



To Catalyse Indo-German Strategic R&D Partnerships

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Inauguration of IGSTC's New Office



*Dr Chandrashekhar
& Mr Linder
inaugurating the
new IGSTC office*



Indo-German Science & Technology Centre, a bilateral centre established by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Education and Research (BMBF), Government of Germany inaugurated its new office at the

campus of DST in New Delhi. The event was held on 21st February 2022 in the august presence of Dr Srivari Chandrasekhar, Secretary, DST and H.E. Walter J. Lindner, German Ambassador to India and Bhutan.

The inauguration was also graced by dignitaries of DST, BMBF, DLR-PT and German Embassy.

Mr Sanjeev Varshney, Head, International Cooperation Division, DST & the Indian Co-Chair, IGSTC GB and Ms Kathrin Meyer, Head of Division Cooperation with Asia & Oceania, BMBF & German Co-Chair, IGSTC GB congratulated the Centre and progress in its journey forward in the new premises. IGSTC office on DST campus will give it a wider outreach and impetus among the scientific community located in Delhi.

Indo-German Science & Technology Centre, a bilateral centre established by the Department of Science and Technology (DST), Government of India and the Federal Ministry of Education and Research (BMBF), Government of Germany inaugurated its new office at the campus of DST in New Delhi.



Dignitaries from DST, BMBF, DLR-PT and German Embassy



IGSTC team with Mr Lindner and IGSTC's new office



IGSTC Signed MoU with Tata Steel and Lol with BASF

to Foster Science and Technology Led Innovations through Indo-German R&D Networking



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IGSTC signs MoU with Tata Steel Ltd.
Left: Dr Debashish Bhattacharjee
Right: Mr R. Madhan

IGSTC signed an MoU with Tata Steel and Lol with BASF on 21st March 2022 in the presence of dignitaries Mr S.K. Varshney, Head, International Cooperation, DST and Indian Co-Chair IGSTC Governing Body, Dr Steffen Norbert Koch, Minister and Head of Economic Department, German Embassy, Dr Debashish Bhattacharjee, Vice President Technology & New Materials Business, Tata Steel Ltd., Mr Kamesh Gupta, Chief - Graphene Business, Innoventure and Innovation, Technology & New Materials Business, Tata Steel Ltd. and Dr Dietmar Hueglin, Director, BASF Innovation Campus, Mumbai and officials from DST & Indo-German Chamber of Commerce. These partnerships with the leading industrial houses of India & Germany aims to enhance the public-private partnerships in the frontier areas of science & technology.



IGSTC signs LoI with BASF
Left: Mr R. Madhan
Right: Dr Dietmar Hueglin

The Memorandum of Understanding (MoU) between Indo-German Science and Technology Centre (IGSTC) and Tata Steel Ltd. will institute a joint collaborative Research & Innovation (R&I) framework to facilitate new technologies development, conduct thought leadership workshops and support human capital development. The cooperation with Tata Steel Ltd. will focus on globally relevant technology & innovation areas of climate change, greening of the industrial sector, emerging technologies in new materials, joint research & innovation for emerging technologies and technology development for scaling-up.

The Letter of Intent (LoI) with BASF Chemicals India Pvt. Ltd. (BASF) will foster science and technology led innovations through Indo-German R&D networking, including industrial research partnership in PPP mode. Recognizing the mutual benefits obtainable from scientific cooperation, BASF will jointly support the IGSTC's Industrial Fellowships under the categories of PhD Industrial Fellowships and Post-Doctoral Fellowships to encourage and enable the capacity building of young Indian researchers by facilitating for exposure at BASF facilities in Germany.

Workshop on “Waste to Wealth and Sustainable Packaging”



A virtual workshop was organised by the Indo-German Science and Technology Centre (IGSTC) on “Waste to Wealth and Sustainable Packaging” to promote the upcoming Call 2022 of its flagship programme “2+2 Projects”. The workshop was held on 27th January 2022.

IGSTC had invited top experts and scientists from India & Germany to have an insightful and immersive session for subject knowledge and bilateral research & partnerships. The workshop witnessed an overwhelming participation of over 250+ academicians/ researchers & industry personnel from India & Germany.

IGSTC virtual workshop on
“Waste to Wealth &
Sustainable Packaging

A Q & A session addressed the queries on the 2+2 Projects schemes. It was followed by concluding remarks from Hans Westphal, Head of the German Project Office. The Workshop had the presence of the IGSTC Governing Body Co-Chairs & members, representatives from Indian & German Governments, Industries and Academia.

The event started with a brief introductory talk by Director, IGSTC on the workshop & IGSTC programmes. An informative talk by Mr Sanjeev Rangrass, Group Head, ITC Limited on “Waste to Wealth & Sustainable Packaging - An Industrial perspective” highlighted the aspects of sustainable packaging and usage of recycled content for packaging. Mr Malte Schoen, Institut für Kunststoffverarbeitung (IKV) accentuated the current status of recycled plastics in Europe and addressed the need of utilisation recycled plastics in a sustainable way. Prof Arvind M Lali, Institute of Chemical Technology (ICT), Mumbai enlightened the participants on “Waste-to-Wealth: Opportunities and challenges” discussing the various techniques for converting waste into biofuels. Prof Dirk Weichgrebe, Leibniz Universität, Hannover gave a remarkable example of a successful 2+2 project in “Recovering value from the waste-the project, partnership and suggestions”. He provided insights on how to successfully execute a bilateral 2+2 project. Prof Vinu Ravikrishnan, IIT Madras concluded the workshop by delivering an insightful talk on the “E-waste: Current state and future outlook in India”. He also discussed the policy matters and attainment of UN Sustainable Development Goals (SDGs).



Sanjeev Rangrass
Group Head
ITC Limited

Mr Rangrass said next 10 years marks the decade in Sustainability & Packaging. He emphasized on incremental recycling over generic disposal and incorporation of recycled content into packaging.



Dirk Weichgrebe
Professor
Leibniz Universität

Prof Weichgrebe highlighted his recent Indo-German collaborative project RESERVES which delved into the fruitful interaction of science and practice in resource recycling of municipal organic waste & agricultural waste into biogas and biochar. He emphasized on the importance of team building activities for a successful 2+2 project.



2+2 Projects

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Meet The Researchers Behind The 2+2 Projects

LABELONIK & CleanWater



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Mr Debajit working in the synthesis lab

LABELONIK

Roll-to-roll printed electronic labels for temperature, humidity and tampering detection.

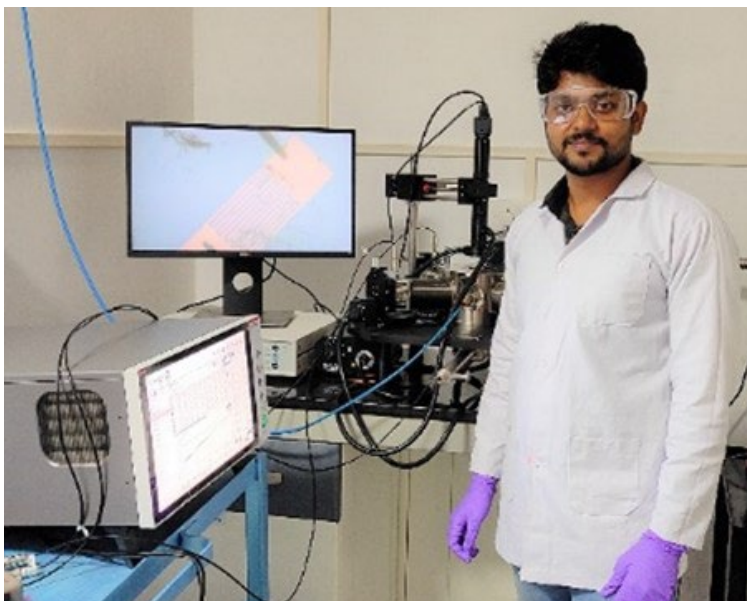
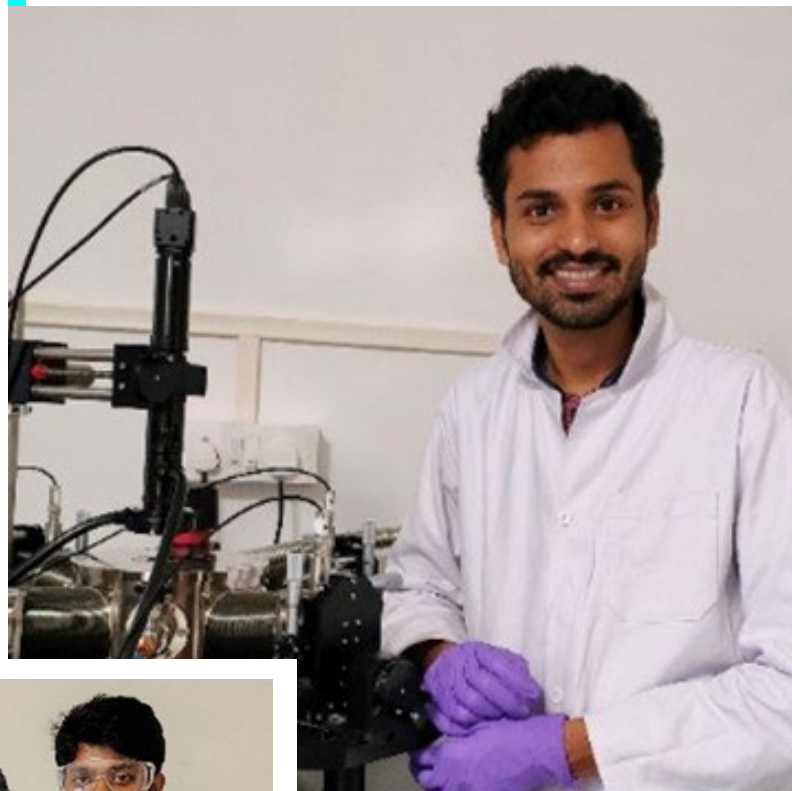
The project is partnered by Dr Debansu Chaudhuri, IISER Kolkata & Mr Rohit D Mistry, Holographic Security Marketing Systems, Pvt. Ltd. from India and Prof Frank Ellinger, Technische Universität Dresden & Dr Moazzam Ali, Saralon GmbH from Germany.

