



AI EW Decision is a stand-alone artificial-intelligence decision-support application built on the OAK DEFENSE EW SUITE's physics models. It classifies emitters, assesses threat and priority, recommends an electronic- warfare course of action, answers plain-language questions, and runs a self- learning cognitive-EW loop — and it is packaged with a **classification-handling shell** so it can be fielded in a controlled environment with the operator's own data. Every result is computed from transparent, validated models and grounded in open published literature — **honest by design**: no black box, no operational technique library, no exploit content.

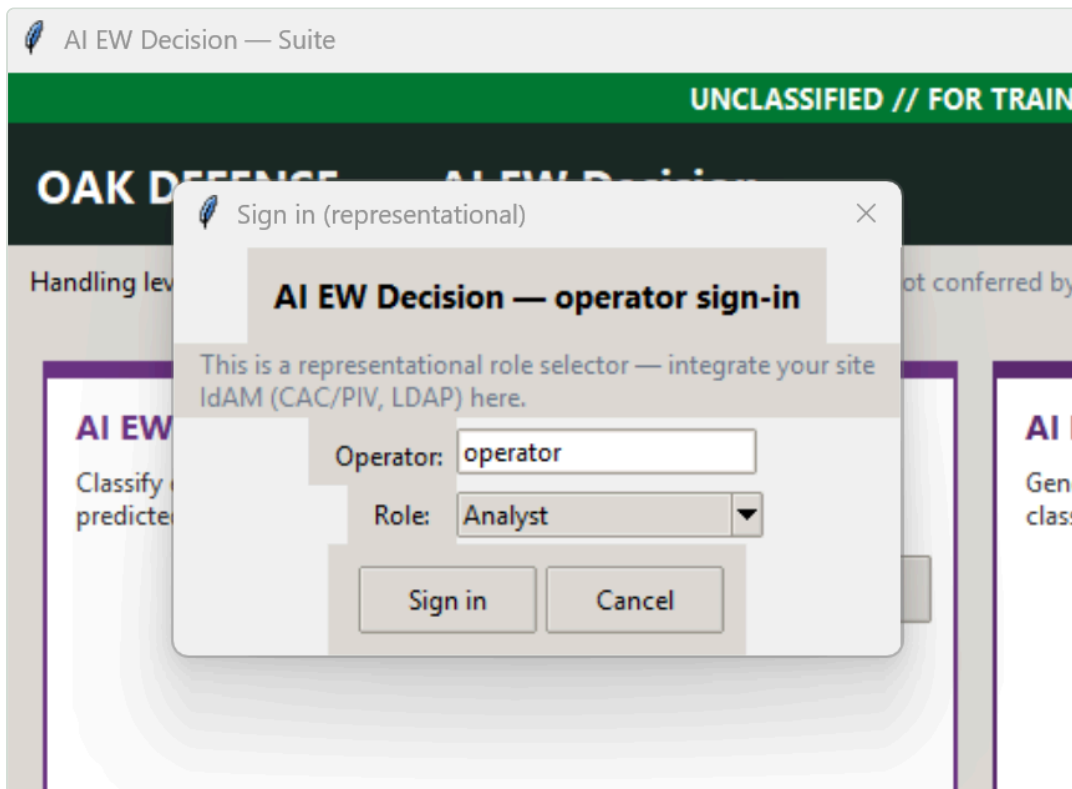
THE FOUR AI APPLICATIONS	
Application	What it does
AI EW Advisor	Reads a scenario and uses an ML model to classify each emitter, score threat & priority, and recommend an EW technique with predicted effectiveness — with feature-level explainability and a published-source grounding + open-source named-system example per class.
AI Model Trainer	Generates labelled datasets from the emitter physics and trains / evaluates classifiers (softmax / k-NN / Gaussian naive-Bayes): accuracy, confusion matrix, model comparison, ROC. A real-data mode benchmarks on public datasets (RadioML, RadChar).
AI EW Assistant	A natural-language front-end: ask "classify the emitters", "highest-priority threat?", "what Chinese radars do you know?", "what J/S at 30 km?" — answered from the suite's models. Cites its sources. Fully offline rule-based engine (no cloud).
Cognitive-EW Agent	A closed-loop agent that senses every emitter, learns which technique beats which emitter class, acts and adapts — out-performing a fixed doctrine once it has learned the threat picture.

