Proposal for 11th INDOGFOE

Title of the Symposium : **11th Indo-German Frontiers of Engineering Symposium (INDOGFOE 2017)**

Proposed Venue : Kolkata, West Bengal (India)

Dates : June 11 to 14, 2020

Principal Investigator :

Dr Rabibrata Mukherjee
Indian Co-Chair, INDOGFOE 2020

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Background, Concept and Purpose of the Conference:

The Indo-German Frontiers of Engineering Symposia (INDOGFOE) are a highly interdisciplinary series of bilateral conferences, which are co-organized by Department of Science and Technology (DST), India and the Alexander von Humboldt Foundation, Germany. The symposium is aimed to bring together outstanding, early-career German and Indian engineers and scientists from industry, universities, and other research institutions, to discuss their areas of research and technical expertise, thereby facilitating a conducive atmosphere for cooperation and to foster interdisciplinary transfer of knowledge and methodology that could eventually lead to the development of collaborative networks of young researchers from both countries.

These conferences are held by-annually, typically alternating between Germany and India, with about 30-35 engineers and scientists participating from each country. An organizing committee comprising of German and Indian Co-Chairs and theme leaders develop the program for this event and choose various speakers and participants for four thematic sessions.

Participation

Participation is by invitation only.

Format

- Bilateral programme: 50% Indian and 50% German participants.
- Outstanding young engineers and scientists from academia, industry, and other research institutions from both countries.
- Young researchers up to 15 years after completing their Ph.D. degree, with appropriate representation of women.
- Approximately 60 participants including Organizers, Speakers, and General Participants. Invited guests and staff may count as extra.
- Interdisciplinary themes representing state-of-the-art research areas.

Themes:

There will be four (4) contemporary and socially relevant thematic sessions. Each session will have two (2) India and two (2) German speakers.

- Energy Materials
- Advanced Communication and 5G Technologies
- Sustainable Earth
- Machine Learning and Big Data Analytics

180 minutes are allotted **for each session** (two blocks of 90 minutes each, with a break in between).

Session structure:

- Brief introduction of the session topic and introduction of Speakers by Theme Chairs (s).
- 4 talks (2 each from Germany and India) on specific topics related to the theme: covering innovations in research and cutting-edge research.
- Each talk: 20 minutes presentation followed by approx. 20 minutes Question-Answer among all participants.

Tentative Schedule attached (See Annexure 1)

The relevance of the themes as topics of cutting edge scientific discussion:

Advanced Communication and 5G Technologies:

The proliferation and penetration of smart phones and IoT devices is having profound impact on world economy. Advanced wireless communication technologies like 5G will help in supporting billions of wirelessly connected devices and tackling exponentially increasing traffic demands and ever-increasing Quality of Experience (QoE) and energy efficiency requirements of diverse services and applications being envisaged in the networks of the future. 5G will deliver new levels of performance and efficiency that will empower new user experiences and connect new industries. 5G is promising to deliver multi-Gbps peak rates, ultra-low latency, massive capacity, and ubiquitous coverage which will ultimately alter the DNA of digital experience and pave way for new business ventures that many have never thought of. Furthermore, 5G will redefine a broad range of industries with connected services from retail to education, transportation to entertainment, healthcare to manufacturing, agriculture to public safety, and everything in between.

Machine Learning and Big Data Analytics

The easy access to large data repositories, growth in computing power, and advances in algorithm modelling have resulted in the ubiquity of machine learning and big data analytics techniques. The impact of machine learning is being felt across all domains with a spurt in applications driven by artificial intelligence models. This special session at INDOGFOE 2020 is aimed at showcasing to the larger audience both the relevant recent advances in machine learning as well as their successful applications. The session aims to cover important advances in machine learning in the areas of fairness, explainability, and auto-ml, along with state-of-the-art approaches in deep learning and reinforcement learning. The speakers and the general participants are experts in a wide range of machine learning applications such as computer vision, bioinformatics, speech and music, natural language processing, and analytics. We hope that this will help the larger audience to understand how machine learning can assist in their work and connect with the appropriate researchers.

Sustainable Eath:

We are in the doorstep of a new decade, during which the UN Sustainable Development Goals (SDG) are to be achieved. This cannot be done without involving Earth Science to a great degree in a variety of problems, ranging from poverty alleviation to access to clean water. While, scientists should continue to build on their traditional strengths of promoting research and stewardship in uncovering the knowledge of Earth's deep interior, crustal processes, knowing other planets, exploring mineral and fossil fuel resources etc., they ought to gear themselves to solve more direct societal problems, of clean air, potable water, food availability, changing climate and resilience to natural calamities . To do this, there is a need to integrate and collaborate with other disciplines, including engineering and the social sciences, to greater degrees, such that together they can solve topical issues with better efficiency. For example, about half of all the data ever collected have been recorded in the last decade during the digital boom. This