2+2 project scheme is the flagship programme of IGSTC. The programme aims to support the joint R&D+I project 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. The project proposals received under this programme are expected to produce insight and exploitable research results leading to new technologies, products and/or services. Currently, IGSTC supports 29 ongoing projects. There are many young researchers working behind the projects. IGSTC is elucidating a few researchers behind two projects viz LABELONIK & CleanWater.

The project aims to establish a test production line for printed electronic labels by roll-to-roll gravure printing. The label shall comprise a first coil (to receive 13.56 MHz from a smartphone), a rectifier (to convert AC into DC), a ring oscillator (to generate 1-1000 Hz, ~10 mA), a resistive sensor (to control the output frequency of the ring oscillator) and a second coil (to generate a magnetic field to be detected by the Hall sensor of the smartphone). The resistive sensor can detect a change in temperature or humidity or damage to the label. These labels shall have a huge market value in the field of anti-counterfeiting, food packaging and biomedicine cold storage logistics. The consortium brings experts of circuit design, functional inks, organic transistors and roll-to-roll gravure printing at one platform to guarantee the success of the project.

A team of research scholars Mr Debjit Biswas, Mr Indrajit Giri and Mr Sagar Biswas are working as a group on the project to achieve its milestones and targets. They are involved in the design and synthesis of n-type semiconducting molecules as active materials for organic field-effect transistors (OFETs) as well as the fabrication of the OFET devices.

Mr Indrajit (left) & Mr Sagar (right) carrying out device characterization





^
The consortium partners in front of "CleanWater" prototype TRC WTP segments during the visit to CSIR-SERC, Chennai (from Right: Prof Thomas Gries, Dr Mohit Raina, Dr Smitha Gopinath, Dr Amar Prakash, Mr Farvaze Ahmed & Mr Shankar. S)

CleanWater

Molecular lightweight wastewater treatment units made with TRC for rural and peri-urban dwellings.

The project comprises of consortium partners viz. Dr Ravindra Gettu, IIT Madras; Dr Smitha Gopinath, CSIR-SERC, Chennai & Dr Mohit Raina, Raina Industries, Mumbai from India and Mr Till Quadflieg, RWTH Aachen University, Aachen & Mr Oliver Hentzchet, Betonwerk Hentzschel GmbH, Elsterwerda from Germany.

Wastewater treatment (WT) is an essential prerequisite for a healthy society. 90 % of the worldwide used water enters the environment untreated. Most rural and peri urban regions of developing countries have no access to a Wastewater Treatment Plant (WTP) because current mid/big size WTPs require large power supply and space. Currently, septic tanks or soak pits are used in many regions that could be replaced with modular and lightweight WT units, which are easy to transport and handle in hard to reach locations. The realization of these required systems is possible through the development of high strength and lightweight materials.

By using durable materials, the operating and maintenance costs can be kept as low as possible, which is an important decision

criterion concerning the orders. The aim of this project is the realization of an innovative lightweight, modular WTP made with Textile Reinforced Concrete (TRC). The advantage of a modular WTP design lies in a decentralized production facility, where all the necessary plant components have to be delivered to the construction site and assembled.

To further take this project towards its goal, a senior research fellow, Mr Shankar.S, from CSIR-SERC joined the project under the guidance of Dr Smitha Gopinath, CSIR-SERC, Chennai. After his Bachelor's in Civil Engineering, he has done his Master's in Structural Dynamics and Earthquake Engineering from VNIT, Nagpur. He worked as an Assistant Professor for about 2 years and later joined as an Engineering consultant in the Bridges and Metros Department, L&T Infra Engineering Ltd. for a year. In this project, he is involved in modelling, analysing and designing the TRC wastewater treatment plant. The project led Mr Shankar to get an understanding of material modelling and the experimental procedures to ascertain material properties. The project allowed him to interact with the professors from RWTH Aachen & IIT Madras and industrialists with civil engineering and textile engineering backgrounds, who were involved in the project consortia.

AutoNutri

On-site Multi Ion Monitoring System for Online Nutrient-laden Water Control in Vertical Hydroponic Systems to Minimize Environmental Impact

Project Investigators



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ICT Mumbai

>
Vishal G. Warke
HiMedia Laboratories
Pvt. Ltd., Mumbai



<
Rainer Gransee
Fraunhofer IMM
Mainz

>
Oliver Stegen
RM Geraetebau Oliver
Stegen, Reinheim



In a hydroponic system, the yield and quality of plant grown depends on the composition of the nutrients in the solution. There are some plants which consume ions in certain quantities and there are others which accumulate them in the solution causing an imbalance in the concentration of nutrients in the solution.

This brings out one of the major challenges in a hydroponic system with a closed irrigation system for the optimized nutrient regulation, although many researchers have reported the determination of the concentration of individual ions in solution, as the key information for optimized operation. Current practice involves determination of conductivity, pH, redox potential and temperature. As a result of which there is a limited possibility to adjust nutrients to the needs of individual crops to avoid deficiency or eutrophication. The operators therefore periodically drain and replace the nutrient solutions.

To address this challenge, AutoNutri, a project under IGSTC's 2+2 programme aims to develop an on-site multi ion monitoring system for automated online control of nutrient input in vertical hydroculture systems with closed circulation systems based on a feedback controlled supply of nutrients. This will enable the farmers to efficiently use the fertilizers for crop growth while regenerating a nutrient/hydroponic solution of an optimal composition according to the plant demands.

The project aspires to come up with a one of its kind cutting edge technology to augment soilless farming globally. Nutrient monitoring based on a direct potentiometric determination of relevant ions using ion selective sensors will be integrated into a microfluidic system, which will enable automated sample collection and adjustment of the measurement matrix. The calibration and acquisition/processing of data will be carried out using "machine learning" algorithms developed in the project to compensate for non-linear effects due to ion interference/cross sensitivity and electrode/temperature drift.

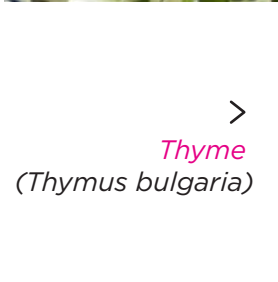
One of the most critical objectives of the project is to ensure that their system is compatible with the commercially important crops in terms of consumption, essential oil production and medicinal properties. With respect to this, they have chosen Lettuce (*Lactuca sativa var. crispa 'Lollo Rossa'*), Brahmi (*Bacopa monnieri*), Thyme (*Thymus bulgaria*), Stevia (*Stevia rebaudiana*) & Basil (*Ocimum basilicum*) as model crops for this project.

The project is partnered by Dr Vishal G. Warke, HiMedia Laboratories Pvt. Ltd. (HiM) & Dr Uday Annapure, Institute of Chemical Technology (ICT), Mumbai from India and Dr Rainer Gransee, Fraunhofer IMM, Mainz & Dr Oliver Stegen, RM Geraetebau Oliver Stegen, Reinheim from Germany.

The Food Engineering and Technology Department (FETD) of ICT have carried out major projects related to food, agriculture and fermentation as one of their key research sectors in improving the food, in terms of nutrition, safety and functionality by employing fundamental and applied sciences.



<
Basil
(*Ocimum basilicum*)



>
Thyme
(*Thymus bulgaria*)

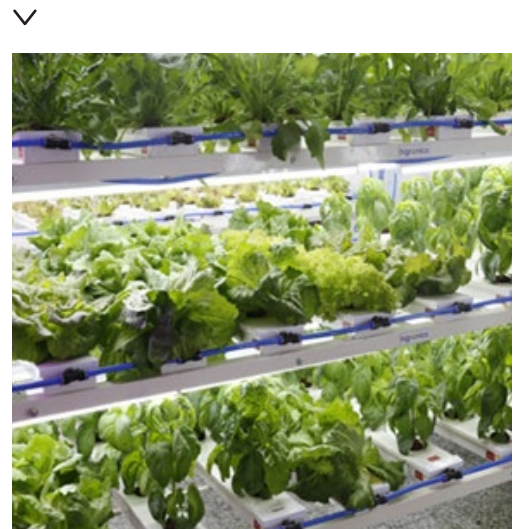


<
Lettuce
(*Lactuca sativa var. crispa 'Lollo Rossa'*)



<
Stevia
(*Stevia rebaudiana*)

HiMedia's Indoor R&D Testing Facility
Mumbai



When it comes to providing end-to-end solutions for food production and support for commercial turn key solutions, HiMedia Laboratories Pvt. Ltd. is a one stop solution for hydroponic systems and related products, their solutions start right from land surveys to farm management services. In this context, ICT is collaborating with HiMedia for developing the assay for nutrient release and testing the prototypes on selected crops. HiMedia also has a state-of-the-art hydroponic farm which will ensure smooth testing of the prototypes and a game changing marketing team which will be responsible for revolutionary commercialization of the product.



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*HiMedia's Outdoor R&D Facility
Igatpuri*

Another important feature of this project is the microfluidic chips which are best known for mimicking a natural biological process. These chips precisely regulate the nutrient supply in the crops. They are easy to handle, cost-friendly and time saving. Fraunhofer IMM, as a research and service provider has developed various integrated microfluidic analyses and modules for on-site and online analysis of ions for quality control of electroplating baths and solutions for the processing of semiconductors (DSP and DSP+), mineral nutrient solutions for plants in autonomous working environments. In collaboration with RM Geraetebau Oliver Stegen, Reinheim their contribution to the investigation, design and implementation of online laboratory demonstrators for the analysis of ions in the water will form the basis of a technological contribution to the project.



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*HiMedia's Outdoor R&D Facility
Igatpuri*

A multipurpose on-site nutrient monitoring/release system will be developed to limit the unnecessary release of any chemical salts into the water bodies. If successful, this proposed novel system would be a highly efficient way to reduce water pollution and increase green cover to mitigate the detrimental effects of the pollution on the environment.

