organ Engineering: Long-term goals addressed the development of transplantable solid organs and complex tissue constructs.

Key Outcomes & Future Plans

- **Clinical Validation:** A major consensus was the need for randomized controlled clinical trials to validate biofabricated constructs for human application.
- **Collaborative Success:** The workshop directly resulted in two successful WISER applications and two PECFAR applications.
- **Bench-to-Bedside Training:** Participants emphasized training future clinicians in engineering concepts to facilitate smoother technology adoption in hospitals.
- **Joint Funding:** Immediate steps include the preparation of joint project applications for IGSTC funding with a focus on regulatory transparency and ethics.

Participating Institutions and Organisations

India

SASTRA Deemed University | IIT Delhi: Indian Institute of Technology Delhi

DBT-NIAB: Department of Biotechnology – National Institute of Animal Biotechnology

Wipro 3D | Next Big Innovation Labs

CTARS: Centre for Traditional Arts and Rehabilitation Support

DSS Imagetech

Germany

Ruhr-University Bochum

Fraunhofer ILT: Fraunhofer Institute for Laser Technology

TU Dresden: Technische Universität Dresden

TU Munich: Technical University of Munich

Reutlingen University | RWTH Aachen University | University of Freiburg

University of Wuerzburg | Cellink | Fibrothelium GmbH



Indo-German Workshop on Biofabrication: Emerging biomaterials, machines & digital tools (IGBMDT) workshop group photo

Around the same time in February 2023, Prof. Bikramjit Basu (IISc Bangalore, India) and Prof. Aldo R. Boccaccini (University of Erlangen-Nuremberg, Germany) held a Workshop on 'Design and manufacturing of biomaterials and implants for dental and cranio-maxillofacial reconstruction and regeneration (BIODENT)' in Erlangen-Nuremberg, Germany, which built on the learning of the 2014 workshop on orthopedic implants. The event addressed the critical medical needs of an aging population susceptible to bone fractures and musculoskeletal disorders, focusing on the challenge of matching synthetic biomaterials to

natural bone properties and ensuring biocompatibility. The symposium aimed to integrate state-of-the-art manufacturing technologies with scientific understanding to facilitate effective translational research and incentivized joint ventures to scale up the production and commercialization of laboratory innovations. Active participation from a diverse group of clinicians, scientists, and industry experts. The Indian delegation included representatives from IISc Bangalore, IIT Kanpur, IIT (BHU), King George's Medical University (KGMU), Ramaiah University of Applied Sciences, Jaslok Hospital, and Ceramat Pvt. Ltd. (a Tata Steel Enterprise), while

the German contingent comprised speakers from universities and hospitals across Dresden, Erlangen-Nuremberg, Frankfurt, Heidelberg, Cologne, Würzburg, Mainz, Potsdam, Bremen, and Berlin.

Key Outcomes & Future Plans

The workshop catalyzed several specific collaborative initiatives:

- **Implants for Cranioplasty:** A partnership was formed between FAU Erlangen and Jaslok Hospital, Mumbai, to develop patient-specific implants.
- **Synchrotron Studies:** A joint study on neobone formation around implants involving IISc, IIT Kanpur, and the Max Planck Institute.
- **Commercialization:** A collaboration between Ceramat Pvt. Ltd. and CeramTec Germany was established for the commercialization of bioceramics.
- **Tissue Engineering:** Joint research on vascularization co-culture models was initiated between IISc and TU Dresden.