provides an immense potential for using big data analytics and AI to solve geoscience problems, which we couldn't dare to dream before. Looking forward, infusing physical models with numerical analyses by deep learning can open up new horizons of geosciences. This is the future for the sustainability of the evolving Earth, we need to engage professionals and students to achieve its vision by adapting to this changing world. Recent debate in urban studies is fueld by underscoring the increasing need of sustainable development in the global South. So far, transfering specific research findings into policies and specific public programs to achieve sustaibale development remains a challange. This session of „Sustainable Earth" brings together different disciplines of engineering science and natural science aiming not only to simplify understanding the findings but also enabling policy formulation and reforms. The session focuses specifically in context to current research demand and problems in sustainable development in Indian rural urban regions but is not limited to the following:

1. Unregulated land use change and impact on natural resources (soil sealing, depletion of ground water, river contamination, extensive use of cars and two-wheelers increases Co2 emmisions etc.).
2. Increasing disparities in distribution of infrastructure (both social and technical) accelerates migration towards large cities. This not only reduces latters carrying capacity but also exerts pressure on existing basic amenities leading to break down or grid-lock like situations.
3. Limited planning and implementation as well as public participation to sustainably manage and guide growth inrapidly growing cities (lack of government accountability, lack of citizen enpowerment and making them accountable for growth/change).
4. Policies and reforms should be evidence-based for sustainable growth management. However, the lack of good quality and reliable data, not only hinders research but also realistic

Energy Materials

The ever increasing demand for energy storage and energy conversion systems, which stems from the ceaseless demand of energy for everyday functioning, reflects the critical need for advanced energy materials. Research in fundamental discovery in materials science, engineering, and related disciplines leads to the discovery of novel devices like advanced batteries, supercapacitors, fuel cell, thermoelectrics with high energy storage which are used in different applications. The efficient fuel production from the water and pollutant materials like CO_2 and biomass also urged the scientific thrust in fundamental research, especially in materials research. To further strengthen research and advancement of materials for energy applications, **energy materials** theme in INDOGFOE focuses on the fundamental discovery in renewable energy generation.

Organizing Committee

Conference Co-Chairs	
Prof. Rabibrata Mukherjee ***India Co-Chair, INDOGFOE 2020*** Department of Chemical Engineering Indian Institute of Technology Kharagpur, Pin 721302, West Bengal, India Phone: +91-3222-283912 (O) +91-9831096816 (Cell) +91-9475884339 (Cell) Email: rabibrata@che.iitkgp.ac.in	**Prof. Benedikt Schmulling** ***German Co-Chair, INDOGFOE 2020*** University of Wuppertal E-Mobility Research Group Rainer-Gruenter-Straße 21 Raum: FD 02.16 D-42119 Wuppertal Telefon: +49 202 439-1510 Telefax : +49 202 439-1512 e-mail: schmuelling@uni-wuppertal.de

Theme Chairs (from India and Germany)		
	INDIA	**GERMANY**
Energy Materials	**Prof. Sebastian C. Peter** Associate Professor New Chemistry Unit Jawaharlal Nehru Centre for Advanced Scientific Research, Jakkur Post, Bengaluru, India-560064 Phone: +919480827672 Email: sebastiancp@jncasr.ac.in	**Prof. Oliver Clemens** Technische Universität Darmstadt Materials Science Alarich-Weiss-Straße 2 64287 Darmstadt, Germany E-Mail: oliver.clemens@md.tu-darmstadt.de
Advanced Communication and 5G Technologies	**Dr. Bheemarjuna Reddy Tamma** Associate Professor Dept. of Computer Science & Engg. IIT Hyderabad, Kandi, India 502285 Phone: +91-40-2301 7001 (Office) Email: tbr@iith.ac.in	**Dr.-Ing. Christian Senger** Deputy Director Institute of Telecommunications University of Stuttgart Pfaffenwaldring 47 70569 Stuttgart, Germany Email: senger@inue.uni-stuttgart.de
Sustainable Earth	**Dr. Abhijit Mukherjee** Department of Geology and Geophysics, Indian Institute of Technology (IIT) Kharagpur West Bengal 721302, India Email: abhijit@gg.iitkgp.ernet.in amukh2@gmail.com Phone: +91-9007228876	**Dr. Manisha Jain** Leibniz Institute of Ecological Urban and Regional Development Weberplatz 1, 01217 Dresden, Germany Email: m.jain@ioer.de Phone: +49 351 46 79 294 Fax: +49 351 46 79 211
Machine Learning and Big Data Analytics	**Dr. Narayanan C Krishnan** Department of Computer Science and Engineering Indian Institute of Technology Ropar Rupnagar, PB, India - 140001 Phone: +91 1881 232158 Email: ckn@iitrpr.ac.in	**Prof. Sebastian Stober** Artificial Intelligence Lab Institute for Intelligent Cooperating Systems, Faculty of Computer Science, Otto von Guericke University Magdeburg Universitätsplatz 2 D-39106 Magdeburg, Germany E-Mail: stober@ovgu.de