Next Generation of Corneal Imaging and Analytics - from Lab to Market

Project Investigators



Abhijit Sinha Roy
Narayana Nethralaya
Foundation, Bangalore

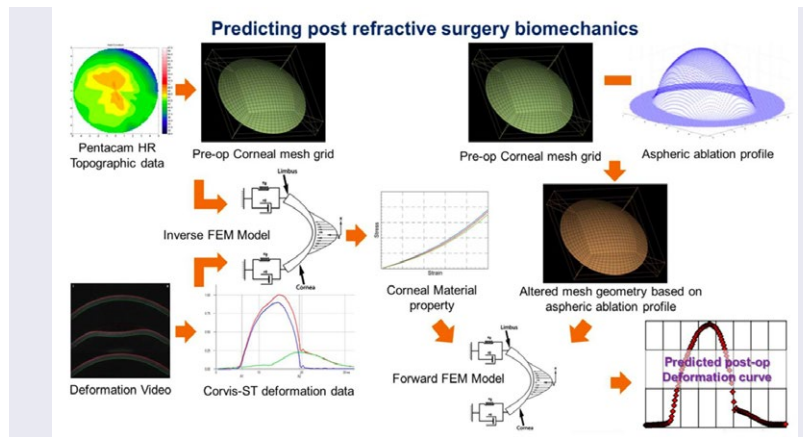


Sven Reisdorf
OCULUS Optikgeräte
GmbH, Dresden

Over the years, refractive surgeries like LASIK, SMILE, PRK, RLE have been most opted by people to get rid of eyeglasses or contact lenses. But it also comes with the risk of postoperative complications of the cornea. It is well known that the biomechanical response of the cornea plays a significant role in refractive outcomes. If the collagen in the cornea degenerates, it may lead to steepening of the cornea which can further cause visual impairment. Post-refractive surgery ectasia is one such rare condition which results from refractive surgery characterized by an abnormal change in corneal refraction and vision loss due to cornea steepening after surgery. Thus, the knowledge of the biomechanical properties of the cornea is important in disease diagnosis, treatment planning and monitoring of treatment outcomes.

There are several techniques which are being investigated to quantify the in-vivo corneal biomechanics, but none have been translated to the clinic so far. To explore these issues and find a plausible solution, SIBAC Project: Next generation dynamic Scheimpflug imaging and biomechanical analytics for in vivo quantification of corneal viscoelasticity under the flagship programme of IGSTC “2+2 Projects” was initiated. Phase 2 of the project is partnered by Dr Abhijit Sinha Roy, Narayana Nethralaya Foundation, Bangalore and Mr Sven Reisdorf, OCULUS Optikgeräte GmbH, Dresden. The project intends to provide a comprehensive package to investigate the accurate biomechanical outcomes after refractive surgery and corneal crosslinking by coupling corneal tomography with high speed dynamic Scheimpflug imaging.

One of the major achievements of this project is the development of the software called **“AcuSimX,”** an inverse finite element tool for post-refractive surgery biomechanics prediction. It is the world’s first advanced biomechanical simulation software which allows to predict biomechanical outcomes after refractive surgery and estimate the risk of corneal ectasia. This tool shall aid surgeons in simulating the surgery before the actual surgery has been conducted which shall further help mitigate the risks associated with it.

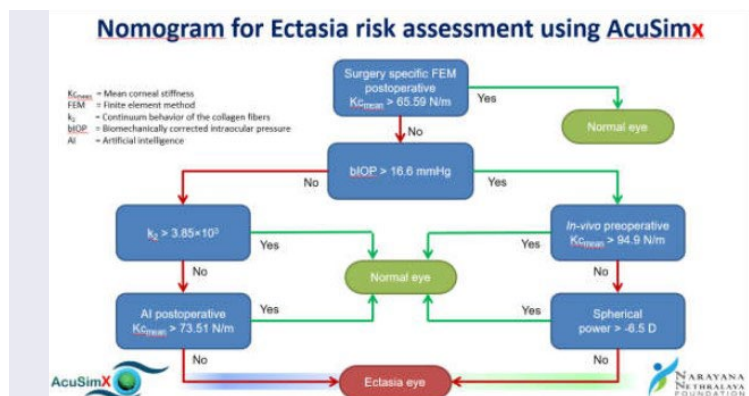


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Schematic of software tool predicting post-refractive surgery biomechanics

AcuSimX is designed to accept data directly from the Corvis ST and the Pentacam devices made by German ophthalmic instrument developer OCULUS. In LASIK, preoperative Pentacam and Corvis measurements are processed to perform an inverse finite element solution which determines the biomechanical properties of the cornea. These properties along with the postoperative geometric mesh produced using refractive errors present in the patient’s eye are used to generate a simulation report which can be later exported as a pdf and shared with the patient and surgeon. This entire process of finite mesh generation, biomechanical simulation and AI driven population comparison are automatically performed by the AcuSimX without any proprietary tools. Similar reports are also generated for SMILE, PRK and glaucoma simulations making AcuSimX, standalone software to put the power of simulations in the hands of clinicians.

Recently, project partners have made a new advancement by producing a

Nomogram to predict corneal ectasia using the outcomes of AcuSimX software. The Nomogram is a tree of parameters which helps the clinicians to identify the risks involved in the cornea. This new development shall be installed in the upcoming versions of AcuSimX.



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Nomogram for risk assessment of Ectasia using AcuSimX

Currently, AcuSimX is available for installation at the customer sites of OCULUS Optikegrate GmbH, Germany. In the first phase, AcuSimX is being made available to Asian customers via OCULUS Optikgerate GmbH, Asia. As a next step, OCULUS Optikgerate GmbH, Asia has taken over sales and marketing of the software in South-East Asia.

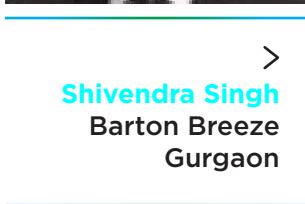
SensVert

Development and Evaluation of Automated Sensors for a Highly Efficient Nutrition Management System in Indoor Vertical Farming

Project Investigators



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The importance of vertical farming systems to produce foods like leafy greens, herbs or vegetables is increasing worldwide. Vertical farming is a highly efficient way of crop production that maximizes the obtainable yield per cultivation area. By using multiple levels supplied with artificial LED lighting and completely isolated cultivation conditions, very precise and controlled crop cultivation is possible around the year. Nutritional management through fertigation and major & micronutrient management are the basic requirement in vertical farming as the plants are grown in inert media. Sensors are required for precise measurement, control and supply of nutrition to the plants. There is an urgent need for the detection of NPK (Nitrogen, Phosphorus, Potassium), Ca, Mg, EC (Electrical Conductivity) and pH for fertigation management. These sensors should act automatically and be connected to the fertigation unit through Internet of things (IoT) for a close loop system.

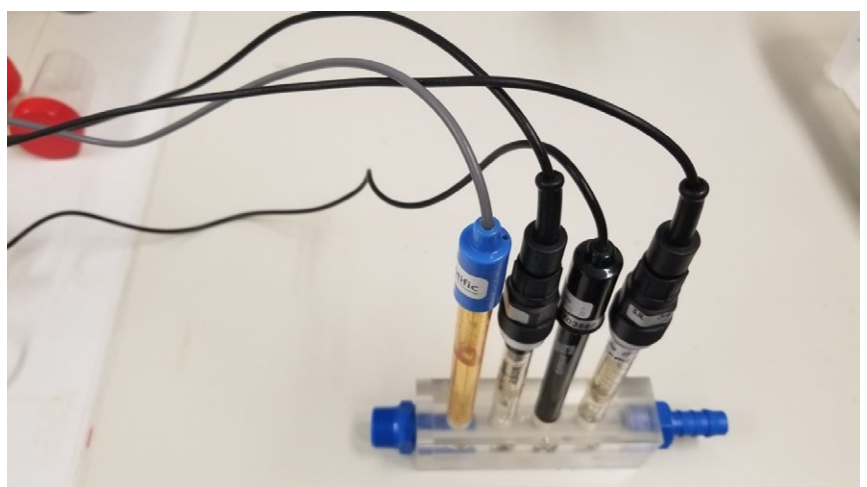
Therefore, SensVert project under IGSTC's "2+2 Programme" aims to develop an automated sensor system for a highly efficient nutrient management system in vertical farms. The project is partnered by Dr Murtaza Hasan, ICAR-IARI, New Delhi & Mr Shivendra Singh, Barton Breeze, Gurgaon from India and Prof Dr Heike Mempel, Hochschule Weihenstephan-Triesdorf (HSWT), Freising and Mr Mohamed Bourouah, Hahn-Schickard Schwenningen & Georg Bruckner, Sondermaschinenbau Bruckner GmbH, Marktgraitz from Germany.

During the first months of the year multiple test runs with different nutrient solution compositions were conducted at HSWT, to glean data on crop growth and changes in the nutrient solutions ion ratios to devise future hydroponic experiment setups with the ion selective sensor array and a high precision stock solution dosing unit. A complete ion uptake profile for Pak Choi and one nutrient solution composition in a deep-water culture was obtained by spectrophotometric analysis to establish a sound validation method for the calibration of the Ion Selective Electrode (ISE) sensor array. The results concerning the quantification of the ion uptake of Pak Choi throughout the culture period shall be presented by the consortium at the International Horticultural Congress (IHC) 2022, Angers.

The first prototype of the ISE Sensor array, comprising probes for NO_3^- , K^+ and Ca^{2+} , was completed at Hahn Schikard institute. Calibration tests with standard solutions prepared at HSWT were carried out before the device was delivered to HSWT in the last week of April for further tests and calibration in more complex solutions. A crucial step towards attaining the main goal of the project, the ion selective control of nutrient solutions involves the integration of the Sensor array and a high precision fertigation dosing unit into a hydroponic test unit. The fertigation dosing unit developed at Sondermaschinenbau Brückner GmbH will be shipped and installed at HSWT at the beginning of May.



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SensVert consortium meeting held on 7th April 2022



>
Ion selective probes of the Sensor array prototype

A study was conducted at the Centre for Protected Cultivation and Technology (CPCT), ICAR-IARI, New Delhi to determine the optimal photoperiod for lettuce grown in the vertical hydroponic system with artificial lights. The observations on transpiration rate, stomatal conductance and intercellular CO₂ concentration were recorded. Lettuce was grown under full spectrum Light Emitting Diode (LED) lights. Three photoperiod treatments viz. 12 hours, 16 hours and 20 hours with three replications each were undertaken and acceptable results were obtained with 16 hour photoperiod which amounts to Daily Light Integral (DLI) of 10.36 mol m⁻² day⁻¹.

