ISART 2026 · MODERATED PANEL

Evaluation Frameworks for ML vs. Classical Radio Solutions

How should engineers decide, validate, and deploy ML alongside classical methods in real-time radios, digital baseband, and sensing systems?

NG **Nada Golmie**
NIST

AD **Aleksandar Damnjanovic**
Qualcomm

KC **Kaushik Chowdhury**
UT Austin

DC **Danijela Cabric**
UCLA

Moderator

KB **Kumar Balachandran**
Ericsson

ISART™ 2026: Sketching a Spectrum Management Blueprint

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When do we use ML — and when classical still wins

Start from the property of the problem, not the novelty of the model.

SUGGESTED QUESTIONS

Q 1 **Which case justifies ML: trusted data with no good analytical model, an intractable optimization, or a genuinely complex new task?** ↳ *Which of these is present before training begins?*

Q 2 **Where should classical approaches remain the default—matched models, tight PHY loops, massive-MIMO IQ processing, or a strong closed-form estimator?** ↳ *Name the boundary where that answer changes.*

Q 3 **Is the right architecture ML, classical, or hybrid—for example, a learned block inside a physics-based pipeline?**

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Audience Poll

Should we try to use ML? Is there enough uncertainty in most modeling to turn into additional performance?

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Evaluation, certification, and fair comparison

A black-box result is not deployable evidence until it survives the lab, field, and full system.

SUGGESTED QUESTIONS

Q 1 Without analytical bounds, how should a black-box ML radio be tested in the lab and monitored after deployment? ↳ What triggers recovery or fallback in the field?

Q 2 What must be standardized: public datasets and metadata, a testing harness, system-level metrics—or all three?

Q 3 How do we prevent benchmark overfitting while preserving reproducible comparisons and vendor differentiation? ↳ Where should standards stop and implementation begin?

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Edge latency, model placement, and hardware

Training and inference live on different clocks—and on different parts of the network.

SUGGESTED QUESTIONS

Q 1 Which functions belong on device, base station, or higher in the RAN—and what latency budget decides placement?

Q 2 When data movement, buffering, or inference arrives one millisecond late, is compression enough—or should the system fall back to classical?

↳ What is the recovery path when the model is stale?

Q 3 Do purpose-built accelerators make the case, or do model size, energy, and retraining cadence still defeat deployment economics?

Q 4 Are sensing and ISAC better candidates because tens-to-hundreds of milliseconds offer more slack than tight communications loops?

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Digital twins: Real-time situational awareness

A useful twin is bounded by the decision it supports and the feedback that keeps it current.

SUGGESTED QUESTIONS

Q 1 How do we close the sim-to-real gap: field measurements, continuous feedback, online calibration, or explicit uncertainty bounds? ↳ How often must the twin be refreshed?

Q 2 When the physical world changes faster than the twin, should the system adapt, forget, or fall back to classical?

Audience Poll

Are digital twins of a system necessary for advancing the state of the art?

TOPIC 5

APPLICATIONS · RAPID ROUND

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Where would you deploy ML today?

Two-minute verdict: ML, classical, or hybrid—plus the deciding metric and the condition that breaks the choice.

RF fingerprinting — DC

Owner: Cabric · UCLA

Neural receiver / channel estimation — KC

Owner: Chowdhury · UT Austin

ISAC and location — ND

Owner: Damnjanovic · Qualcomm

DPD and beam management — AD

Owner: Damnjanovic + Cabric

If time is tight, take only the first two. Do not sacrifice the protected 15-minute audience window.

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Audience questions

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What do we carry out of the room?