Dr. Greeshma Thrivikraman, Assistant Professor at IIT Madras, WISER 2023 awardee with Prof. Michael Gelinsky at Technische Universität Dresden, is rethinking how the body can be guided to heal large skull defects that are otherwise beyond its natural repair capacity. Instead of relying on transplanted bone or cells, her approach engineers a “smart” collagen-based implant that actively instructs the body’s own cells where to go and what to do. The graft is built from collagen fibres that are radially aligned, creating microscopic pathways that direct





cells to migrate from the edges of a cranial defect toward its centre. This scaffold is then strengthened by bone-like nanoscale mineralization and equipped with a central depot of the sensory neuropeptide CGRP, which diffuses

outward as a controlled chemical signal. Together, these structural and biochemical cues recruit blood vessel-forming cells and bone-forming stem cells, while tempering bone-resorbing cells. Detailed molecular and biophysical studies have validated the stability and controlled release of the neuropeptide, and the team is now advancing toward complex cell-culture and in vivo studies. The work blends biomaterials engineering, neurobiology, and regenerative medicine to create a new paradigm for cell-free bone repair.

Dr. Svenja Nellinger, Postdoctoral Researcher at Reutlingen University, WISER 2023 awardee working with Prof. Sundaramurthi Dhakshinamoorthy at SASTRA University, is working to make wound dressings behave less like passive bandages and more like living tissues. The focus is the extracellular matrix (ECM), the complex mesh of proteins and sugars that surrounds cells and actively directs healing. Instead of extracting ECM from donor tissues, her team grows "cell-derived ECM" in the laboratory using fibroblasts, stem cells and epithelial cells, then carefully removes the

cells while preserving the bioactive matrix they leave behind. During the project, protocols were optimized to substantially increase ECM yield and tailor its composition, including the use of growth factor stimulation and serum-free culture systems. A key innovation is chemically





“clickable” ECM, functionalized with azide groups, which allows it to be precisely integrated into printable

hydrogel bioinks. Initially aimed at advanced wound dressings, the work has expanded to include ECM-based bioinks for growing colon organoids—miniature tissue models that mimic human intestine. By combining cell biology, chemistry and biofabrication, the project is laying the groundwork for customizable, biologically instructive materials that could transform wound care and tissue engineering.

Prof. Andreas Blaeser, Professor, Technical University Darmstadt, Germany

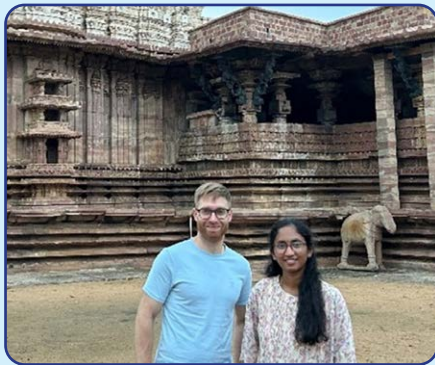
Dr. Dhakshinamoorthy Sundaramurthi, Assistant Professor, SASTRA Deemed University, Thanjavur, India



Biomaterials and bioprinting approaches for regenerative medicine, focusing on 3D and 4D bioprinting of tissue constructs and bioinks. Their work addressed challenges in tissue engineering, scaffold design, and biofabrication, supporting the development of advanced constructs for applications such as nerve, cardiac, and musculoskeletal tissue regeneration.

Dr. Janani Radhakrishnan, Scientist–B, DBT–National Institute of Animal Biotechnology (NIAB), Hyderabad, India

Dr. Alexander Sieberath, Postdoctoral Researcher, University Hospital Knappschaftskrankenhaus Bochum, Germany



Micro-structured, porous biomaterial constructs for bone regeneration, focusing on 3D hydrogel scaffolds that mimic bone tissue architecture. Their work involved developing and testing mineralised scaffolds and in-vitro functional models to study cell growth, tissue integration, and angiogenic potential, supporting future applications in regenerative medicine and digitally assisted tissue engineering research.

DIGITAL HEALTH, AI, AND PRECISION MEDICINE



Germany(G) and India (IND) – Brain(B) and Oncology(O) Personalized Medicine(PM) GIND-BOPM: Advancing Personalized Medicine in Cancer and Neurological Disorders: The Evolving Role of Circulating Biomarkers was an important event coordinated by Basant Kumar Thakur, University Hospital Essen and Sasidhar Manda, Apollo Hospitals Educational & Research Foundation (AHERF) in March 2025 in Hyderabad, India. This workshop, focused on addressing translational challenges in precision medicine through international cooperation.