Another experiment is being conducted to determine the optimal quality of light to grow lettuce plants in vertical farming with artificial

lights. In this experiment, the effect of various Red:Blue ratios on the growth and yield of lettuce shall be studied. The comparison of results of both these experiments shall be done with the vertical hydroponic system without artificial lights.

A frame type hydroponic based vertical farming system prototype was developed inside climate controlled greenhouse for leafy green vegetables. Fertigation and climatic sensors were used and connected with the IoT system.

Development of IoT and sensor-based vertical farming prototype



Visit of IGSTC Officials to ICAR-IARI, Delhi during annual farmers fare 9th-11th March 2022





NOMIS

Non-enzymatic Microfluidic Electrochemical Multiplex Sensor for Cost-Effective Soil Testing

Project Investigators



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Cellasys GmbH
Kronburg

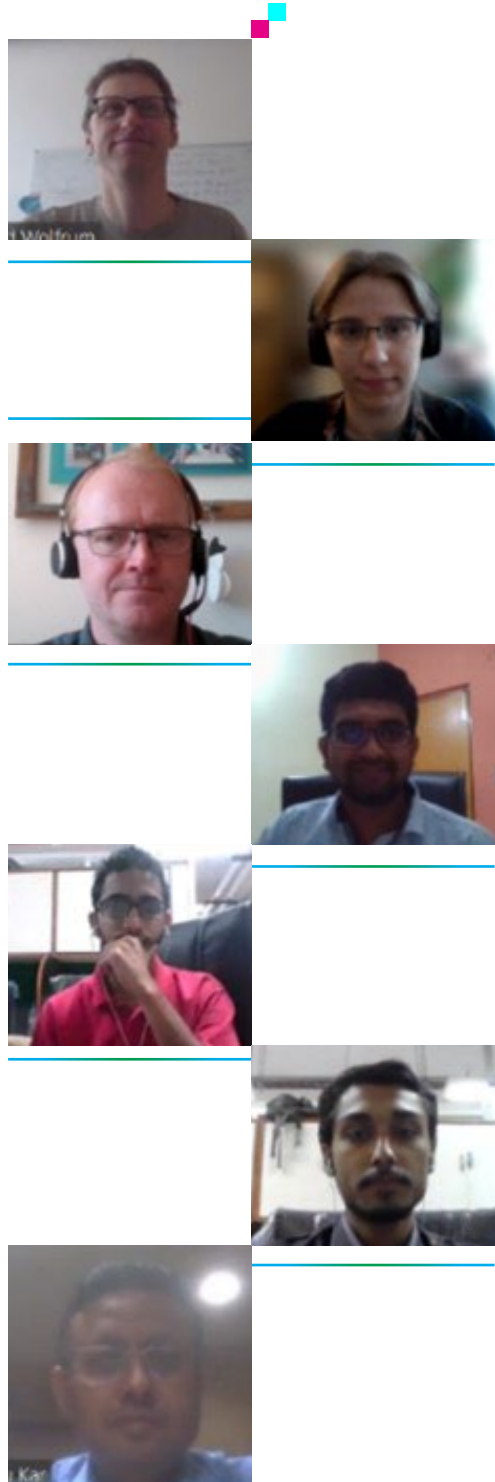


Fertilizers and pesticides are abundantly used to boost agricultural productivity. However, these chemicals move up through the food chain and lead to biomagnification which has detrimental effects on humans and the environment. Currently, most of the established methods used for the detection of fertilizer and pesticides in soil are expensive and difficult to realize within a device outside the laboratory environment. To address this challenge, NOMIS project aims to develop a multiplexed device for the detection of nitrate and organophosphates. The device will comprise a microfluidic platform integrated with printed electrodes based on analyte sensitive ink formulations and will facilitate the regular screening of nitrate and organophosphates to monitor the quality of soil samples. Envisioned for commercial marketing, this device will be an important step towards sustainable agriculture, which will significantly improve the livelihood of rural farming communities in the countries and help in safeguarding water resources from pollution.

The project is partnered by Dr Gorachand Dutta, IIT Kharagpur & Dr Amit Rastogi, Coromandel International Ltd., Secunderabad from India and Dr Bernhard Wolfrum, Technical University (TU), Munich & Dr Joachim Wiest, Cellasys GmbH, Kronburg.

The consortium met on April 19th, 2022, to discuss the progress made under the project. The Partners from TU, Munich presented their results from the Carbon Nano Tube (CNT) ink formulation experiments and dispersion challenges. They also planned on sending the substrate samples to IIT partners for deposition of nitrate sensitive composition on metalized foils and subsequent processing at TU, Munich. Partners from IIT, Kharagpur showcased their work on composites for nitrate detection and introduced the possibility to make a Cu-Ag bimetallic composite with CNTs as a second strategy as well as discussed the stability of Cu nanoparticles. Cellasys GmbH reported on their progress in the design layout of the device and sought feedback from the consortium on requirements for mobile devices.

NOMIS project aims to develop a multiplexed device for the detection of nitrate and organophosphates. The device will comprise a microfluidic platform integrated with printed electrodes based on analyte sensitive ink formulations and will facilitate the regular screening of nitrate and organophosphates to monitor the quality of soil samples.



*NOMIS progress meeting
in April 2022*

Circular Urban Cultivation Systems with Reusable Textile Growing Substrates

Project Investigators



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Dr Sanjit Debnath
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Bastian Winkler
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Michael Walz
Eschler Textil GmbH
Balingen



The project is partnered by a consortium of Amity University, Bidhan Chandra Krishi Viswavidyalaya (BCKV) and HariMitti Agro Pvt. Ltd. from the Indian side and the University of Hohenheim, German Institutes of Textile and Fiber Research (DITF) and Eschler Textil GmbH from the German side.

The project aims at the development of a reusable textile cultivation substrate following a plant performance based approach. In addition to plant and system specific properties, the dimensional stability of the textile will be taken into account during the development to allow for re-usability of the substrate through cleaning. Thermo-mechanical and a biological cleaning process will be developed and evaluated. Subsequently, existing urban farming systems will be technically adapted to the textile substrate to improve resource use efficiency and include an appropriate substrate cleaning process. In combination with a market analysis and target group segmentation (community gardening, urban farming for self-sufficiency, professional indoor, greenhouse and vertical farming) the value proposition and the financial feasibility will be translated into novel business models to support the market growth of urban farming. Circular, lightweight and resource efficient urban farming with reusable substrate may inspire urban inhabitants, trigger sustainable consumer behaviour and lead to a societal transition towards bioeconomy.

The consortium had a virtual meeting on 8th March 2022 for the discussion on the progress and future work plans of the project. A lab-based hydroponics system and a lab-based (Nutrient Film Technique) NFT system have been established at lab scale Amity University, Kolkata (AUK). The plant performance with respect to growth behaviour, metabolomics and molecular biology under treatment of salt stress and heavy metal stress were examined. Novel microbial biostimulants by isolation of endophytes from the plants of stress (salt stress and arsenic stress) affected area of West Bengal were formulated at AUK. Experimental designs for the greenhouse unit at BCKV are under process for finalizing. Market analysis and commercially feasible unit designing (indoor and outdoor) for the vertical system avoiding the barrier of tropical hindrance are under process by the HariMitti.

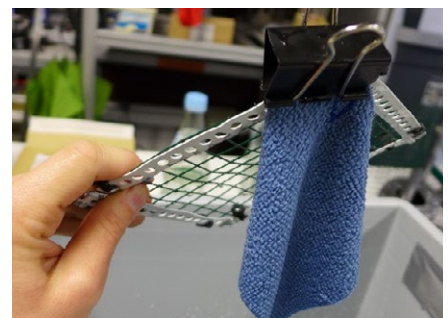


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Lab-based Dutch bucket system & Lab-based NFT system, Amity University, Kolkata



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Bidhan Chandra Krishi Viswavidyalaya project site

Project site at HariMitti

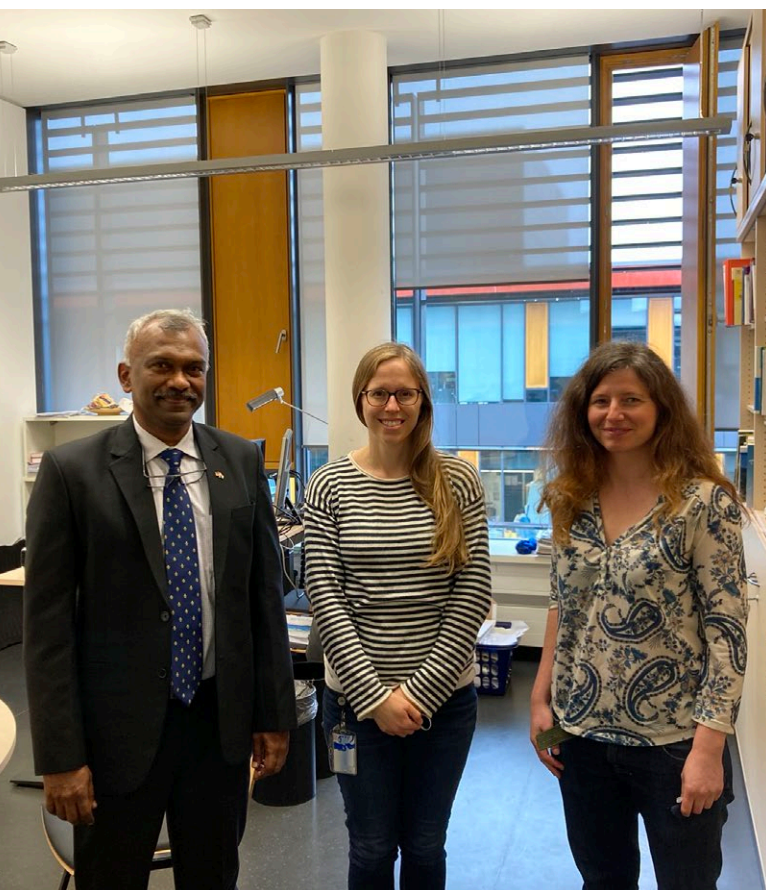


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Textile-based substrates



EffectroH₂O

Effect-based Monitoring Demonstrates Efficiency of Electrically Driven Water Treatment Processes to Remove Salts and Micropollutants from Process Water



The project is partnered by IIT Madras & Tamilnadu Water Investment Company (TWIC) Limited from the Indian side and Goethe University & Eurofins Agrosience Services Ecotox GmbH from the German side.

