SRI International
Lightning Talk

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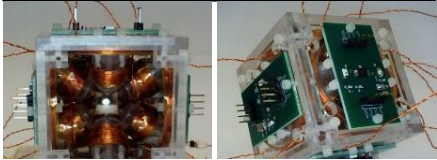
February 27th, 2025

Who We Are

- SRI is a non-profit research institute working on projects across the scientific disciplines.
    - 19 locations in the US
    - Four primary divisions: **Information and Computing Sciences (ICS), Advanced Technology and Systems (ATSD)**, Biosciences (BSD), and Integrated Systems and Solutions (InSys)

- SRI has a long history of research, with a record of important contributions to many fields
    - Siri
    - Telerobotic surgery
    - ARPANET
    - The computer mouse

- We specialize in transitioning technologies from low to medium/high TRL with help from our industry collaborators.

SRI

Advanced Technology and Systems Division

ATSD

Applied Sciences

Applied Technology

Space & Survivability

Surveillance

QED-C
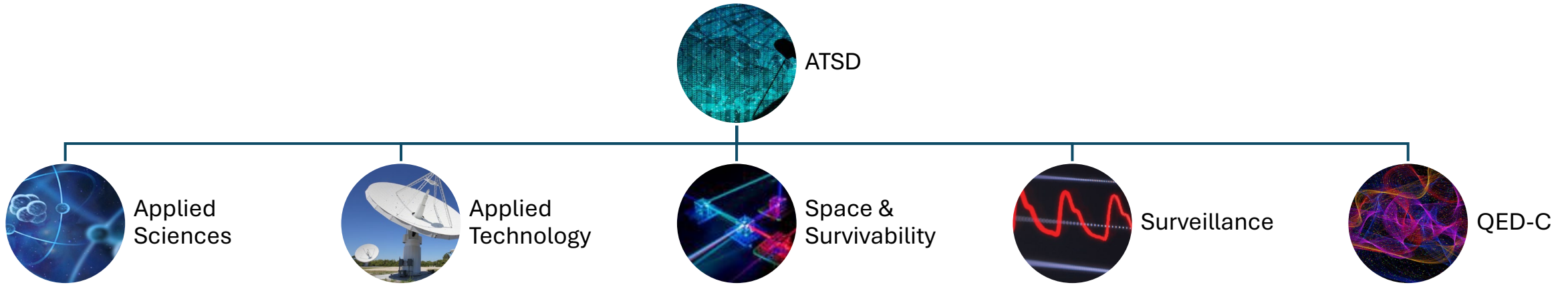
Applied Physics
- **LPI/LPD signals and systems**
- **Photonics**
- **AI/ML** and Applied Math

Quantum and Semiconductors
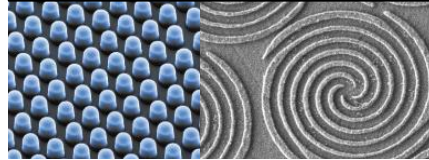- Quantum Sensing
- Hardware Security
- Semiconductor Device Physics

Ground Segment Operations
- Constellation State of Health
- Calibration and Maintenance
- Anomaly Resolution

Robotics
- Humanoid Robotic Systems
- Surgical, UXO, hazardous env.
- Advanced End Effectors

Applied Electromagnetics
- Metamaterials and surfaces
- Micro/nano fabrication
- High Energy Density Materials

Center for Geospace Studies
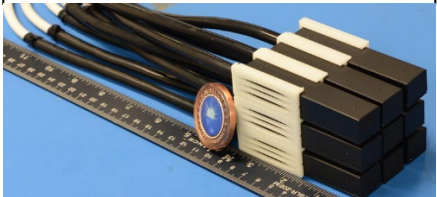- 30 x 30 meter Ionospheric Incoherent Scatter Radar
- Space weather and space surv.

RF and EOIR ISR Systems Eng.
- Phenomenology and studies
- **Electronic Warfare**
- Design-Implement-Operate

Ocean Modeling & Data Fusion
- Environmental characterization
- Advanced analytics
- Optimal sensor management

QED·C
The Quantum Consortium
Managed by SRI International
Enabling the Quantum Industrial Ecosystem

SRI is a big place.

You're seeing a slice of the engineering & physical sciences division.

