PROJECT FARADAI

Frugal and Robust AI for Defence Advanced Intelligence

The project “Frugal and Robust AI for Defence Advanced Intelligence” (FaRADAI) focusses on frugal learning, i.e. the ability of a system to adapt and learn from its’ environment, including from user supervision, for a reasonable cost and without intervention from expert developers. An important cross-cutting need for Artificial Intelligence is to create technologies for reliable, autonomous and frugal learning, i.e. the ability of a system to adapt and learn from its environment, including from user supervision, at a reasonable cost and without ‘ intervention of expert developers nor regression. Such technologies can be highly disruptive and have a high impact on many capabilities, especially when the information to be managed is highly variable or unpredictable and high adaptability is required.

These technologies can also alleviate the current need to provide data to system developers to achieve improvements depending on that data, which can be critical when the data is sensitive, and is therefore critical for defense. They can improve technological independence more generally. Selected actions should include the organization of technology challenges that address well-defined objectives in order to initiate and drive progress towards addressing identified defense needs, while simultaneously leveraging civilian research and generating spillover effects.

As part of the FaRADAI project, current advances in artificial intelligence technologies will be thoroughly studied in parallel with a detailed study of the main challenges imposed by a defense system. Aiming for significant breakthroughs in artificial intelligence, the models will accelerate their wider application and deployment in defense systems, increasing their impact and overall performance.

Technical Sheet

Funding institution:

EU EDF

Project partners

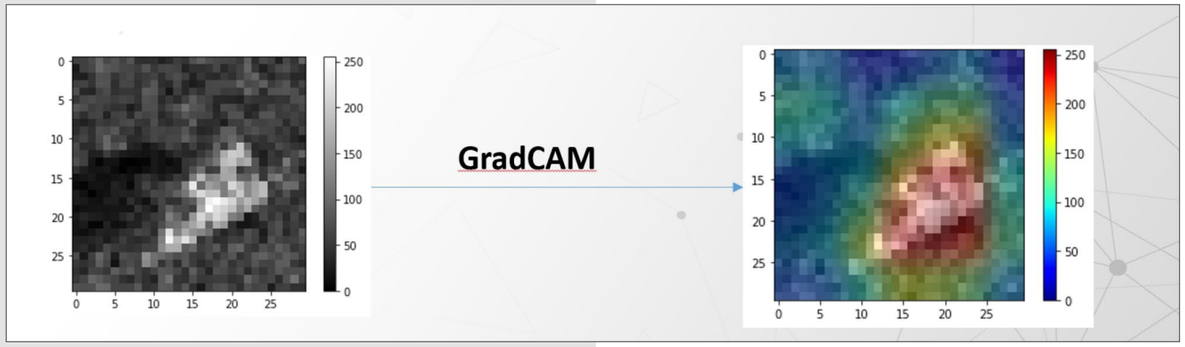
ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS, ANAPTYXIS - CERTH, BALTIJOS PAZANGIU TECHNOLOGIJU INSTITUTAS, BIANOR SERVICES EOOD, C&V CONSULTING, COMMISSARIAT A L ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES, DEFSECINTEL SOLUTIONS OU, E-GEOS SPA, EXUS SOFTWARE MONOPROSOPI ETAIRIA, PERIORISMENIS EVTHINIS, FLYSIGHT SRL, FRAUNHOFER GESELLSCHAFT ZUR FOERDERUNG DER, ANGEWANDTEN FORSCHUNG E.V., FUNDACION TECNALIA RESEARCH & INNOVATION , HENSOLDT OPTRONICS GMBH, INDRA SISTEMAS SA, INFILI TECHNOLOGIES SOCIETE ANONYME, INSTITUT PO OTBRANA, LEONARDO - S.p.A., LINK CAMPUS UNIVERSITY, MARINTRAFIK OPEREISONS ANONYMI, ETAIREIA PLIROFORIKIS, MBDA ITALIA SPA, NATIONAL CENTER FOR SCIENTIFIC, RESEARCH “DEMOKRITOS”, NAVAL GROUP, NEDERLANDSE ORGANISATIE VOOR TOEGEPAST, NATUURWETENSCHAPPELIJK ONDERZOEK TNO, OKTAL SYNTHETIC ENVIRONMENT, RHEINMETALL ELECTRONICS GMBH, RIGAS TEHNISKA UNIVERSITATE, SAFRAN ELECTRONICS & DEFENSE, SATWAYS, SKA POLSKA SPOLKA Z OGRANICZONA, ODPOWIEDZIALNO, STAM SRL, SZAMITASTECHNIKAI ES AUTOMATIZALASI KUTATOINTEZET, THALES France, THALES PROGRAMAS DE ELECTRONICA Y COMUNICACIONES SA, THALES SIX GTS FRANCE SAS, UNIVERSIDAD POLITECNICA DE MADRID