The project aims at improving the process of water treatment in industries in order to reduce harmful toxicological effects in receiving environments. They seek to recycle process streams and recover resources and thus improve the techno-economic feasibility of Zero Liquid Discharge plants. Project targets the United Nations Environment Programme Sustainable Development Goals 6 to “Ensure availability and sustainable management of water and sanitation for all” by contributing to the reduction of water consumption in water scarce regions such as India. Director, IGSTC visited the project site of EffectroH₂O at Goethe University, Frankfurt on 8th April 2022. EffectroH₂O team discussed the progress of the project in terms of work packages, outcomes and deliverables. Mr Madhan presented to the university researchers about the programmes of IGSTC to encourage active participation.

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*Mr Madhan with Dr Sarah Crawford,
Goethe University*

Steel4LTC

High Strength Spring Steels with Reduced Low Temperature Creep for Light Weight Designs



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*Discussions on the scientific progress of the project:
Mr R. Madhan, IGSTC Director and the UoH team*



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*Mr R. Madhan, IGSTC Director with Materials processing
and deformation science laboratory team*

This 2+2 Project is implemented by a consortium of University of Hyderabad (UoH) & JSW Steels Salem Works from the Indian side and Universität Siegen (USI) & Muhr und Bender KG (MUB) from the German side.

The consortium aims to develop an advanced spring steel grade with the improved mechanical properties by lab scale, pilot scale and industrial scale melting by continuous optimisation of process parameters, fabrication technologies and heat treatments. The development of a new spring steel grade is being achieved by close interaction between a steel maker (JSW), academic institutes (UoH and USI) and the spring manufacturer (MUB).

On 23rd March 2022, Mr R Madhan visited the project site of Steel4LTC at University of Hyderabad. They discussed the developments and growth of the project. Besides the progress, they also deliberated on the outcomes and deliverables of the project and interacted with the young team behind the projects.

IGSTC Industrial Fellows Meet



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Dr Chandrasekhar and Mr. Lindner with the Industrial Fellows



^
Mr Lindner with the Industrial Fellows

The first call of IGSTC Industrial Fellowship was launched on 14th June 2021. It is designed to encourage young researchers from an early stage of their career to experience an industrial exposure in a German setup. A total of 20 candidates were selected for this prestigious Fellowship.

IGSTC has organized an Industrial Fellows meet 2021 to award the fellows and encourage the networking among the fellows.

Industrial Fellows were awarded certificates by Dr Srivari Chandrasekhar, Secretary, Department of Science and Technology, Government of India; H.E. Walter J. Lindner, German Ambassador to India and Bhutan and Prof Ashutosh Sharma, Former Secretary, DST. Dr Chandrasekhar and Mr Lindner addressed the fellows and encouraged them for pursuing their research journey in Germany. They inspired the fellowship awardees to experience German culture and excellent facilities in applied research. The event was also attended by Dr Steffen Koch, Minister & Head of Economic Department and Globalisation, German Embassy and Mr Philipp Von Ritter, Science Counsellor of German Embassy.

“Dr Chandrasekhar and Mr Lindner addressed the fellows and encouraged the young Industrial Fellows for pursuing their research journey in Germany.”

Industrial Fellows



Mr Rinku Kumar Prajapat
Indian Institute of Technology
Roorkee (IIT Roorkee)

Mr. Prajapat is involved in exploring the dynamics of nuclear reactions mainly the heavy-ion induced fusion reactions in the low energy region.



Ms Sadbhawna Thakur
Indian Institute of Technology
Jammu (IIT Jammu)

Since recent cameras capture all the nine perspectives on a single sensor, the size of each captured image becomes $1/3$ of the sensor size in each direction. Sadbhawna's objective is to develop a Video Super Resolution (VSR) algorithm for real life videos considering all the assumptions via a deep convolutional neural network that should up sample each image by a factor of two in each dimension.



Dr Balram Singh
University of Delhi

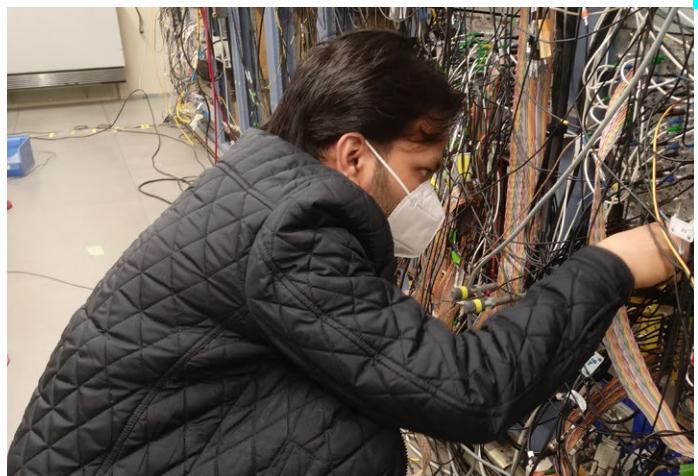
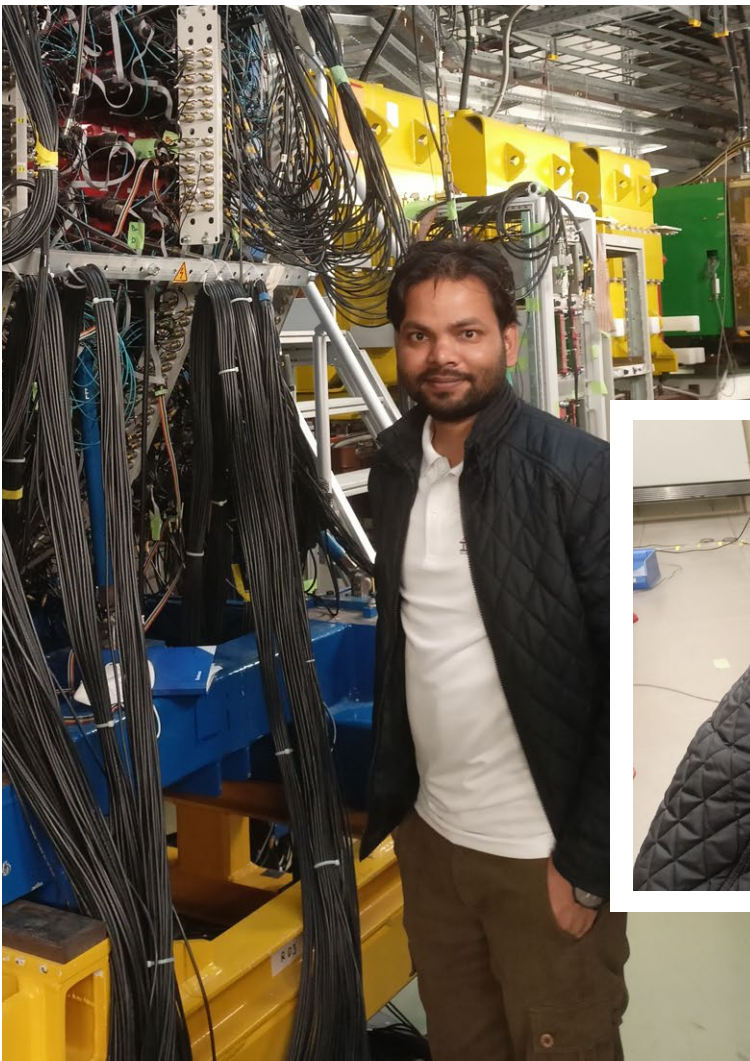
Dr Singh, through his project "NANOpain" seeks to treat inflammation with novel dendritic nano-drugs without the addictive, potential for a better quality of life for patients with post-operative pain, cancer and chronic pain.

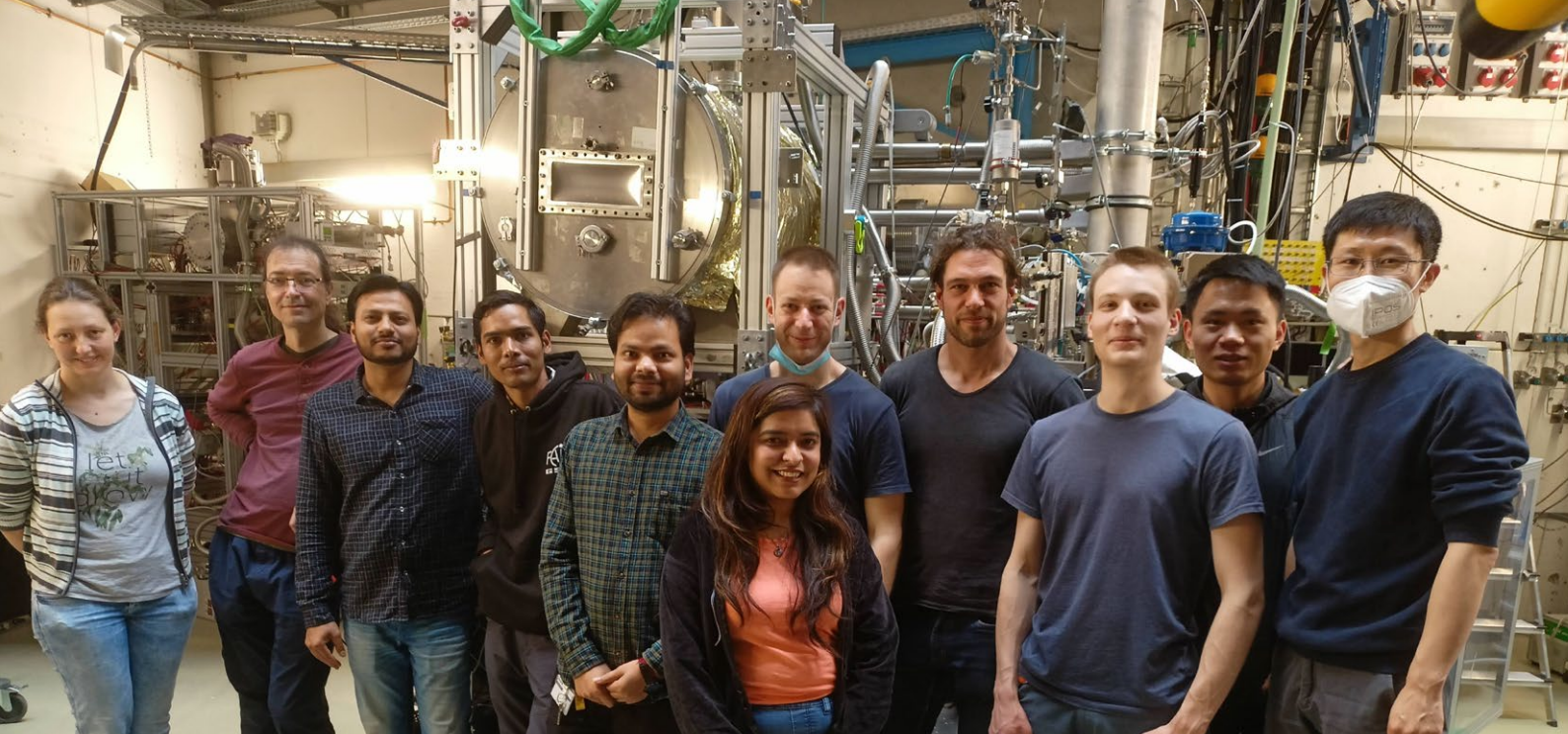
$$\zeta(z) = \sum_{n=1}^{\infty} \frac{1}{n^z}$$