Technical Deliberations

- **Oncology:** Experts highlighted innovations such as AI-integrated multi-analyte platforms, droplet digital PCR, and functional tumor models (tumoroids) for therapeutic screening.
- **Neurology:** Sessions explored exosome-based diagnostics, miRNA profiling, and vesicle-mediated drug delivery for

conditions like Alzheimer's, Parkinson's, and pediatric brain tumors.

Key Outcomes & Future Plans

- **Research Centre:** A major milestone was the agreement between AHERF and University Hospital Essen to jointly apply for an Indo-German Research Centre in oncology and neurology.
- **Strategic Collaboration:** A Confidential Disclosure Agreement (CDA) was signed between AHERF and the University of Freiburg to conduct specific biomarker research in prostate cancer.
- **Consortium Formation:** Future plans include the establishment of an Indo-German Liquid Biopsy Consortium.
- **Funding & Sustainability:** Participants agreed to pursue joint funding through IGSTC and Horizon Europe and launch an annual symposium to monitor progress.

Participating Institutions and Organisations

India

AHERF: Apollo Hospitals Educational and Research Foundation

AIIMS: All India Institute of Medical Sciences

IIT (BHU): Indian Institute of Technology (Banaras Hindu University)

NIPER: National Institute of Pharmaceutical Education and Research, Hyderabad

Mahindra University | Actorius Innovations

Germany

University Hospital Essen | University Hospital Düsseldorf

University Hospital Bonn | University Hospital Freiburg

University Hospital Leipzig

Fraunhofer IZI: Fraunhofer Institute for Cell Therapy and Immunology



Germany(G) and India (IND) – Brain(B) and Oncology(O) Personalized Medicine(PM) GINDBOPM: Advancing Personalized Medicine in Cancer and Neurological Disorders: The Evolving Role of Circulating Biomarkers workshop group photo

The bilateral workshop AWM: Ageing, Workplace and Mental Health: A Multipronged Approach to Addressing a Complex Bio-Social Challenge, coordinated by Christian Schmahl, Central Institute for Mental Health, Mannheim and Jamuna Rajeswaran, National Institute of Mental Health and Neurosciences (NIMHANS) was held in Mannheim, Germany in June 2025. It addressed the mental health challenges of an ageing workforce through a cross-disciplinary lens.

Thematic Deliberations

- **Mental Health & Diagnostics:** Experts focused on the rising prevalence of dementia and Mild Cognitive Impairment (MCI), emphasizing early diagnosis and the role of rhythmic metabolism in mental well-being.
- **Workplace Dynamics:** Sessions explored the economic impacts of depression and how occupational engagement affects older adults.
- **Technological Innovation:** Industry experts presented AI-driven text mining and machine learning approaches to quantify workplace stress factors.
- **Innovative Interventions:** Highlights included personalized tDCS methods leveraging AI for dementia, Senotherapy to combat age-relevant diseases, and smartphone-based Ecological Momentary Assessment (EMA).

Key Outcomes & Way Forward

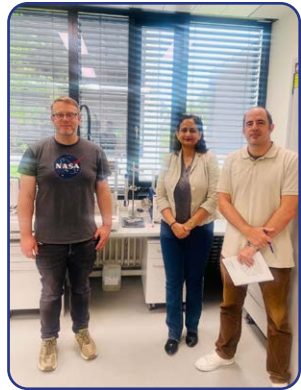
- **Tripartite Partnership:** A major outcome was the decision to form a partnership between academia, industry, and policymakers to design scalable, age-sensitive interventions.
- **Working Groups:** Two dedicated groups were established to draft collaborative IGSTC research proposals on “Workplace Environment and Ageing” and “Innovative Healthcare Interventions”.
- **Future Planning:** Participants agreed to a follow-up meeting at NIMHANS next year and discussed potentially expanding the partnership to include Japan as a demographic case study.



