

EAI BODYNETS 2024

Programme Detailed Schedule 2024

Time	Location	Day 1- 15th December 2024 Event
08:30 onward		Registration (Papers accepted as a Poster should be displaced in the designated area)
09:30-10:00	ABLT-4	Event Inauguration
10:00-10:30	ABLT-4	Welcome address
10:30-11:00		High Tea
11:00-11:45	ABLT-4	<p>Keynote by Prof. Teemu Myllylä on</p> <p>Title: Prospects of Healthcare Utilizing 6G</p> <p>Affiliation: Professor Research Unit of Health Sciences and Technology, Faculty of Medicine & Optoelectronics and Measurement Techniques Research Unit, Faculty of Information Technology and Electrical Engineering, University of Oulu, Finland</p> <p>Abstract:</p> <p>Patient diagnostics require a hospital environment, whereas in the future, 6 G-based health technology will enable a more sensitive and prolonged view of pathological conditions. The data generated by wireless and wearable sensors will provide value to healthcare services as comprehensive data can be more readily collected during currently impossible and very important situations like sleep, work, rest at home, and exercise. They can be used for diagnostics and monitoring therapies, enabling personalized healthcare.</p> <p>A current trend is establishing remote, decentralized data collection and analytics capacities from relevant sensors on the spot. This requires that classified data is transmitted from the sensors trust-worthily via 6G technology to data mining portals using eventually patient-controlled apps as mediators. With permission, citizen-originated data can be used for treatment and scientific purposes. Within these prospects, this talk discusses research and development of 6 G-supported healthcare applications that will provide the basis for next-generation healthcare concepts. In addition, it will explore how these advancements can assist clinicians in delivering more precise and timely diagnostics, ultimately leading to improved therapeutic outcomes.</p>

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12:00-12:30	ABLT-4	<p>Invited talk: Prof. Nilesh Mehta on</p> <p>Title: Energy-Efficient and Communication on-efficient Wireless Sensor Networks</p> <p>Affiliation: Neelesh B. Mehta is a Professor in the Department of Electrical Communication Engineering at the Indian Institute of Science (IISc), Bangalore.</p> <p>Abstract: Distributed detection is a fundamental problem in signal detection theory impacting diverse fields such as surveillance, healthcare, environmental monitoring, transportation, and logistics. Energy-efficiency is a crucial issue when distributed detection is implemented using a wireless sensor network (WSN), in which an edge server makes the decisions based on inputs from spatially separated, energy-constrained sensor nodes. We investigate ordered transmission schemes, which innovatively employ distributed multiple access-based ordered channel access to reduce the number of sensor transmissions and improve energy efficiency without any degradation in performance. We redesigned them for energy harvesting WSNs, in which some sensor nodes occasionally cannot transmit their measurements due to lack of energy, and dense WSNs, in which measurements of the sensor nodes are correlated. We show that a limited amount of feedback from the edge server about the most recent measurement it has obtained can markedly improve energy efficiency.</p>	Parallel Oral Sessions	
			ABLT-1	Track A
			<p>Session Chair:</p> <p>Dr. Deepak Mishra</p>	
			ABLT-2	Track B
	<p>Session Chair:</p> <p>Dr. Ankur Pandey</p>		<p>Session Chair:</p> <p>Dr. Kishor P. Sarawadekar</p>	
			ABLT-3	Track C
			<p>Session Chair:</p> <p>Dr. Shivam Verma</p>	

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12:30-13:00	ABLT-4	<p>Invited talk: Dr. Ashish Sahani on</p> <p>Title: Digital Health Innovation and Entrepreneurship — Leveraging the Power of xR, AI, and IoT in Physical and Mental Health</p> <p>Affiliation: Former Assistant Professor of Biomedical Engineering at IIT Ropar. Director of IIT Ropar Technology Business Incubator Foundation. He loves technology and loves to build tech products—director of Epilepto Systems.</p> <p>Abstract: This talk will broadly cover Dr. Sahani's research background in medical devices and his entrepreneurship journey in digital health. The talk will cover some of his work at Magnusus, leveraging state-of-the-art mixed reality and AI to gamify fitness. The talk will also cover his work in wearables and Smartwatch apps to enable the management of Epilepsy and bring measurability into practices of meditation and Yoga. The seminar will briefly touch upon some of the medical devices developed by him during his earlier</p>	Parallel Oral Sessions	
			ABLT-1	Track A
			Session Chair: Dr. Deepak Mishra	
			ABLT-2	Track B
			Session Chair: Dr. Kishor P. Sarawadekar	
			ABLT-3	Track C
			Session Chair: Dr. Shivam Verma	
13:00-14:00		Lunch Break		