When Particles Collide at Low Energy

This is a key question which is being addressed and pondered upon by many researchers all over the world. Mr Rinku Kumar Prajapat, IGSTC Industrial Fellow mainly focuses his work on exploring the dynamics of nuclear reactions mainly heavy-ion induced fusion reactions in the low-energy region.

Mr Prajapat is a PhD candidate at the Indian Institute of Technology, Roorkee (IIT Roorkee), Uttarakhand, India. He is working in the field of Experimental Nuclear Physics under the guidance of Prof Moumita Maiti, Associate Professor at IIT Roorkee. From his early career, he has engaged himself in the study of various nuclear reaction mechanisms and the production of some important radionuclides, from an application point of view. He has also utilised the existing facilities of Bhabha Atomic Research Centre-Tata Institute of Fundamental Research (BARC-TIFR) Pelletron, Mumbai, Inter-University Accelerator Centre (IUAC) Pelletron, New Delhi, India and Joint Institute of Nuclear Research (JINR), Dubna, Russia to study the light-heavy ion induced reactions using the gamma-ray spectroscopic method and mass spectrometers.



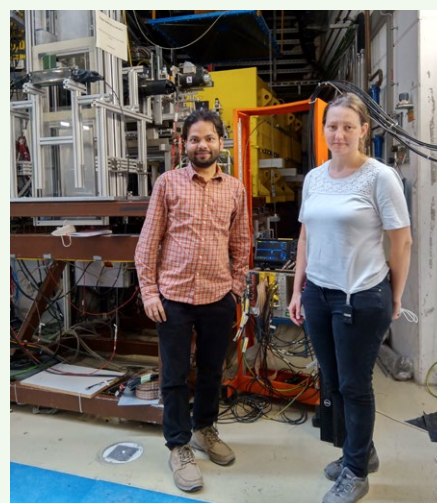


Recently, he has been awarded PhD Industrial Exposure Fellowship (PIEF) 2021 by IGSTC to work at an industrial set up in Facility for Antiproton and Ion Research (FAIR) GmbH, Darmstadt, Germany. FAIR GmbH is an international accelerator facility for research with antiprotons and ions which is being developed and built in cooperation with international partners at GSI Helmholtzzentrum für Schwerionenforschung in Darmstadt. His work in FAIR GmbH involves the operation of a large scale facility, FRagment Separator (FRS), which

includes developing software tools to optimize various parameters and/or components of the separator. Further, the production of exotic isotopes using fragmentation reactions with optimized conditions of FRS is one of his objectives.

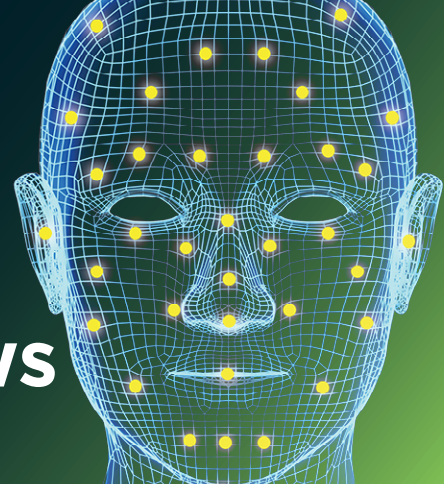
Dr Emma Haettner, an expert in FRS operation, production and separation of radioactive ion beams, ion-optical, developments and calculations for new experiments and detailed experiment planning is the host of Mr Prajapat at FAIR GmbH, Darmstadt, Germany.

He has already started his fellowship at FAIR GmbH from 1st March 2022 for six months. This Fellowship will create an excellent opportunity to acquire hands on experience in state-of-art detectors and technological development, including various hardware and software tools. It will also add the value of the research dimension from nuclear reaction studies to Radioactive Ion Beam (RIB) based experiments to his work. Hence, the impact of the IGSTC Fellowship will not only provide an opportunity for Mr Prajapat to become involved in the near future experiments at FAIR GmbH but also will open doorways to work for other similar nuclear physics facilities. During his spare time, he is also exploring and experiencing the best of Germany's culture & lifestyle along with his colleagues.



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*Mr Prajapat with his host
Dr Emma Haettner at FAIR GmbH*

Neural Networks for 3D Synthesized Views



Since recent cameras capture all the nine perspectives on a single sensor, the size of each captured image becomes 1/3 of the sensor size in each direction. Sadbhawna's objective is to develop a Video Super Resolution (VSR) algorithm for real-life videos considering all the assumptions via a deep convolutional neural network that should up sample each image by a factor of two in each dimension.

Ms Thakur is a PhD candidate at the Indian Institute of Technology, Jammu (IIT Jammu), India. She is working in the field of image processing, computer vision and machine learning under the guidance of Dr Vinit Jakhetiya at IIT Jammu. The major focus of her work includes analysing and enhancing the perceptual quality of 3D synthesised views.

Recently, she has been awarded PhD Industrial Exposure Fellowship (PIEF) 2021 by the Indo-German Science & Technology Centre (IGSTC) to work at an industrial set up in K|Lens GmbH, Germany. She has already started her fellowship at K|Lens GmbH from 10th March 2022. K|Lens GmbH is a spin-off of the Max Planck Institute of Informatics, founded in Saarbrücken in 2016. Since its inception, it has developed a lens enabling any camera with exchangeable lenses to capture light field images which consist of 9 perspectives of a scene.



At K|Lens GmbH she is working with her host, Dr Sunil Jaiswal who is currently working as a computer vision researcher. His research interest includes 3D computer vision, deep learning & image quality assessment.



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*Ms Sadbhawna with her host
Dr Sunil Jaiswal*

Through this Fellowship, she intends to develop a robust and promising VSR algorithm that applies to specific characteristics of real world videos. VSR is a challenging task faced by various camera companies, including K|Lens. It can have an extensive real world application, in the field of medical image reconstruction, remote sensing, panorama video super resolution, video surveillance and high definition television.

A demonstration during an office event at K-Lens GmbH in the presence of Dr Klaus Illgner (CTO & Co-Founder, K-Lens GmbH) and Dr Sunil Jaiswal (Head, R&D, K-Lens GmbH).



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*A project demonstration during an office event at K|Lens GmbH
Ms Sadbhawna (sixth from the left)*

Carrying Molecules to it's Destiny

Dr Singh, through his project “NANOpain” 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 Balram Singh completed his PhD from University of Delhi, India under the supervision of Prof. Ashok K. Prasad. During his PhD, he received “ERAMUS+” and “SFB1112” to work on Polymer Chemistry, Material Chemistry and Drug/Protein labelling specially with thermoresponsive polymer. Later, he joined Actorius Innovation and Research Pvt. Ltd., Pune as a Senior Research Scientist where he was involved in design and synthesis of novel biomaterials that have applications in cancer diagnostics and treatment. He was also effectively engaged in ‘Lab to Clinic’ translations of a highly efficient, novel multi component OncoDiscover® Liquid Biopsy Technology, which act as a diagnostic test for the rapid enumeration of Circulating Tumor Cells (CTCs) from peripheral blood of cancer patients to monitor cancer progression and metastasis.

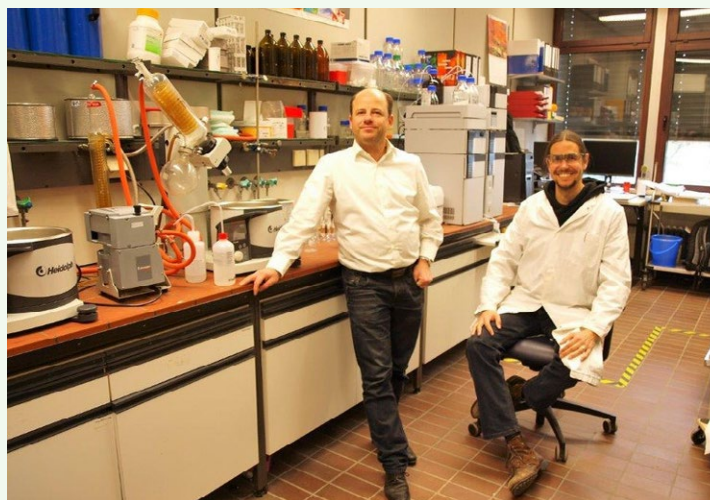
**For a World
with Less Pain**

A novel non-sedating, non-addictive
opioid to combat chronic pain.