AWM: Ageing, Workplace and Mental Health: A Multipronged Approach to Addressing a Complex Bio-Social Challenge workshop group photo

Dr. Puja Yadav, Assistant Professor at Central University of Haryana, WISER 2023 awardee with Prof. Barbara Maria Spellerberg at University Hospital Ulm, is confronting one of the quiet but persistent threats to newborn health: infections caused by Group B Streptococcus (GBS), a bacterium that can evade antibiotics by hiding within protective biofilms. Rather than modifying existing drugs, her strategy looks inward, mining the human body itself for new antimicrobials. The team systematically fractionates peptide-rich human samples, including blood-derived hemofiltrate and tissue sources, generating thousands of peptide fractions that are screened against multidrug-resistant GBS

strains from India, Europe and the United States. Through repeated rounds of purification and rigorous antibacterial and anti-biofilm testing, only the most potent candidates survive. Advanced mass spectrometry is then used to verify peptide purity and rule out antibiotic contamination, a critical step that led to the discovery of genuinely human-derived antimicrobial peptides, particularly from vaginal tissue. To date, over a thousand peptide subfractions have been evaluated, yielding several highly promising leads. By uncovering nature's own antimicrobial toolkit, the project lays the groundwork for a new generation of peptide-based therapies against antibiotic-resistant infections.



Dr. Soumya Ranjan Mohapatra, Assistant Professor (II), Kalinga Institute of Industrial Technology (KIIT) Deemed University, Bhubaneswar, India

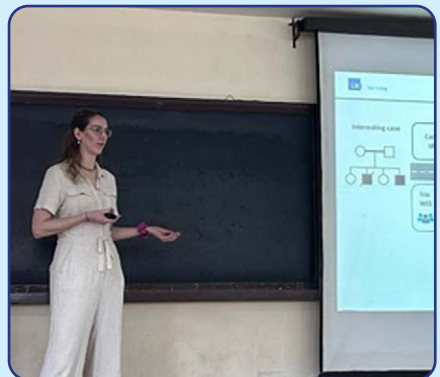
Dr. Aoife Gahlawat, Scientist, German Cancer Research Center (DKFZ) and National Center for Tumor Diseases (NCT), Heidelberg, Germany

Non-invasive liquid biopsy biomarkers for early detection and management of head and neck cancers. Their collaboration integrated metabolomics with molecular and immune profiling of blood and saliva samples to develop data-driven biomarker signatures, supporting digital health-enabled cancer diagnostics and personalized treatment approaches.

Dr. Vivekananda Bhat, Assistant Professor, Department of Medical Genetics, Kasturba Medical College, Manipal, India

Dr. Tess Holling, Postdoctoral Researcher, University Medical Center Hamburg-Eppendorf, Germany

Genomic analysis of rare monogenic disorders, focusing on next-generation sequencing





data, variant interpretation, and genotype–phenotype correlation. The collaboration involved computational analysis and re-analysis of genomic datasets to resolve previously undiagnosed cases, supporting data-driven precision diagnostics in medical genetics.



Dr Balram Singh, University of Delhi

Host: DendroPharm, Berlin

Area of Work: Through his project “NANOpain” he seeks to treat inflammation with novel dendritic nano-drugs without the addictive, potential for a better quality of life for patients with post-operative pain, cancer and chronic pain.



Dr Jyotsnamayee Nayak, Sardar Vallabhbhai National Institute of Technology, Surat

Host: DendroPharm GmbH

Area of Work: Nanomedicine – Nano-Solution for Hyperphosphatemia: Iron Oxide Nanoparticles functionalized with Thiolated Chitosan



Dr Darshika Bohra, Tata Institute of Fundamental Research, Hyderabad

Host: ProBioGen AG

Area of Work: Targeting host pathways that interfere expression of foreign DNA and virus infection



Mr Rakesh Kumar Dhritlahre, CSIR-Institute of Himalayan Bioresource Technology (IHBT), Palampur

Host: DendroPharm GmbH

Area of Work: IDCC conjugated dendritic polyglycerol-N-isopropylacrylamide thermoresponsive nanogel for safe and efficient transdermal drug delivery.

