



# Cognitive electronic warfare

The rise of modern machine learning techniques coupled with advances in computational hardware is set to revolutionise electronic warfare.

The traditional approach for developing RF countermeasures is becoming increasingly antiquated as modern sensors deal in multiple dimensions and across widening bandwidths.

Countering these sensors has reached a level of complexity where machine learning is an obvious and necessary enhancement to be applied to RF countermeasures development. Electronic warfare is a new and significant realm of research for applying cognitive systems.

DST researchers are currently investigating how to utilise the power and speed of machine-based cognition to better defend Australia and its interests.

## Partnering opportunities

DST is seeking to escalate current efforts in cognitive electronic warfare research in the following key areas:

- **RF countermeasures optimisation:** Deriving methods to judiciously search high-dimensional feature spaces for non-intuitive solutions. Using heuristic optimisation strategies such as evolutionary strategies and particle swarm optimisation techniques.
- **System identification and behavioural modelling:** Characterising the operation of radar, guidance and control systems. Predicting sequences and states. Using techniques such as design of experiments, recurrent neural networks and deep learning.
- **Feature extraction:** Extracting measures of effectiveness from observations, radar data and images through dimensionality reduction and computer vision techniques.
- **Dynamic data retention, evaluation and update:** Developing approaches for judiciously storing parameters in a database and updating this knowledge as the system undergoes new experiences .
- **Cognitive electronic warfare architectures:** Wiring of the cognitive electronic warfare system, including development of agent functions, reasoning, self-organising structures and interfacing disparate machine learning techniques.

### For more information contact:

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A cognitive system can **learn, infer** and **react** to information about its environment.