dendro  **pharm**
q6uqlo

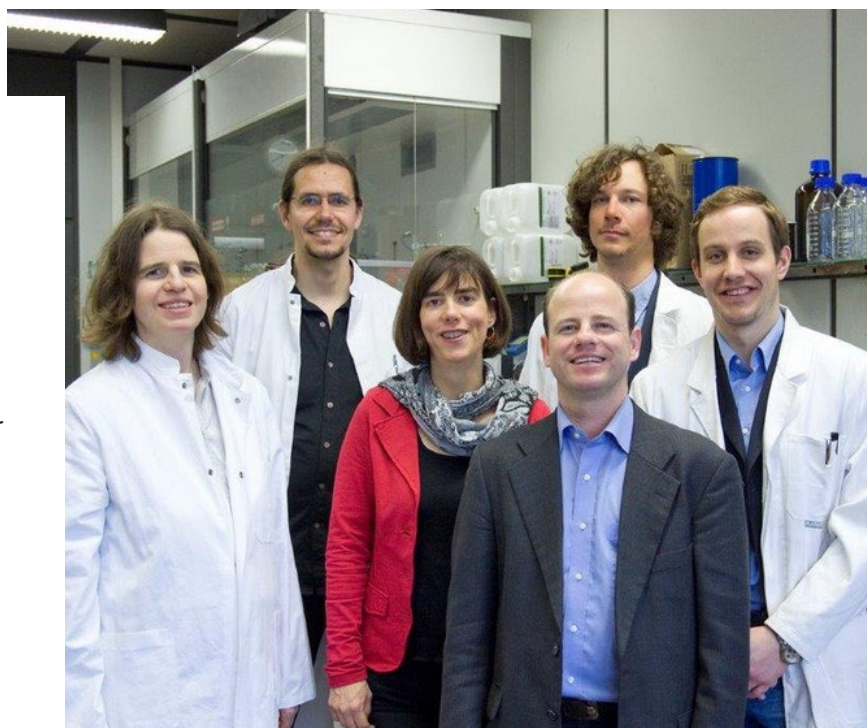
Presently, Dr Singh is an IGSTC Postdoctoral Industrial Fellow (PDIF) working at DendroPharm GmbH, Berlin, Germany. DendroPharm GmbH is an ISO certified company dealing with building block-based core-multishell nanocarriers with the possibility of fine tuning their properties.

Dr Sam Dylan Moré is his host at DendroPharm. He develops NanoCarriers that bring your drug to the target (skin or tumor tissue) - suited for poorly soluble or lipophilic drugs.



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*Dr Sam Dylan Moré (left), MD,
DendroPharm & host of Dr Singh*

Through this Fellowship, Dr Singh intends to mitigate the agony at an early stage of detection. Inflammation is a disturbing and emotional sensation that results from tissue damage/disease. Dendritic nanoanalgesics with no addictive have the potential to provide a better quality of life to patients with post-operative cancer and chronic pain. If successful, it would be a major step forward in the health care industry and serve as a one stop solution for pain relief. The anti-inflammatory therapy approach specifically treating tumor, surgery sites and inflamed tissue with higher efficiency is considered one of the ultimate goals of medical science in near future to reduce systemic side effects as well as the addictive nature of opioids.



Dendritic nanoanalgesics with no addictive have the potential to provide a better quality of life to patients with post-operative cancer and chronic pain.

The background is a photograph of three scientists in a laboratory setting, wearing white lab coats and safety glasses. They are gathered around a workbench with various pieces of laboratory equipment, including pipettes and test tubes. The image is overlaid with a semi-transparent purple and orange gradient. Scattered throughout the background are several small squares in yellow and green, and the letters 'AI' in a light yellow font, suggesting a focus on artificial intelligence in research.

PECFAR

Paired Early Career
Fellowship in Applied
Research



S K Varshney

Head, International Cooperative Division, DST
Indian Co-Chair, IGSTC Governing Body

PECFAR will give wings to early career researchers for exploring what can be accomplished as a pair and pave their way toward collaborative research in applied science.



Kathrin Meyer

Head of Division Cooperation with
Asia & Oceania, BMBF
German Co-Chair, IGSTC Governing Body

Ms Meyer congratulated IGSTC for taking a step towards Indo-German cooperation by promoting scientific exchange between India & Germany. She mentioned that paired fellows through PECFAR will not only gain exposure to scientific R&D but also experience each other's cultures.

IGSTC launched Paired Early Career Fellowship in Applied Research (PECFAR) on 1st February 2022 to facilitate the exchange of early career researchers between India & Germany.

The Fellowship was jointly launched by Mr S. K. Varshney, Head, International Cooperation, Department of Science and Technology (DST), Govt of India & Indian Co-Chair, IGSTC GB and Ms Kathrin Meyer, Head of Division, Cooperation with Asia & Oceania (BMBF), Federal Ministry of Education and Research & German Co-Chair, IGSTC GB.

It is tailored for early career researchers in India & Germany below the age of 35 years working at a recognised academic/research organisation or holding a long term nationally recognised Fellowship to have a short visit to Germany/India for a duration of 1-2 months. A pair should be formed between an Indian and German early career researcher to apply for the Fellowship. IGSTC has also offered a networking platform for 1:1 matchmaking to form the pairs.

The Fellowship shall enhance the research capabilities and provide an opportunity to early-career scientists & engineers with potential in their field to explore the Indian & German research landscape in various aspects, including entrepreneurship, collaborative research & innovation and sharing of lab facilities & infrastructure.

Both Co-Chairs welcomed the launching of the programme and stressed that this programme will be a unique opportunity for the young researchers of two countries.

More information on the programme, eligibility, guidelines, etc., can be found at www.igstc.org.

SING

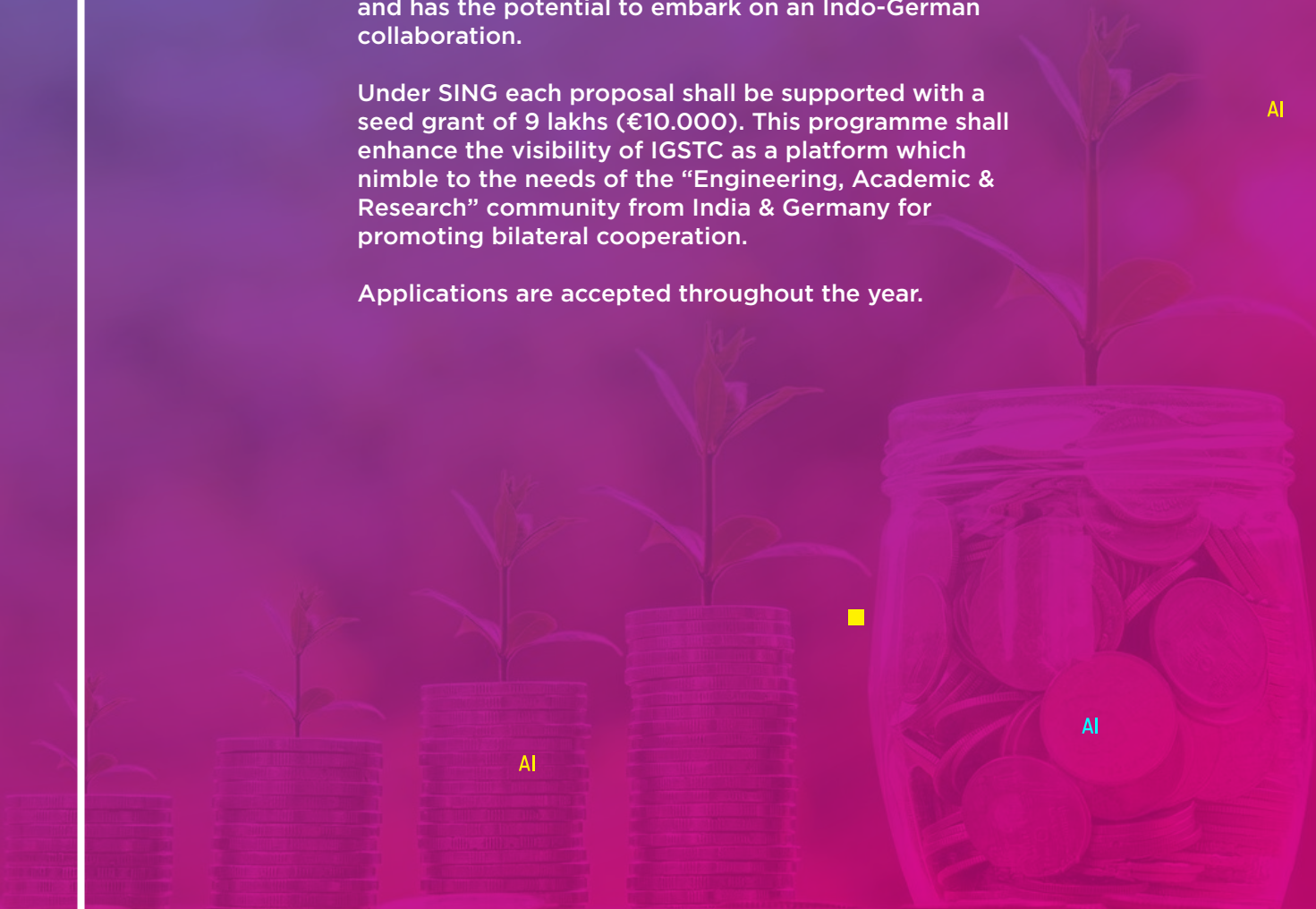
Small Immediate Need Grants

A new initiative Small Immediate Need Grants (SING) was announced by the Indo-German Science and Technology Centre (IGSTC) on 27th December 2021.

SING aims to provide quick assistance to kick off proposals or initiatives which require modest funding and has the potential to embark on an Indo-German collaboration.

Under SING each proposal shall be supported with a seed grant of 9 lakhs (€10.000). This programme shall enhance the visibility of IGSTC as a platform which nimble to the needs of the "Engineering, Academic & Research" community from India & Germany for promoting bilateral cooperation.

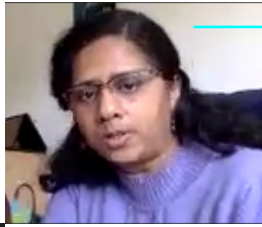
Applications are accepted throughout the year.