Dr Ines Klein, Postdoctoral Researcher, University Hospital of Cologne, Germany

Dr Abhijeet Joshi, Assistant Professor, BITS Pilani, Hyderabad Campus, India

Digital and data-driven approaches to study chemotherapy-induced neuropathy, combining high-resolution imaging, behavioral analysis, and molecular profiling. Their collaboration strengthened digital health research workflows for understanding nerve damage and cognitive effects, with relevance for improved disease modelling and future therapeutic evaluation.

VETERINARY SCIENCE AND "ONE HEALTH"



InDeVet: The Indo-German Veterinary Partnership for Fostering Innovation in AI-Powered Diagnostics, One Health and Animal Welfare was organized in April, 2025 in Leipzig University, Germany. The workshop aimed to bridge the gap between academic research and industrial application under the “One Health” paradigm and focused on the integration of Artificial Intelligence (AI) into veterinary science to address global health challenges.

Technical Deliberations

- **Diagnostics & Imaging:** Experts explored AI-powered diagnostics and automated histopathology for faster, more accurate disease identification.
- **Epidemiology:** Sessions focused on predictive modeling and pandemic preparedness to mitigate the spread of zoonotic diseases.
- **Precision Farming:** Discussions covered precision livestock farming techniques to enhance animal welfare and productivity.
- **Genomics & AMR:** Significant attention was given to the intersection of AI with genomics, vaccine development, and strategies to combat Antimicrobial Resistance (AMR).

Key Outcomes & Network Building

- **Network Launch:** A major milestone was the official launch of the Indo-German-Vet-Net (InDeVet), a permanent collaborative network.
- **Formal Agreement:** The network was formalized through a Memorandum of Understanding (MoU) to ensure long-term cooperation.
- **Future Roadmap:** The workshop concluded with plans to establish an incubation center and submit joint funding applications for IGSTC, DST (Department of Science and Technology)-DFG (Deutsche Forschungsgemeinschaft), and EU Horizon projects.

Participating Institutions and Organisations

India

WBUAFS: West Bengal University of Animal and Fishery Sciences

ICAR-IVRI: Indian Council of Agricultural Research – Indian Veterinary Research Institute

ICAR-NDRI: Indian Council of Agricultural Research – National Dairy Research Institute

ICAR-NIANP: Indian Council of Agricultural Research – National Institute of Animal Nutrition and Physiology

CSIR-IGIB: Council of Scientific & Industrial Research – Institute of Genomics and Integrative Biology

GADVASU: Guru Angad Dev Veterinary and Animal Sciences University

TANUVAS: Tamil Nadu Veterinary and Animal Sciences University

BASU: Bihar Animal Sciences University

GBRC: Gujarat Biotechnology Research Centre

NAVS: National Academy of Veterinary Sciences

VINS Bioproducts | Agrivet Research

Germany

University of Leipzig

TiHo Hannover: University of Veterinary Medicine Hannover

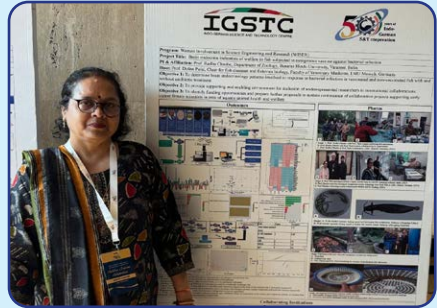
FU Berlin: Free University of Berlin

FLI: Friedrich-Loeffler-Institut (Federal Research Institute for Animal Health)



Prof. Radha Chaube, Professor at Banaras Hindu University, WISER 2022 awardee with Prof. Dušan Palić at Ludwig-Maximilians-Universität Munich, is addressing a critical but often overlooked question in aquaculture: do vaccines protect fish not only from disease, but also from physiological stress and suffering? Working at the interface of fish health, neuroendocrinology and genomics, her team focuses on *Aeromonas hydrophila*, a major bacterial pathogen in Indian freshwater aquaculture.

