

Panel Discussion

Domain-Aware AI/ML for Real-World Signal Processing: Healthcare and Communication Perspectives

Conference: SIGNASS — Signal Analysis for Smart Systems

Sub-Theme 1: Today's Commercial Applications of AI/ML in Power Sector & Communication and Healthcare

Focus: Perspectives from Power Sector & Communication, Healthcare, and Industry

Questions

To Dr. Pallab Ganguly (Power & Communication):

- What are some current commercial applications of AI/ML in the power sector and communication systems?
 - Where have you seen tangible operational benefits—such as fault detection, load forecasting, or predictive maintenance?
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To Dr. Arnab Sengupta (Healthcare):

- From a clinical perspective, where is AI already making an impact—diagnostics, monitoring, workflow optimization?
 - How do clinicians perceive these systems in day-to-day practice?
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To Mr. Ambarish Ganguly (Industry):

- From an enterprise viewpoint, what types of signal-driven AI solutions are most commonly deployed today?
 - Which sectors are adopting AI fastest, and why?
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Cross-panel prompt:

- Would you say today's AI deployments are more assistive or truly autonomous in your respective domains?

Sub-Theme 2: The “Signal-to-System” Reality Check

Focus: Data acquisition, noise, and the physical constraints of real-world environments

Questions

To Dr. Arnab Sengupta:

- In clinical settings, how reliable are physiological signals such as ECG, EEG, or imaging data?
 - What are the most common sources of distortion or inconsistency?
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To Dr. Pallab Ganguly:

- In power grids and communication networks, what practical issues affect signal quality and continuity?
 - How do environmental factors or sensor placement influence data reliability?
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To Mr. Ambarish Ganguly:

- In real projects, how much effort typically goes into data cleaning and preprocessing compared to model development?
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Cross-panel prompt:

- Would you agree that data preparation often consumes more time than building AI models?

Sub-Theme 3: Recent Technological Advancements in AI/ML

Focus: Robotics, Generative AI, and their use in Power Sector & Communication and Healthcare for Smart Solutions

Questions

To Mr. Ambarish Ganguly:

- How is generative AI currently being used in industry—for example, in signal synthesis, anomaly detection, or automation pipelines?
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To Dr. Pallab Ganguly:

- Do you see practical applications of robotics or generative AI in power systems or communication infrastructure, such as automated inspection or predictive simulation?
 - How important is it that these models respect physical system constraints?
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To Dr. Arnab Sengupta:

- In healthcare, could generative AI or robotics meaningfully support diagnosis, monitoring, or rehabilitation?
 - What concerns do clinicians have regarding clinical validity and transparency?
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Cross-panel prompt:

- In your view, should generative AI primarily remain an assistive tool, or can it evolve into a core decision-making component?

Sub-Theme 4: Reliability, Security, and the “Trust” Protocol

Focus: Data security, ethics, and the human-in-the-loop

Questions

To Dr. Pallab Ganguly:

- What are the major AI-related vulnerabilities in power and communication systems—such as cyber-attacks, signal spoofing, or model manipulation?
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To Dr. Arnab Sengupta:

- What ethical and privacy challenges arise when patient data is analysed by AI systems?
 - How essential is clinician involvement in final decision-making?
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To Mr. Ambarish Ganguly:

- How does industry balance innovation with data governance, regulatory compliance, and security?
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Cross-panel prompt:

- How critical is the “human-in-the-loop” for ensuring reliability in your respective domains?

Sub-Theme 5: The Future of Smart Systems for Real-World Signal Processing

Focus: Perspectives from Power Sector & Communication, Healthcare, Industry, and Expectations from Academia

Questions

To all panellists:

- What do academic researchers most underestimate about real-world deployment?
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Rapid round (30 seconds each):

- Looking ahead 5–10 years, where do you see the greatest impact of domain-aware AI in your field?
- What expectations do you have from academia to better support industry and society?