Pitching Session

Waste to Wealth and Sustainable Packaging

After the launch of 2+2 Call 2022 on thematic area “Waste to Wealth and Sustainable Packaging”, IGSTC has set up a match making platform to support the search for suitable partners and the formation of a proper consortium with complementary expertise, so that users from academia and industry can network to build mutually beneficial collaborations. Users created a profile covering their expertise, company or organization profile and areas of interest in the broad field of thematic area. In addition, users can make use of the so called marketplace where project ideas or the description of a specific expertise can be described and requests for specific expertise in potential partners can also be requested. Match meeting with the potential partners could be requested and scheduled. These could then be realized through a build in web conferencing function. Moreover, the applicants were able to present their research ideas/concepts through two online pitching sessions which were integrated into the matchmaking platform. A pitching session was held on 25th February 2022. Participants presented their ideas for partnerships in 5-10 minutes pitches. IGSTC expected that the use of matchmaking and online pitching events would ease the process of finding research partners and helped in constructing a strong long term Indo-German R&D collaboration.



Online Session

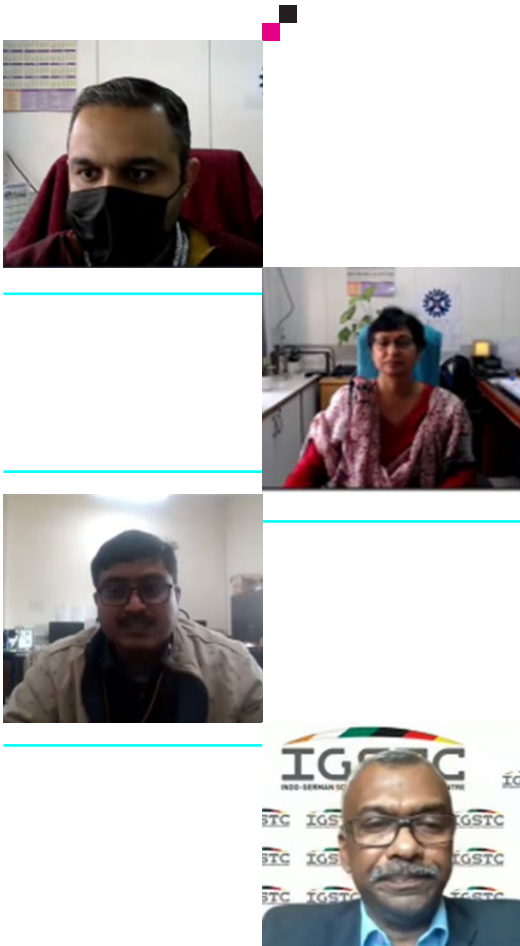
Indo-German Cooperation in Science & Technology

Embassy of India, Berlin organized an event to celebrate Azadi Ka Amrit Mahotsav and commemorate 75 years of Independence on 22nd February 2022, in which Mr Madhan, Director, IGSTC had participated in the panel discussion and discussed the ideas to facilitate and promote Indo-German bilateral collaborations in basic and applied science, research and technology through substantive interaction among government, academia and industry. The panel comprised of experts and key decision makers from various agencies like DAAD, AvH, etc. Director spoke about the role IGSTC plays in Indo-German bilateral cooperation and the four pillars for strengthening future collaboration - resources, areas of cooperation, approaches & challenges. He also briefed about the opportunities at IGSTC. He focused on various modes of collaboration like joint innovations, encouraging visits through fellowships, fast track opportunities and long-term research collaborations. Based on the experiences, he explained the challenges faced for Indo-German collaboration and shared the solutions for the same. Later, he highlighted the programmes offered by IGSTC and how these scientific activities motivate inclusiveness, advanced industrial partnership, applied research in STEM and participation of early career researchers.

Director focused on various modes of collaboration like joint innovations, encouraging visits through fellowships, fast track opportunities and long-term research collaborations. Based on the experiences, he explained the challenges faced for Indo-German collaboration and shared the solutions for the same.

Webinar

International Collaboration Funding Opportunities through Bilateral Programmes



Mr R. Madhan showcasing IGSTC at the webinar

Council of Scientific and Industrial Research (CSIR) organised a webinar on “International collaboration funding opportunities through bilateral programmes by various bilateral organisations: Indo-US Science & Technology Forum (IUSSTF), Indo-French Centre for the Promotion of Advanced Research (IFCPAR), Indo-German Science & Technology Centre (IGSTC) and Global Innovation & Technology Alliance (GITA)” on March 4th, 2022. Mr R Madhan delved into the insights of the Indo-German research landscape and urged researchers from both the countries to participate in programmes of IGSTC. He delivered an insightful talk on the intricacies of the bilateral programmes. He also emphasized on IGSTC programmes and other scientific activities like 2+2 projects, fellowships, workshops, etc. There was a tremendous interest in the IGSTC programmes from the audience.

International collaboration funding opportunities through bilateral programmes by various bilateral organisations - IUSSTF, IFCPAR, IGSTC and GITA” on March 4th, 2022.

CII - KAS Webinar Proceedings

The Confederation of Indian Industry (CII) and Konrad-Adenauer-Stiftung (KAS) organized a webinar on 10th March 2022 about India and Germany strengthening skills where Mr R. Madhan, Director of IGSTC highlighted several programmes within IGSTC which are directly linked to skill development. He talked about one of the recently launched programme, the IGSTC Industrial Fellowship, offered two different Fellowships: PhD Industrial Exposure Fellowship (PIEF) and Post-Doctoral Industrial Fellowship (PDIF). Further, he mentioned about another attractive scheme called the Women Involvement in Science and Engineering Research (WISER). The scheme aspires to help women to scale new heights in their academic research, he added. He noted that many programmes in IGSTC have been designed to help young researchers in India and Germany like Paired Early Career Fellowship in Applied Research (PECFAR). Later, he stated that the 2+2 programme is significant, where industry, academia and research institutions from both the countries work on specific topics. These are largely funded programmes decided upon by ministries and help young researchers and young industrialists acquire new skills and experience by visiting other countries, including Germany.

Director, IGSTC highlighted various programmes offered by IGSTC like Industrial Fellowship, PECFAR & WISER which are directly linked to skill development. These are well funded programmes decided upon by ministries and help young researchers and young industrialists acquire new skills and experience by visiting Germany.

Outreach of IGSTC, Hyderabad

Mr R. Madhan had deliberations with leading research institutes in Hyderabad like International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI), Hyderabad on 23rd March 2022, Indian Institute of Technology (IIT) Hyderabad on 24th March 2022 and on 25th March, he visited CSIR - Centre for Cellular & Molecular Biology (CSIR - CCMB) and CSIR - Indian Institute of Chemical Technology (CSIR - IICT) to promote IGSTC. He introduced all IGSTC programmes to various organisations and the motive of each scientific activities by IGSTC. Mentioning the focus areas of IGSTC, Director encouraged the participation for 2+2 projects, fellowships, workshops and other networking programmes of IGSTC.



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Mr Madhan at CSIR-IICT, Hyderabad

*Prof B. S. Murty, Director, IIT Hyderabad
and Mr R. Madhan*



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Mr Madhan at CSIR-CCMB



Interactions with Embassy of India, Germany



Mr John H. Ruolngul, Consul General of India, Hamburg with Mr R. Madhan



Mr R. Madhan had an extensive deliberation with the officials of the Indian embassy, Germany.

He met with Ms Rachita Bhandari, Deputy Chief of Mission, Mr Gaurav Sharma, First Secretary (ITOU, Economics & Commerce), Mr Saketa Raja Musinipally, First Secretary (Head of Chancery, Economics & Commerce) and Dr Madhusudan Reddy Nandineni, Counsellor, Science and Technology of the Indian embassy, Germany on 4th April 2022. The meeting focused to promote IGSTC programmes in

Germany and strengthening Indo-German collaborations. It also had intense discussions on encouraging the outreach of IGSTC at the events by Indian embassy in Germany.

Mr Madhan discussed the IGSTC programmes, milestones and success stories with Mr John H. Ruolngul, Consul General of India, Hamburg and Mr Vinod Kumar, Consul General of India, Frankfurt. Director emphasized on connecting industry with IGSTC for Industrial fellowship programs.

Discussions with BMBF

Mr R. Madhan had a meeting with BMBF officials on 7th April 2022 in Berlin. He had discussions with Ms Kathrin Meyer, Head of Division Cooperation with Asia & Oceania, BMBF and German Co-Chair IGSTC; Dr Ulrike Wolters, Desk Officer India, Directorate for

Cooperation with Asia and Oceania, BMBF and Mr Hans Westphal, Scientific Officer, DLR-PT. Director presented the activities of IGSTC. They had a holistic discussion on IGSTC and future actions.

Discussions at FAIR GmbH



FAIR GmbH - The Universe in the Lab, the international accelerator facility, one of the largest research projects worldwide, is being built in Darmstadt, Germany. At FAIR GmbH, matter that usually only exists in the depth of space will be produced in a lab for research. Scientists from all over the world will be able to gain new insights into the structure of matter and the evolution of the universe from the Big Bang to the present. FAIR GmbH is one of the hosts for the Industrial Fellowship programme of IGSTC. Director met Dr Pradeep Ghosh, International Programme Coordinator, FAIR GmbH on 8th April 2022 to discuss on collaborations between FAIR GmbH & IGSTC. Currently, one of the IGSTC PhD Industrial Exposure Fellows Mr Rinku Kumar Prajapat has started his fellowship at FAIR GmbH.

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Left to Right: Dr Pradeep Ghosh, Mr R. Madhan and Mr Rinku Kumar Prajapat

Indo-German joint initiative for development of renewable and sustainable technologies



Mr R. Madhan at The Energy and Resources Institute (TERI), Goa



The Energy and Resources Institute (TERI) organized a meeting on Indo-German joint initiative for the development of renewable and sustainable technologies on 20th April 2022 at Panaji, Goa where the director of IGSTC, Mr R. Madhan presented the initiatives by

Indo-German Science & Technology Centre. He showcased the programmes offered by IGSTC. He motivated the participation of women and early career researchers for the newly launched programmes of IGSTC.

Outreach of IGSTC at NIT, Goa



Mr R. Madhan met Prof Gopal Mugeraya, Director, National Institute of Technology (NIT), Goa on 28th April 2022. He discussed the programmes of IGSTC. The deliberations were also held to bring NIT Goa scientists/faculties into the fold of Indo-German collaborations through IGSTC programmes. Specifically, he encouraged the participation of young PhDs/researchers in Industrial Fellowship programme of IGSTC to have exposure to German industrial set-up.

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Mr R. Madhan and Prof Gopal Mugeraya, Director, NIT, Goa

Indo-German Science & Technology Centre

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