Locally isolated strains were first characterised and used to develop an autogenous, formalin-killed vaccine tailored to regional disease profiles. The real innovation lies in what followed. Using RNA sequencing, the project mapped how infection and vaccination reshape gene activity in the fish brain, the central command centre linking immunity, stress hormones and metabolism. The results reveal a finely tuned neuroendocrine-immune dialogue: infection triggers strong stress and immune signalling,



while vaccination provides robust protection without disrupting brain homeostasis. Survival trials confirmed high efficacy of the vaccine via both injection and immersion routes. By combining field-relevant vaccine development with deep molecular insights into fish welfare, the project provides a scientific foundation for reducing antibiotic use while improving both productivity and animal well-being in aquaculture.



Dr. Thanammal Ravichandran of Kumaraguru College of Liberal Arts and Science, WISER 2022 awardee with Prof. Mizeck Chagunda and Dr. Kristina Roesel at University of Hohenheim, is asking a deceptively simple question with far-reaching





consequences: can digital data, if used wisely, transform the lives of smallholder dairy farmers? Working at the intersection of veterinary science, economics and institutional analysis, her project moved beyond pilots and prototypes into real villages across Tamil Nadu. More than 2,400 animals owned by over 600 smallholder farmers were digitally registered using a herd-management application, generating fine-grained data on fertility, health, feeding and productivity. These data were not left to sit on servers. Instead, they were translated into evidence-based advisories, delivered through veterinarians, call-centre

support and WhatsApp groups, and reinforced by village-level health camps and training sessions. The results are tangible: marked reductions in repeat breeding and infertility, lower disease burden, and improved incomes through reduced production costs. Equally important, the project unpacked the institutional questions of who owns animal data, who benefits from it, and how incentives shape adoption. By grounding digital innovation in social realities, the work demonstrates how “smart farming” can be made genuinely inclusive for small farmers in developing countries.



Mr Ritam Guha, Cochin University of Science and Technology

Host: W42 Industrial Biotechnology

Area of Work: Cloning and expression of viral like particles in Pichia Pastoris system for a successful vaccine development in aquaculture



Ms Surbhi Kumari, Panjab University, Chandigarh

Host: Bundesanstalt für Materialforschung und -prüfung (BAM)

Area of Work: Revolutionizing dairy safety: Instant - lactam antibiotic(s) detection in milk via microfluidic flow cell technology

Selected publications arising out of IGSTC supported projects

1. Expression of SOD and APX genes positively regulates secondary cell wall biosynthesis and promotes plant growth and yield in Arabidopsis under salt stress – Amrina Shafi, Rohit Chauhan, Tejpal Gill, Mohit K. Swarnkar, Yelam Sreenivasulu, Sanjay Kumar, Neeraj Kumar, Ravi Shankar, Paramvir Singh Ahuja, Anil Kumar Singh. *Plant Molecular Biology*, 87(6):615–631, 2015. DOI: 10.1007/s11103-015-0301-6
2. A review on biomechanics of anterior cruciate ligament and materials for reconstruction – M. Marieswaran, Ishita Jain, Bhavuk Garg, Vijay Sharma, Dinesh Kalyanasundaram. *Applied Bionics and Biomechanics*, 2018:4657824. DOI: 10.1155/2018/4657824
3. Cytotoxicity of ultrasmall gold nanoparticles on planktonic and biofilm encapsulated gram-positive staphylococci – Sunil Kumar Boda, Janine Broda, Frank Schiefer, Josefine Weber-Heynemann, Mareike Hoss, Ulrich Simon, Bikramjit Basu, Willi Jahnen-Dechent. *Small*, 11(26):3183–3193, 2015. DOI: 10.1002/smll.201403014
4. Corneal biomechanical changes and tissue remodeling after SMILE and LASIK – Rohit Shetty, Mathew Francis, Rushad Shroff, Natasha Pahuja, Pooja Khamar, Molleti Girish, Rudy MMA Nuijts, Abhijit Sinha Roy. *Investigative Ophthalmology & Visual Science*, 58(13):5703–5712, 2017. DOI: 10.1167/iops.17-22864
5. Plasmonic biosensors for bacterial endotoxin detection on biomimetic C-18 supported fiber optic probes – Hariharan Manoharan, Prasanta Kalita, Shalini Gupta, V.V.R. Sai. *Biosensors and Bioelectronics*, 129:79–86, 2019. DOI: 10.1016/j.bios.2018.12.045
6. Draft genome sequence of chickpea (*Cicer arietinum*) provides a resource for trait improvement – Rajeev K. Varshney, Chi Song, Rachit K. Saxena, Sarwar Azam, Sheng Yu, Andrew G. Sharpe, Steven Cannon, Jongmin Baek, Benjamin D. Rosen, Bunyamin Tar'An, et al. *Nature Biotechnology*, 31(3):240–246, 2013. DOI: 10.1038/nbt.2491