WHY IT IS DIFFERENT — HONEST BY DESIGN

- **Grounded in open literature.** The 13-class emitter taxonomy, the RF/PW/PRI/PA feature set and the modulation/scan vocabularies are cited to open published sources — RadChar (IEEE ICASSP 2023), RadioML 2018, IEEE Std 521 / Skolnik Radar Handbook, MIT OpenCourseWare (Lincoln Lab), Richards / POMR, FOI. The assistant shows its references on request.
- **Explainable, not a black box.** Confidence scores, per-feature contribution, and the published grounding for every classification are visible in-app — auditable by design.
- **Real-data capable.** Benchmark the same classifiers against public RadioML / RadChar datasets (AMC features: instantaneous statistics + higher- order cumulants), all in transparent pure-numpy.
- **Named-system familiarisation.** An open-source reference library of ~28 radar / air-defence systems across **8 markets** (Iran, Russia, China, USA, France, Sweden, Netherlands, Israel) — role, band and publicly-reported approximate range, mapped to the taxonomy. Open-source only.
- **Unclassified & export-friendly.** Representational throughout — no classified parametrics, no operational/exploit content.

CLASSIFICATION-READY (NOT CLASSIFIED)

Feature	Detail
Marking banners	Top & bottom classification banners (UNCLASSIFIED · CUI · CONFIDENTIAL · SECRET · TOP SECRET · TS//SCI) with caveats — operator-asserted handling level.
Access control	Role-based sign-in stub (Viewer / Analyst / Admin, least-privilege) — an integration point for site IdAM (CAC/PIV, LDAP).
Audit log	Append-only record of sign-in / open / data-load / classification-change events.
Bring-your-own data	Drop your own (separately-authorized) emitter library or public dataset into a folder; the apps reason over it.



The launcher with the classification banner and the operator sign-in (role-based, representational).

The software **displays** the handling level the operator asserts; it does not classify content. Classification is a legal act performed by a cleared Original Classification Authority. Everything shipped is UNCLASSIFIED // FOR TRAINING USE ONLY — no controlled data is included.

AI MODEL & METHOD

Item	Specification
Emitter taxonomy	13 literature-backed classes: Early- Warning, Acquisition, Surveillance, Height-Finder, Airborne-Intercept, Fire- Control, SAM-Track, Navigation, OTH-Radar, Counter-Battery, Multifunction-AESA, CW-Illuminator, SAR-Imaging.
Features	RF, PRI, PW, duty, scan type, modulation, frequency/PRI agility, ERP, beamwidth, scan period — derived from the suite's emitter physics. For IQ datasets: AMC features (Azzouz-Nandi instantaneous + higher-order cumulants).
Classifiers	Pure-numpy softmax (multinomial logistic regression), k-nearest-neighbours, Gaussian naive-Bayes — no external ML dependencies, fully offline.
Evaluation	Train/test split, accuracy, per-class accuracy, confusion matrix, one-vs-rest ROC / AUC, model comparison.
Decision support	Transparent threat-assessment and technique-recommendation heuristics; a learning bandit policy for the agent.
Public datasets	RadioML 2016.10A (numpy) · RadioML 2018.01A & RadChar (HDF5, h5py). Not shipped — drop-in folder.

SYSTEM REQUIREMENTS

OS	Windows 10/11 (64-bit)
CPU/RAM	x64, 8 GB RAM
Disk	~150 MB installed
Network	None — fully offline / air-gap-friendly
Dependencies	Self-contained single-folder exe (Python/numpy/matplotlib bundled)

PACKAGING & DEPLOYMENT

- Standalone one-folder build — `OAK_AI_EW.exe`
- Per-user installer + Desktop/Start-menu shortcuts
- Launcher → sign-in → 4 app cards; or `--app aiadvisor`
- Built-in `--selftest` for post-install verification
- Reuses the EW SUITE physics models as a library

OPEN-SOURCE PROVENANCE (SELECTED)

- RadChar — Huang et al., IEEE ICASSP 2023 (arXiv:2306.13105)
- RadioML 2018.01A — O'Shea, Roy, Clancy, IEEE JSTSP 2018
- MIT OpenCourseWare RES.LL-001 — O'Donnell (MIT Lincoln Laboratory)
- Richards, *Fundamentals of Radar Signal Processing* (Georgia Tech); POMR
- IEEE Std 521 / Skolnik, *Radar Handbook* 3rd ed.; FOI PRI-classification
- Named-system library: CSIS Missile Threat, GlobalSecurity, IISS, public profiles

WHAT IT IS — AND IS NOT

Is

- An unclassified, representational AI decision-support & training tool
- Transparent, explainable, cited models
- Classification-ready for controlled deployment with your own data

Is not

- An operational technique library or targeting system
- A holder of classified parametrics or exploit code
- Connected to any network — offline by design