Example Program: Sim-to-Real Adversarial Learning for Electronic Dominance (SALEDin)
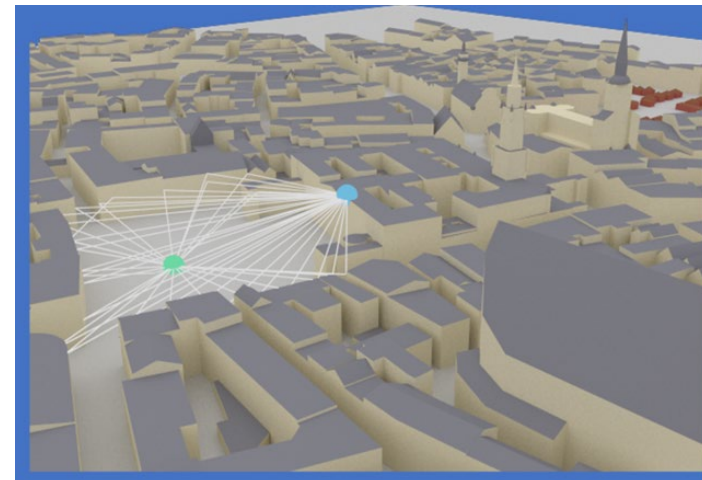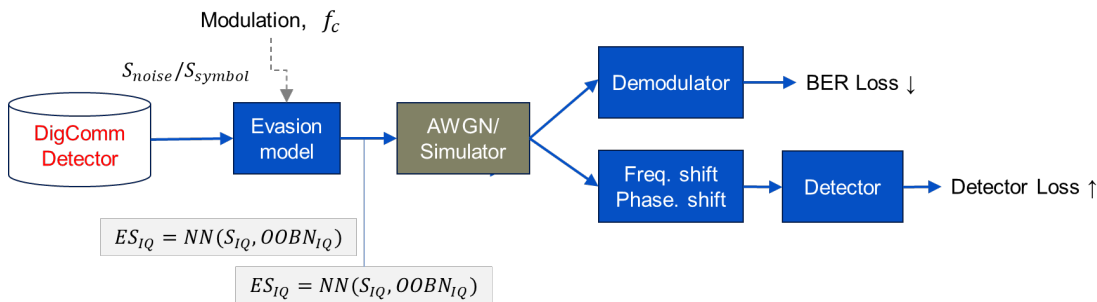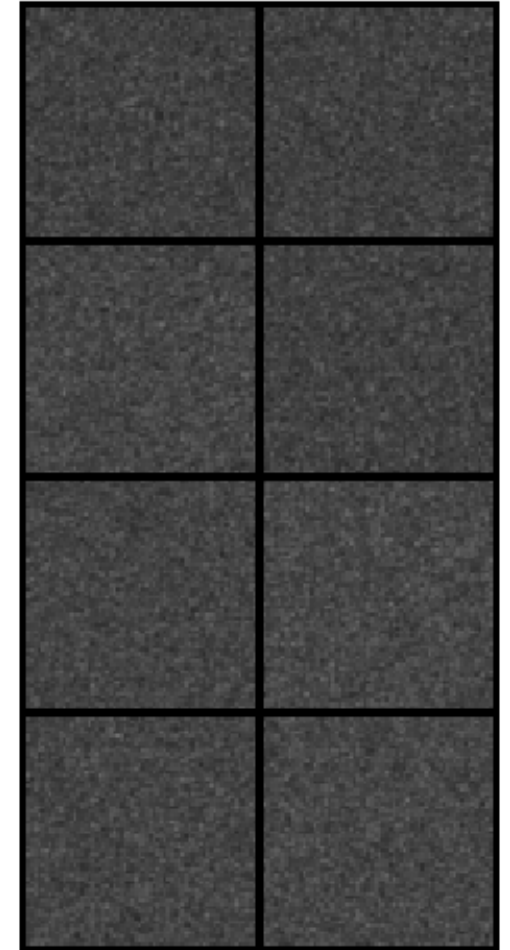
Connor Awe, DARPA I2O

- Seedling effort with DARPA I2O (Wil Corvey and Naim Merheb PMs).

- Focus on using adversarial ML (two AI fighting each other) to generate and detect LPI/LPD waveforms.