7. Functional 1,8-naphthalimide AIE/AIEEgens: recent advances and prospects – Peddaboodi Gopikrishna, Niranjana Meher, Parameswar Krishnan Iyer. ACS Applied Materials & Interfaces, 10(15):12081–12111, 2017. DOI -10.1021/acsami.7b14473
8. Emerging genomic tools for legume breeding: current status and future prospects – Manish K. Pandey, Manish Roorkiwal, Vikas K. Singh, Abirami Ramalingam, Himabindu Kudapa, Mahendar Thudi, Anu Chitikineni, Abhishek Rathore, Rajeev K. Varshney. Frontiers in Plant Science, 7:455, 2016. DOI: 10.3389/fpls.2016.00455
9. Wearable sensing devices for point of care diagnostics – Subrata Mondal, Nehal Zehra, Anwesha Choudhury, Parameswar Krishnan Iyer. ACS Applied Bio Materials, 4(1):47–70, 2020. DOI: 10.1021/acsabm.0c00798

For more information: https://scholar.google.com/citations?user=_uQDQUYAAAAJ&hl=en

2+2 PROJECTS



2+2 PROJECTS

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany aims to support joint R&D+I projects of industrial relevance by

means of "2+2 Mode of Partnership" with the participation of research/academic institution and industry from both India and Germany. Project proposal is expected to produce insight and exploitable research results leading to new technologies, products and/or services.

Salient Features



Partners

- India: one academic/research institute + one industry
- Germany: one academic/research institute + one industry
- Minimum 4 and Maximum 6



Funding

- Indian side: ₹ 350 lakhs (includes ₹ 150 lakhs for industry)
- German side: € 500000 (includes funding for industry according to De-Minimis or AGVO)



Duration

- 3 years
- Selected projects may be considered for extension phase up to 2 years





Phase II of 2+2

It is an opportunity to selected 2+ 2 projects with promising results to apply for an extension up to two years with additional financial support to cover the gap between the validation in relevant environment and system qualification.



Partners

- One partner from both India and Germany
- Minimum one industry



Duration: • 2 Years



Expected Starting Level

- Technology Readiness Level (TRL) 6



Funding

- Indian side: ₹ 230 lakhs (includes ₹ 100 lakhs for industry)
- German side: € 30000 (includes funding for industry as per AVGO norms)

WORKSHOPS



Bilateral Workshops

Platform for substantive interactions between researchers, academicians and industry

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany supports proposals for organising Indo-German workshops (in India or Germany) on areas designed around a specific research topic out of thematic areas relevant to both DST and BMFTR.

- Create platform for cross fertilization of ideas
- Establish joint knowledge pools to address global challenges
- Develop knowledge networks for industrial sectors to enhance competitiveness
- Advance industrial research partnership with mutuality of interest and respect

Salient Features



Who can apply?