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14:00-14:45	ABLT-4	<p>Qualcomm Tutorial:</p> <p>Title: Challenges and Improvements over Bluetooth LE Audio for Handsets and Earbuds</p> <p>Abstract: Bluetooth is used across the entire consumer electronics ecosystem, including audio, smartphones, IoT, and more. Audio streaming is by far the most popular use case for Bluetooth technology, and it has been shifted to Bluetooth LE from Classic Bluetooth. With the LE Audio Bluetooth standard, the way we experience audio is set to evolve. Audio streaming has challenges like Latency, Robustness, Throughput, and Power. These concerns become even more challenging given audio evolution for ultra-low latency gaming use cases and growing data rate requirements for high-quality or lossless audio. The most used topology for Bluetooth LE audio comprises a phone and two earbuds, where the Phone streams audio to the earbuds. Since Bluetooth and Wi-Fi work in the same 2.4 GHz ISM band, Wi-Fi throughput becomes another important parameter where the Phone gets streaming data from Wi-Fi and streams it to the earbuds over Bluetooth. In such cases, the bandwidth is divided between Wi-Fi and Bluetooth, and it becomes critical for the phone to meet bandwidth requirements for Bluetooth and Wi-Fi. This paper discusses these challenges, suggests improvements using LE audio and quantitative analysis for some of the suggested improvements</p>	Parallel Oral Sessions	
			ABLT-1	Track A
			Session Chair: Dr. Amit Kumar Singh	
			ABLT-2	Track B
			Session Chair: Dr. Smrity Dwivedi	
			ABLT-3	Track C
			Session Chair: Dr. Sudhir Kumar	

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15:00-15:30	<p>ABLT-4</p> <p>Session Chair: Dr. M. Thottappan</p> <p>Session Co-Chair: Dr. Ankur Pandey</p> <p>&</p> <p>ABLT-1</p> <p>Session Chair: Dr. Sanjeev Sharma</p> <p>Session Co-Chair: Dr. Priya Ranjan Muduli</p>	<p>Invited Talk</p> <p>Dr Abhishek Pathak</p> <p>Title: Gaps and Challenges in Neuro-technology</p> <p>Affiliation: Dr Abhishek Pathak MD, DM(Neurology) AIIMS, Professor Neurology, INSTITUTE OF MEDICAL SCIENCES BANARAS HINDU UNIVERSITY</p> <p>Abstract: Neuro-technology holds immense potential for advancing neurological diagnostics and therapeutics, yet significant gaps persist in understanding its ethical, technical, and clinical challenges. This presentation explores these barriers, emphasizing the need for interdisciplinary collaboration to overcome limitations. Insights aim to guide future innovations in neuro-technological applications.</p>	<p>Dr. Sowmik Ghosh</p> <p>Title: Cardiovascular advancement based on wireless technology</p> <p>Affiliation: Dr Sowmik Ghosh MD, AIIMS, Associate Professor, Department of Cardiology, INSTITUTE OF MEDICAL SCIENCES BANARAS HINDU UNIVERSITY</p> <p>Abstract: Wireless technology revolutionizes cardiovascular care, enabling real-time monitoring, diagnostics, and therapeutic interventions with enhanced precision and accessibility. This presentation delves into advancements such as wearable devices, remote patient monitoring systems, and wireless implantable sensors, highlighting their impact on personalized medicine and improved patient outcomes. Future directions and challenges in integrating wireless innovations into cardiology are also explored.</p>
15:45 onwards		<p>Boat ride & Ganga Aarti</p> <p>(Board the bus at the assembling point – ABLT, IIT (BHU))</p>	
19:30 onwards		<p>Gala Dinner at Chet Singh Kila, Chet Singh Ghat, Near Shivala, Varanasi</p>	

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Time	Location	Day 2- 16th December 2024 Event	
08:30 onward		Workshop Registration	
09:30-10:00	ABLT-4	Workshop Inauguration	
10:00-10:30	ABLT-4 Session Chair: Dr. Astha Sharma	Address by the Director General, Bharat 6G Alliance	
10:30-11:00		High Tea	
11:00-11:30	ABLT-4 Session Chair: Dr. Astha Sharma	Keynote by Shri Vinod Kumar on Title: Bharat 6G Vision: Pioneering the Future of Global Connectivity Affiliation: Deputy Director General (DDG), Department of Telecommunications (DoT), and Bharat 6G Head Abstract: Bharat's 6G initiative represents a bold leap into the future of wireless connectivity, aligning with the nation's aspirations for technological leadership and inclusivity in the global digital era. Shri Vinod Kumar will outline the comprehensive roadmap for Bharat's 6G development, emphasizing the synergies between policy frameworks, innovation ecosystems, and industry-academia partnerships. The talk will highlight key focus areas, including indigenous research in spectrum efficiency, sustainability, and advanced use cases like quantum communication, joint sensing, and AI-driven networks	Parallel Oral Sessions
			ABLT-1 Session Chair: Dr. M. Thottappa n
			Track A
			ABLT-2 Session Chair: Dr. Amit Kumar Singh
			Track B
			ABLT-3 Session Chair: Dr. N.S. Rajput
			Track C