Project duration

December 2022 - August 2026

Involved countries

Lithuania, Bulgaria, Belgium, Estonia, Germany, Spain, Greece, France, Netherlands, Germany, Latvia, Poland, Italy, Hungary



(a) XAI results based on Grad-Cam

PROJECT HYPOTENUSE

HYPersOnic Threat dEtection aNd coUntermeaSurEs

Hypersonic missile threats are considered a game-changing military technology. Specifically, hypersonic missiles can fly between approximately 5,000 and 25,000 km/hour, they fly at unusual altitudes of between tens-of-kilometres to in excess of 100 km, their manoeuvrability enables them to evade even the most sophisticated layered missile defence infrastructures. Their speed, unusual altitudes and manoeuvrability combine to render hypersonic missiles extremely elusive to detect and to intercept. A hypersonic strike would unfold more rapidly than a conventional strike and would significantly compress the timelines for an attacked party to respond. The purpose of this study is not to analyse hypersonic missile developments per se, but rather to identify and study the state-of-the-art sensor and intercept (hard- and soft-kill) technologies that constitute a robust Hypersonic Missile Defence (HMD) mechanism. It is clear that no one sensor, or class of sensors, will be able to fully observe hypersonic threats throughout their various phases from launch, glide, cruise to impact. Rather a constellation or layer of technologies will need to be deployed that comprise different types of radar operating with IR sensors and associated intercept (hard- and soft-kill) measures. The layers of electronic sensors including different types of radar and IR sensors represent a stand-alone OODA-loop (Observe–Orient–Decide–Act). For example, the sensor-constellation “holistically” observes the threat, then the constellation Orientates sensing and/or intercept assets toward the threat corridor. All the while, the layer of sensors is providing data to enable the Decide and Act steps of the OODA-loop.

Technical Sheet

Funding institution:

European Defence Agency (EDA)

Project partners

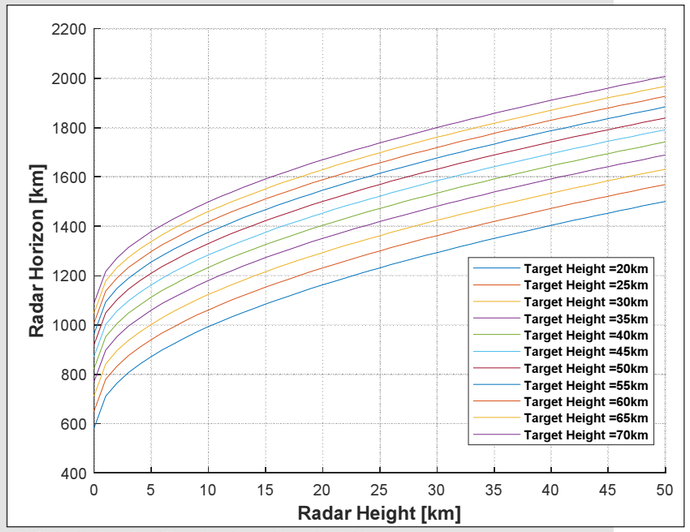
ONERA, FHR, Flysight, HENSOLDT, Leonardo, ISL, MBDA It, LINKS, WUT

Project duration

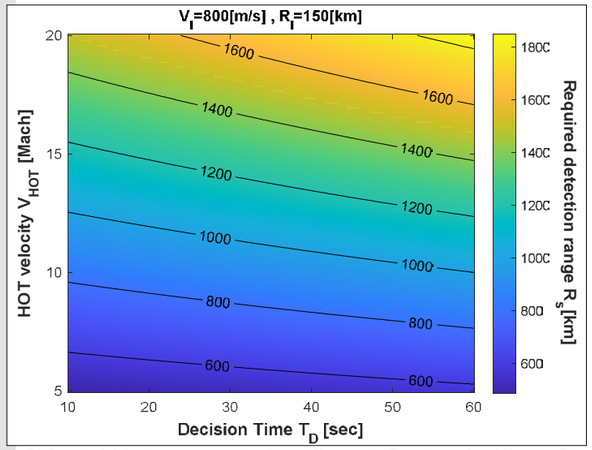
April 2022 – April 2023

Involved countries

France, Italy, Germany, Poland



(a) Radar Horizon for different radar and target height



(b) Required detection range as a function of Hypersonic Threat speed and Decision Time