Brief CV of all the Indian Organizing Committee Members are attached in **Annexure 2**

Speakers

- 2 Indian and 2 German speakers per session: 16 speakers in total
- Experience: up to 15 years after receiving their Ph.D. degree
- Good balance of post-doctoral engineers from academia, industry, and other research institutions
- Appropriate representation of women

Budget Estimate

S. No.	Head	Amount (in Rs.)
1.	Travel costs for Indian participants [**30**: India Chair 2020 (1); OC Member (4); Speakers (8); Poster presenters (12); Invitees (5). Inclusive of **Air India** Fare: City of origin to Kolkata and Back; and other miscellaneous expenses	30 x 30,000= 9,00,000/-
2.	Room rent for 30 Indian + 30 German participants + 2 supporting students (shared) + 2 DST dignitaries + German Embassy + VVIP	65 x 10000 x 3 days = 19,50,000/-
3.	Meals & Special Dinner	65 x 1500 x 3 days =2,92,000/-
4.	Cultural Tour (1/2 day): Travel & Entry Passes	2000 x 65 = 1,30,000/-
5.	Local Travel arrangements at Kolkata	3,00,000
6.	Organizational expenditures	2,71,000
	Sub - Total	**38,43,000/-**
7.	Overhead charged by IIT Kharagpur, Dean CEP (Center for Continuing Education) @10%	4,27,000/-
	Total	**42,70,000/-**

Rabibrata Mukherjee
Indian Conference Co-Chair

Endorsed and Forwarded by:

Dean, Continuing Education Programme

Annexure - 1

Tentative Program

Thursday, Mar 09th, 2017	
3.00 p.m. onwards	Arrival of German and Indian participants
7:00 p.m.	Welcome Reception
Friday, Mar 10th, 2017	
from 7.00 a.m.	Breakfast
9:00 - 9:30 a.m.	Official Inauguration
9:30 - 11:00 a.m.	Session I - Part 1
11:00 - 11:30 a.m.	Break
11:30 - 1:00 p.m.	Session I - Part 2
1:00 - 2:00 p.m.	Lunch
2:00 - 3:00 p.m.	Poster Session: Flash talks
3:00 - 3:45 p.m.	Poster Session I
3:45 - 4:30 p.m.	Poster Session II
4:30 - 5:00 p.m.	Break
5:00 - 6:30 p.m.	Session II - Part 1
6:30 p.m.	Dinner
Saturday, Mar 11th, 2017	
from 7.00 a.m.	Breakfast
8:30 - 10:00 a.m.	Session II - Part 2
10:00 - 10:30 a.m.	Break
10:30 - 12:00 p.m.	Session III - Part 1
12:00 - 1:00 p.m.	Lunch
1:00 - 2:30 p.m.	Session III - Part 2
2:45 - 8:30 p.m.	Cultural evening/Sightseeing
Sunday, Mar 12th, 2017	
from 7.00 a.m.	Breakfast
9:00 - 10:30 a.m.	Session IV - Part 1
10:30 - 11:00 a.m.	Break
11:00 - 11:30 a.m.	Presentation on AvH/DST Programmes
11:30 - 1:00 p.m.	Session IV - Part 2
1:00 - 1:15 p.m.	Closing Remarks
1:15 - 2:30 p.m.	Farewell Lunch
3.00 p.m.	Departure

Annexure II

CV of the Organizing Committee Members from Indian Side

CV of the Conference Co-Chair

Dr Rabibrata Mukherjee

Professor
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Bio Sketch: Rabibrata Mukherjee obtained his PhD from IIT Kanpur in the year 2007 under the supervision of Prof. Ashutosh Sharma. Rabibrata joined IIT Kharagpur in the Department of Chemical Engineering as an Assistant Professor in May 2009 and became a Professor in February 2018. Prior to joining IIT Kharagpur, he was a Scientist at CSIR - Central Glass & Ceramic Research Institute, between 1997 and 2009. He is an internationally recognized expert in soft nano patterning and thin film instability, with specific emphasis on ordering and arranging objects by confined self organization at the nano and meso scale. So far he has published around **70** papers in International journals of repute and holds 7 Indian patents. He has received the CSIR Young Scientist Award in 2007, the MRSI Medal in 2014, the Kaushal Kishore Memorial Award from SPS(I) in 2017 and the Faculty Excellence Award from IIT Kharagpur in 2017. Rabibrata is presently setting up the DST Funded Sophisticated Analytical & Technical Help Institute (SATHI) at IIT Kharagpur. He is an extremely popular teacher, passionate mentor, and an avid aviation enthusiast!