- Uses SRI-developed RF ray tracing software to create a unique digital battleground.
  - This is the only pyTorch compatible RF ray tracer we know of and is available open source.
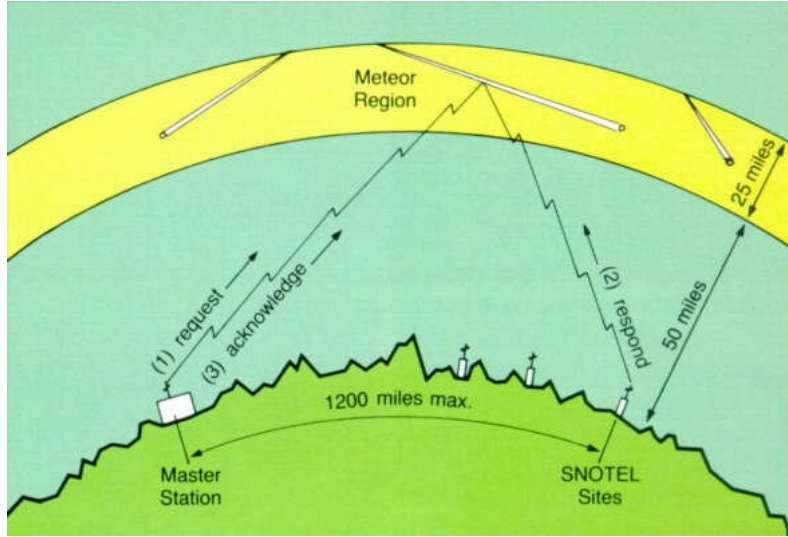
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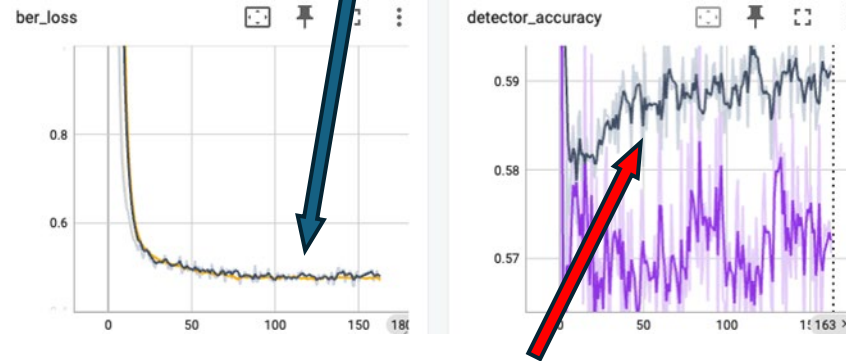
Adversarial receiver has a hard time finding the signals

Signals well hidden in the spectrograms

Example Scene: Munich old town.

$ES_{IQ} = NN(S_{IQ}, OOBN_{IQ})$

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Modulation, f_c

S_{noise}/S_{symbol}

DigComm Detector → Evasion model → AWGN/ Simulator → Demodulator → BER Loss ↓

Freq. shift Phase. shift → Detector → Detector Loss ↑

Meteor burst comms link between Ann Arbor, MI and Harrisonburg, VA
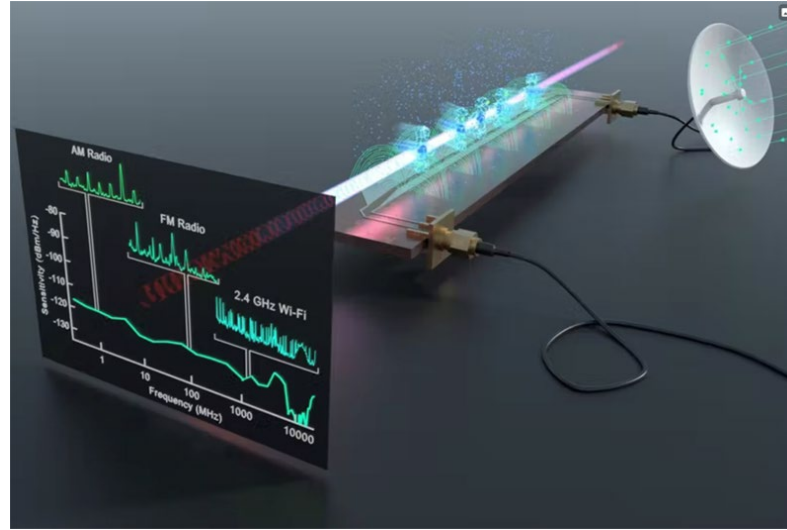
Ultra-wideband Rydberg RF sensors

RF and acoustic anechoic chambers at multiple sites

Other Capabilities and Facilities

...and many more!

What We Need Help With

- Information transfer in the MAC and NET layers
  - Net layer probably not too hard with the relatively small number of links in phase 3, but MAC layer expertise is especially welcome.
- Integration of spatial beamforming learning - do we do this before other steps, can it be done in parallel?
  - SRI has simulation tools and facilities to support this, but would benefit from additional expertise.
- Objective enumeration – would be useful to have some folks thinking purely about the kinds of objectives we might encounter to ensure they're represented in our training and benchmarking.
- Red teaming approach – set up a firewalled team to try and break the system, either with novel channel conditions or tricky objectives.

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