Workshop proposals may be submitted by a researcher in academia or in an industry from India and Germany to deliberate on the experiences and expertise of an identified research issue pertaining to an industrial problem. Proposals should be submitted jointly by one Indian and one German Coordinator.



Funding

Approximately € 30000 / ₹ 25 lakhs



Nature of Support

Funding is supplementary and is intended to cover

- International and Domestic Travel (Economy Class).
- Accommodation and Hospitality (Workshop lunches and official dinner).
- Organizational Costs (Venue, AV support, Logistics, etc).

WOMEN INVOLVEMENT IN SCIENCE AND ENGINEERING RESEARCH (WISER)



Women Involvement in Science and Engineering Research (WISER)

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany supports proposals in paired mode from women researchers in India and Germany to foster innovation in the field of STEM.

- Facilitating bilateral exchange among women researchers
- Create avenues for long-term Indo-German research collaboration
- Capacity building and networking
- Open to all areas of STEM

Salient Features



Eligibility

Women holding a regular/long term research position in academia or research institutes/industry



Tenure: Up to 3 years



Age limit: No age limit



Research stays: 1-month/year fellowship in the host country



Mode

In paired mode (Proposals from Indian and German women researchers)



Financial Assistance

Indian Awardee

- Up to ₹ 39 lakhs
- Grant includes support for research staff, consumables, contingency, travel and per diem (€ 2300/month) in Germany

German Awardee

- Up to € 48000
- Grant includes support for research staff, consumables, contingency, travel and per diem (€ 2300/month) in India

PAIRED EARLY CAREER FELLOWSHIP IN APPLIED RESEARCH (PECFAR)



Paired Early Career Fellowship in Applied Research (PECFAR)

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany offers Paired Early Career Fellowship in Applied Research (PECFAR) to facilitate exchange of early career Indian and German researchers. The Programme supports short duration visit to explore, connect and network for

research collaboration in Science, Technology, Engineering and Mathematics (STEM).

- Create avenues for two-way exchange of young researchers in pairs
- Support for research stay in India/ Germany
- Explore the Indo-German research landscape on entrepreneurship, joint research and innovation
- Build future partnerships with complementary expertise

Salient Features



Eligibility

- Early career researchers holding regular positions in academic/ research institutions/industries or long-term nationally recognized fellowship
- Minimum Qualification: Master of Science/Bachelor in Engineering
- Applications are to be submitted jointly by the pair of Indian and German researchers



Age limit: 40 years



Tenure: Minimum -1 month, Maximum -2 months



Financial Assistance

- Fellowship: € 2300 per month/awardee
- Single round trip economy class airfare including visa fees and medical/travel insurance up to € 1500

IGSTC INDUSTRIAL FELLOWSHIPS



Industrial Fellowships

Industrial Exposure in Germany for Young Indian Researchers

The Indo-German Science & Technology Centre (IGSTC), a joint initiative by the Department of Science and Technology (DST), Government of India, and the Federal Ministry of Research, Technology and Space (BMFTR), Government of Germany offers Industrial Fellowships to encourage young Indian researchers towards applied research at an industrial setup in Germany.

- Motivate and facilitate young researchers towards applied research
- Expose researchers to German industrial ecosystem
- Capacity Building
- Encourage innovation & technology development

Fellowship Details

PhD Industrial Exposure Fellowship (PIEF)



Eligibility Criteria

- Pursuing and completed one year of PhD in Science/Engineering
- Age limit: 28 years



Duration: 3 to 6 months



Funding: Stipend of € 1500 per month + travel, visa and medical insurance

Post Doctoral Industrial Fellowship (PDIF)



Eligibility Criteria

- PhD awarded within the last 2 years in Science/ Engineering
- Age limit: 35 years



Duration: 6 to 12 months



Funding: Stipend of € 2500 per month + travel, visa and medical insurance

Indo-German Science & Technology Centre

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