

Keynote 1: Massive MIMO and RIS: Key Technologies for B5G Cellular Systems

Abstract: Massive Multiple-Input Multiple-Output (mMIMO) and Reconfigurable Intelligent Surfaces (RIS) are two crucial physical-layer technologies poised to meet the escalating network demands of future cellular systems. The large antenna array in mMIMO enables the base station to precisely direct radiated energy toward the intended user via beamforming and concurrently support multiple users through spatial multiplexing. These capabilities fundamentally enhance the system's spectral efficiency. The RIS can intelligently reconfigure the wireless environment by reflecting radio signals in the direction of the desired user. This can improve the signal strength and connectivity for obstructed or cell-edge users. This talk will first discuss the need for cellular systems Beyond 5G (B5G). We will then examine how mMIMO and RIS can cater to the growing network demands, concluding with an overview of the challenges and current directions of research on these transformative technologies

Biography: Dr. Jobin Francis is an Assistant Professor and Head of the Department at the Department of Electrical Engineering at IIT Palakkad. Dr. Francis holds a PhD in Electrical Communication Engineering from Indian Institute of Science, Bangalore. His research spans several advanced areas in wireless communication like system-level modelling and optimization of wireless networks, 5G cellular networks and emerging use-cases, cooperative communications & radio resource management so on and so forth. Dr. Francis has also published research papers in various journals and conferences



Dr. Jobin Francis
Assistant Professor
IIT palakkad

Date: 03-12-2025
Time: 11:15 a.m- 12:30pm
Venue: Aryabhata Hall

Keynote 2: Shaping the Future of Autonomous Vehicles: Signal Processing and Machine Learning for Perception

Abstract: Autonomous vehicles rely on understanding both the surrounding environment and the internal state of the vehicle to achieve high levels of safety and autonomy. This perception is powered by intelligent sensor fusion, combining data from cameras, radars, and LiDARs to create a comprehensive view of the world. In this talk, I will highlight key challenges in automotive perception, from designing architectures that process multiple sensor modalities to developing algorithms that extract meaningful insights from complex data. A central focus will be occupancy mapping, which identifies obstacles and navigable space, supporting safer and more efficient navigation. Finally, I will discuss how advances in machine learning and sensor fusion are shaping the future of intelligent vehicles, highlighting emerging opportunities for research and deployment that could transform autonomous mobility.



Dr. Geethu Joseph, Delft
University of Technology,
Netherlands

Date:03-12-2025

Time:3pm-4pm

Venue:Online

Biography: Dr. Geethu Joseph is an Assistant Professor at the Department of Microelectronics, Delft University of Technology, Netherlands. She holds a Ph.D. in Electrical Communication Engineering from IISc, Bangalore and a Postdoctoral degree from Syracuse University, New York, USA. Her research is broadly in sparse signal processing, networked sensing and control, and statistical inference, with applications such as Sparse Sensing & Compressed Sensing, Control Theory, Autonomous Systems / Radar and Machine Learning & Statistical Inference. Some of her recent and notable research include Anomaly Detection via Learning-Based Sequential Controlled Sensing, Bayesian Learning-Based Kalman Smoothing for Linear Dynamical Systems with Unknown Sparse Inputs and Situation-Aware Adaptive Transmit Beamforming for Automotive Radars. Dr. Joseph is also an Associate Editor for the *IEEE Sensors Journal*.

Keynote 3: Private Information Retrieval: How to Ask a Question without Revealing It

Abstract: In an era where data drives almost every digital interaction, the question of privacy becomes increasingly important: How can we retrieve information from a database without revealing what we are looking for? Private Information Retrieval (PIR) provides elegant answers to this challenge. This keynote will introduce PIR in an accessible yet rigorous manner, beginning with intuitive examples and basic principles from information theory. We explore why single-server PIR cannot guarantee perfect privacy without large download sizes and how the introduction of multiple servers enables dramatically more efficient solutions. The remarkable Sun–Jafar scheme, which characterizes the exact capacity of multi-server PIR, will be presented in a conceptual and intuitive way.



Dr. Nujoom Sageer Karat

Assistant Professor
NIT Calicut

Date: 04.12.2025

Time: 9.30am-11am

Venue: Aryabhatta Hall

The talk further highlights the emerging area of cache-aided PIR, where users possess local side information that can dramatically reduce communication costs. These ideas connect PIR to modern applications in distributed machine learning, content delivery networks, and privacy-preserving communication frameworks.

Biography: Dr. Nujoom Sageer Karat is an Assistant Professor in the Department of Electronics and Communication Engineering at the NIT Calicut, India. He awarded his Ph.D. from the Department of Electrical Communication Engineering at the Indian Institute of Science (IISc) Bangalore. Prior to his doctoral research (IIT Bombay), he gained industry experience as an Engineer at Renesas Mobile India Private Limited and Broadcom India. His research interests lie broadly in information theory, coding theory, and modern communication systems, with a specific focus on coded caching and content delivery, index coding, and index coding for NOMA, communication efficiency in federated learning, private information retrieval, and coded distributed computation.

Keynote 4: Emerging Directions in Device Engineering and Circuit Design

Abstract: Semiconductor evolution from planar CMOS to GAA, heterogeneous integration, and “More-than-Moore” technologies reflects the limits of classical scaling. The International Roadmap for Devices and Systems (IRDS) guides this transition, highlighting needs driven by AI, high-performance computing, and ultra-low-power electronics. Emerging devices—wide-bandgap and 2D materials, ferroelectric and spintronic elements, and monolithic 3D integration—enable new efficiency and density targets.

Parallel circuit trends include ultra-low-power design, variation-tolerant architectures, neuromorphic circuits, and AI-assisted EDA. Key challenges span variability, thermal limits, interconnect scaling, heterogeneous manufacturability, and system-level verification. The overall direction points to materials innovation and device-circuit-system co-design as essential for next-generation electronic platforms

Biography: Dr. Roy P. Paily is a Professor in the Department of Electronics & Electrical Engineering at IIT Guwahati. Dr. Paily holds a Ph.D from IIT Madras and his research areas include devices, MEMS, and VLSI circuits / system design. He has also headed many projects like “Smart Wearable Advanced Nanosensing Technologies in Healthcare” (SWASTHA), under the Ministry of Electronics & Information Technology, Government of India. Dr Paily has authored the book *Design and Analysis of Spiral Inductors* and published numerous papers to his credit.



Dr. Roy P. Paily

Professor, IIT Guwahati

Date:05.12.2025

Time:9.30am-11am

Venue: Aryabhattacha Hall