CV of the Theme Co-Chairs

Theme: Advanced Communication and 5G Technologies

Dr. Bheemarjuna Reddy Tamma

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Bheemarjuna Reddy Tamma is an Associate Professor in the Dept. of Computer Science and Engineering at IIT Hyderabad. He obtained his Ph.D. degree from IIT Madras, India in 2007 and then worked as a post-doctoral fellow at the University of California San Diego (UCSD) division of California Institute for Telecommunications and Information Technology (CALIT2) prior to taking up faculty position at IIT Hyderabad, India in 2010. His research interests are in the areas of Converged Cloud Radio Access Networks, SDN/NFV for 5G, Mobile Social Networks in Proximity, Network Security, and Green ICT. He has published over 100 articles in refereed international journals and conferences. Dr. Reddy is a recipient of Visvesvaraya Young Faculty Research Fellowship at IIT Hyderabad and iNautix Research Fellowship for his Ph.D. tenure at IIT Madras. He is a co-recipient of Top Cited Article Award from Elsevier publishers, Best Academic Demo Award at COMSNETS 2018, Best Poster Award at ICACCI 2018, 2nd Best Paper Award at IEEE ANTS 2017, and Best Paper award at ICACCI 2015 conferences. Dr. Reddy is a prolific reader and an amateur runner!

Theme: Energy Materials

Prof. Dr. Sebastian C. Peter

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Dr. Sebastian C. Peter received his MSc (2000) from St. Thomas College, Thrissur, Calicut University and MTech (2002) from Cochin University of Science and Technology. He received his Ph. D. in chemistry from the University of Münster, Germany (2006). He was a post-doctoral fellow at Max Plank Institute for Chemical Physics of Solids, Dresden, Germany (2006-07) and Northwestern University, USA (2007-10). Dr. Peter joined as Ramanujan faculty fellow at New Chemistry Unit, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore in 2010. His broad research interests include the development of solid-state inorganic materials for various applications ranging fuel cell, CO_2 reduction and in condensed matter physics. He has more than 165 peer reviewed publications and five patents. He was invited and attended around 80 national and international conferences. He is the recipient of Young Investigator awards from ACS (2013), RSC (2017) and IOP (2016). He was awarded Ramanujan fellowship in 2010 and MRSI medal in 2016. In 2018, he received SwarnaJayanti Fellowship in the category of Chemical Science. He is a member of American Chemical Society, Royal Society of Chemistry, ASM international, Chemical Research Society of India, Material Research Society of India, International Union of Crystallography, Indian National Young Academy of Science and Society for Material Chemistry of India. He co-founder the start-up "Breathe Applied Sciences Pvt Ltd" and enters into final round of the NRG-COSIA XPRIZE 20 million USD prize on waste CO_2 utilization. His team is the only one team in final round of the competition earning half a million USD as milestone prize. Breathe Applied Sciences Pvt Ltd has been selected as one of the best 100 start-ups by Karnataka state Government in 2017 through ELEVATE-100. CleanEquity, Monaco (2019) selected CO_2 reduction technology as the second best in the global level.

Theme: Machine Learning and Big Data Analytics

Dr. Narayanan C Krishnan

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Narayanan C Krishnan (CK) joined the Department of Computer Science and Engineering at Indian Institute of Technology Ropar in 2013. Prior to that, he was an assistant research professor at the center for advanced studies in adaptive systems (CASAS) at Washington State University. He worked in the area of data mining applied to activity recognition and smart home technologies. He completed his PhD in 2010 from Arizona State University. He likes to work on fundamental machine learning/data mining problems that are inspired by application domains such as activity recognition, multimedia, pervasive health care and recently from ICT4D. He enjoys trekking in the Himalayas.

Theme: Sustainable Earth

Dr. Abhijit Mukherjee
Associate Professor
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Prof. Abhijit Mukherjee, PhD graduated from the University of Kentucky, USA and completed postdoctoral work at the University of Texas at Austin, USA. He also served as the Physical Hydrogeologist at the Alberta Geological Survey in Canada. He is currently an Associate Professor at the Department of Geology and Geophysics, and School of Environmental Science and Engineering at the Indian Institute of Technology Kharagpur (IIT Kharagpur), India. His main research areas are physical, chemical and isotope hydrogeology, including modeling and contaminant transport, as well as water resource management and the effects of climate change on the hydrosphere. He has worked in 12 countries across Asia, North and South America for safe and sustainable groundwater-sourced drinking water. He has authored about 90 international journal articles and sole-authored/edited the book titled, "Groundwater of South Asia". He has served in Editorial role of several prestigious journals, and also has worked as an advisor and expert to various ministries of Government of India and West Bengal. He has been conferred many awards from various national and international organizations, including the National Geoscience Award by the President of India. He is regarded as heading the strongest and most prolific groundwater research group in South Asia.