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11:30-12:15	<div>ABLT-4</div> <div>Session Chair: Dr. Muralikrishnan Srinivasan</div> <div>Session Co-Chair: Dr. Daljeet Singh</div>	Keynote by Prof. Maurizio Magarini on Title: The Future of Cellular Wireless Communications: 6G and Ubiquitous Connectivity Affiliation: Associate Professor, Department of Electronics, Information & Bioengineering Politecnico di Milano Abstract: The development of the sixth generation (6G) cellular mobile radio systems technology is of fundamental importance for future applications, as it promises unprecedented advances such as mmWave and THz transmission, ultra-low latency, and integration with AI-based networks. Understanding the challenges of achieving ubiquitous connectivity for 6G systems is a key aspect. Starting from the 6G requirements and KPIs, the talk aims to illustrate the following new aspects: a) Applications to vehicular systems b) Intelligent radio environments c) Digital Twin of wireless networks d) Convergence between terrestrial and satellite networks. The main aim is to lay the inspiration for research activities on these emerging topics.		
12:15-13:00	ABLT-4	6G in India: Research, Roadmap, and Opportunities Panel discussion with invited government-industry-academia dignitaries Moderator: Dr. Ankur Pandey, Academia: Prof. Maurizio Magarini (<i>Politecnico di Milano</i>) , Prof. Preetam Kumar (<i>IIT Patna</i>), Government: Shri. Rajesh Pathak (<i>Director General, Bharat 6G Alliance</i>), Dr. Astha Sharma (Assistant Director (Technology), Bharat 6G Alliance) Industry: Qualcomm, Nokia, S-Qube	Parallel Oral Sessions	
			ABLT-1 Session Chair: Dr. Priya Ranjan Muduli	Track A
			ABLT-2 Session Chair: Dr. Smrity Dwivedi	Track B
			ABLT-3 Session Chair: Dr. Shivam Verma	Track C
13:00-14:00		Lunch Break		

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14:00- 14:45	ABLT-4 Session Chair: Dr. Ankit Arora Session Co-Chair: Dr. Priya Ranjan Muduli	Recent advancements in Quantum Technology at IIT (BHU), Varanasi Title: Integrated Quantum Radar Sensing with Secure Communication Affiliation: Dr Atul Kumar is an Assistant Professor in the Department of Electronics Engineering, IIT (BHU), Varanasi. Abstract: The Integrated Quantum Radar Sensing and Communication (IQ-RSC) system represents a groundbreaking approach to secure, precise, resilient, and energy-efficient technologies. Although in its developmental phase, IQ-RSC is advancing rapidly, with neighboring nations making significant strides in quantum radar with secure communication. This emerging technology is strategically crucial for national security, motivating efforts to develop a robust and secure IQ-RSC system through quantum advancements. The goal is establishing testing, standardization, and validation facilities, developing quantum radar for precise detection and tracking, and creating integrated sensing and communication protocols. Additionally, the initiative aims to standardize quantum subsystems to enable universal integration, driving the future of quantum technologies.	Parallel Oral Sessions	
			ABLT-1 Session Chair: Dr. Amit Kumar Singh	Track A
			ABLT-2 Session Chair: Dr. Somak Bhattacharyya	Track B
			ABLT-3 Session Chair: Dr. Hari Shankar	Track C

