

**Event: Distinguished Lecturer (DL) Talk in Association with IEEE Gujarat Section | IEEE GRSS | IEEE MU Student Branch | IEEE SPS Gujarat Chapter**

**Title: Code Smarter, Not Harder: Signal Processing for Integrated Sensing and Communications**

**Date: 28<sup>th</sup> July, 10.00 A.M, to 12.00 PM, Venue: Seminar Hall**

**DL: Dr Kumar Vijay Mishra, Senior Fellow at United States DEVCOM Army Research Laboratory, USA.**

**Participants: 50 IEEE+150 Non IEEE**

**Organized By: Department of Information and Communication Technology (ICT)**

**About the Talk:** In his insightful lecture, Dr. Kumar Vijay Mishra presented a compelling vision of how Integrated Sensing and Communications (ISAC) is revolutionizing modern wireless systems. He explained that traditional approaches that treat sensing (like radar) and communication (like 5G) as separate functions are becoming obsolete, giving way to more efficient, unified systems. Through vivid examples and technical depth, Dr. Mishra demonstrated how shared waveform design allows a single signal to simultaneously detect objects and transmit data, dramatically improving spectral efficiency while reducing hardware complexity and energy consumption.

A significant portion of his talk focused on the critical role of AI and machine learning in optimizing ISAC systems. He illustrated how adaptive algorithms can dynamically adjust parameters in real-time to balance sensing accuracy with communication performance, even in challenging environments with interference or mobility. Dr. Mishra particularly emphasized emerging applications in autonomous vehicles, where ISAC enables cars to "see" their surroundings while maintaining vehicle-to-everything (V2X) communication, and in 6G networks, where environmental awareness will be built into the communication infrastructure itself.

The speaker also addressed key challenges facing ISAC adoption, including spectrum regulation, security vulnerabilities in dual-function systems, and the need for new hardware architectures. Looking ahead, he highlighted promising research directions like terahertz-band ISAC for ultra-high-resolution sensing and communications, and the potential integration of quantum technologies to further enhance performance. Throughout his presentation, Dr. Mishra reinforced his central thesis: that the most impactful future technologies won't just communicate or sense, but will intelligently fuse these capabilities to create systems that are greater than the sum of their parts. His concluding remark resonated strongly: *"We're not just building better radios - we're creating systems that perceive and understand their environment while communicating, opening possibilities we're only beginning to imagine."*

Poster of the session:

**NAAC A+ | NBA TIER-1**



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SIGNAL PROCESSING  
FOR INTEGRATED SENSING  
AND COMMUNICATIONS**

**28 JULY  
2025**

**TIME  
10:00 AM TO 12:00 PM**

Venue : Seminal Hall

**DR KUMAR VIJAY MISHRA**  
Senior Fellow at United States  
DEVCOM Army Research Laboratory



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Section



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Dr. Vijay Sharma addressing students.