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14:45- 15:30	<p>ABLT-4</p> <p>Session Chair: Dr. Somak Bhattacharyya</p> <p>Session Co-Chair: Dr. Ankur Pandey</p>	<p>Keynote by Prof. Jasmin Grosinger on</p> <p>Title: “RF Design for Ultra Low Power Wireless Communication Systems 6G”</p> <p>Affiliation: Jasmin Grosinger is an Associate Professor at the Graz University of Technology in Austria and a Visiting Associate Professor at the Tohoku University in Sendai, Japan.</p> <p>Abstract: This presentation shows radio frequency (RF) design solutions for wireless sensor nodes to address sustainability issues in the Internet of Things (IoT) arising from the massive deployment of wireless IoT nodes on environmental and economic levels. Engineers can apply these RF design solutions to improve the ultra-low-power operation of IoT nodes, avoid batteries’ eco-toxicity, and decrease maintenance costs due to battery replacement. The solutions offer high integration levels based on system-on-chip and system-in-package concepts in low-cost complementary metal-oxide-semiconductor technologies to limit these nodes’ costs and footprints. In particular, the presentation covers solutions for ultra -low-power wireless communication systems based on high-frequency (HF) and ultra-high frequency (UHF) radio frequency identification (RFID) technologies. The talk offers RF design solutions for HF and UHF RFID systems, revealing how to develop passive miniaturized IoT nodes that operate robustly in harsh application environments.</p>
15:30-15:45		Tea Break

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15:45-16:15	ABLT-4 Session Chair: Dr. M. Thottappan Session Co-Chair: Dr. Somak Bhattacharyya	Invited Talk: Dr. Anirban Sarkar on Title: “Specialized Beam Scanning Antenna Arrays and IoT-based Smart Sensing Systems for Upcoming B5G/ 6G Applications” Affiliation: <i>Assistant Professor, School of Computing and Electrical Engineering, Indian Institute of Technology Mandi</i> Abstract: The Indian information and communication technology (ICT) landscape is undergoing a period of major transformation, where new services will usher in the industry with the digital revolution and drive the shift toward “Smart Societies” to meet global standards, and my proposed antenna designs could be very much helpful for the latest IoT, 5G, 6G applications considering improved quality-life, productivity, and resource management. The talk will examine both these areas by showing the quality of the research conducted. Different popular technologies, such as substrate-integrated waveguides, microstrips, spoof surface plasmonics, etc., have been efficiently utilized to design advanced beam scanning antenna arrays to fulfill the demand of different frequency band applications. The increased scope of digitally customized and programmable Electromagnetic (EM) Biosensors produces a new disease identification and biomarker analysis trove. Some ongoing research works on smart EM biosensors within joint communications, and sensing areas will also be displayed as one of my research wings. Overall, the prime objective of the talk will be to create innovative applications and domain capabilities across different verticals of Next-Gen communications needed for society's development, such as 5G, 6G, the latest radar technologies, smart architecture, advanced defense and security systems, next-gen communications, etc.	Parallel Oral Sessions	
			ABLT-1 Session Chair: Dr. Ankur Pandey	Track A
			ABLT-2 Session Chair: Dr. Ashutosh Kumar Singh	Track B
			ABLT-3 Session Chair: Dr. Amit Mishra	Track C

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DIAMOND



GOLD



SILVER



BRONZE



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16:15-16:45	ABLT-4	<p>Invited talk: Dr. Shubhajit Roy Chowdhury on Title: “Cerebral oxygenation studies through Near Infrared Spectroscopy aided by Anodal Transcranial Direct Current Stimulation: Problems and prospects” Affiliation: Associate Professor, School of Computing and Electrical Engineering, IIT Mandi, India, Abstract: Near-infrared spectroscopy (NIRS) is gaining prominence for monitoring cerebral oxygenation by tracking changes in oxygenated (HbO₂) and deoxygenated hemoglobin (Hb) concentrations. When paired with anodal transcranial direct current stimulation (tDCS), this method provides critical insights into cerebrovascular reactivity (CVR), a biomarker for brain vascular reserve, potentially aiding stroke diagnosis and monitoring. NIRS-tDCS studies have demonstrated its feasibility by capturing temporal changes in Hb and HbO₂ concentrations during cortical stimulation, revealing vasodilation effects and initial HbO₂ dips hypothesized to result from local hemodynamic changes. Advanced models like Friston’s first-order model explain these variations as effects of synaptic transmembrane currents on cerebral blood flow (CBF). To deepen understanding, joint NIRS-EEG imaging can elucidate the complex neurovascular coupling pathways, highlighting NIRS-tDCS systems' potential for studying cerebral oxygenation and their challenges.</p>	Parallel Oral Sessions	
	Session Chair: Dr. Shivam Verma		ABLT-1	Track A
	Session Co-Chair: Dr. Sanjeev Sharma		ABLT-2	Track B
			ABLT-3	IEEE Communication Society, UP Section, AGM Meeting, Chapter CH10860
16:45-17:30		Valedictory Ceremony		

Parallel Oral Sessions:

Track A: Communication Protocol, Technology, Security, and Privacy in BAN

Track B: Sensing, Signal Processing, Energy-efficient Design, and Power Management in BAN

Track C: Applications of BAN – AI/ML, Wearable electronic devices, RF, and Quantum and 6G technologies

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