SenTech
Systems and Energy Technologies

Sentech: Trusted Partner in European Defence R&D — From Radar/EW Simulation to AI-Driven Target Recognition

SENTECH SRL: COMPANY PROFILE

Sentech Srl is an Italian company with 18 year of history in innovation in the embedded computing sector, in dedicated solutions for signal processing boards and special functions, in the design of complex components such as antennas and process/measurement controllers, in integration of complex systems and related sensors.

The Company is ISO 9001:2015 certified in SW and HW design and operates mainly in R&D and SW design and development for the Aerospace and Defense domain. It is specialized in the analysis and design of complex systems and related sensors using both high-level technical design/simulation SW (e.g. MATLAB/Simulink, Solid Works, Ansys STK) and programming language as C/C ++/C#, Python, LabVIEW, Java, Android and SQL.

SENTECH is a member of AIAD (Federation of Italian Aerospace, Defense and Security Companies).

SENTECH is affiliated with ATEN GROUP-2014 (50 HI TECH COMPANIES).

Sentech is partner in 6 EUROPEAN DEFENCE FOUND

FEDERAZIONE AZIENDE ITALIANE PER L'AEROSPAZIO, LA DIFESA E LA SICUREZZA

Company expertise covers the following activities:

1. Scenario Simulators for Radar/EW (Radar Target Generator/ECM/ECCM) and Electro-Optical sensors for military scenarios;
2. Automatic Test Equipment design and implementation;
3. CV (Computer Vision) and AI (Artificial Intelligence) algorithms design and development e.g. Automatic Target Recognition and Identification, Object detection and tracking, Change Detection;
4. RF algorithm design and implementation for Electronic Support Measures and Direction Finder Systems;
5. Embedded board RTOS/FPGA Algorithms design and programming and RTOS Control Systems;
6. CD & ATR (Change Detection & Automatic Target Recognition) system in the SAR field
7. Research & Development for national and EU projects in military / aerospace domains
8. Real-Time Communication for highly specialized medical/surgical teleconsultation (HUB-SPOKE) + Processing and analysis of neurophysiological signals and medical images (EEG, MRI, fMRI, CT, nTMS, etc.)

B-SENTECH RUNNING FINANCED EDF PROJECTS

EDF 21 -SHOLFEA-SHoulderLaunched Family for European Armies

TOTAL COST: 2,5 M
Coordinator: GAHN
Sentech Activities: EO/IR Missile Seeker SW and FW
Others Main Partners: INSTALAZA, GELCO, STARTIUN, Others

EDF 21 -ARTURO-Advanced Radar Technology in eUROpe

TOTAL COST: 20 M
Coordinator: LEONARDO
Sentech Activities: Responsive complex Radar Target Generator and Electronic Warfare Countermeasure
Others Main Partners: AIRBUS DEFENCE AND SPACE, HENSOLDT SENSORS, INDRA SISTEMAS, THALES FRANCE, Others

EDF 22 -REACTII-Responsive Electronic Attack for Cooperation Tasks II

TOTAL COST: 69,7 M
Coordinator: INDRA SISTEMAS
Sentech Activities: Complex DES (Digital Environment Simulator) made up by Radar Emulator and a Scenario Generator capable of generating interfering signals (Comm, Radar).
Others Main Partners: ELETTRONICA, HENSOLDT SENSORS, THALES FRANCE, UNIVERSIDAD POLITECNICA DE MADRID, Others

EDF 22 -TIRESYAS-Technology Innovation for Radar European System ApplicationS

TOTAL COST: 15 M
Coordinator: LEONARDO
Sentech Activities: Generating the inputs (e.g. signals and disturbances received from both the radar and the EW apparatus) for the Radar Digital Twin implemented by Leonardo
Others Main Partners: AIRBUS DEFENCE AND SPACE, ELETTRONICA, HENSOLDT SENSORS, INDRA SISTEMAS, MBDA, Others

EDF 23 -MARTE Main ARmoured Tank of Europe

TOTAL COST:	20,225 M
Coordinator:	MARTE ARGE GbR
Sentech Activities:	EO/IR/LPC AI SW for ATR/Change Detection
Others Main Partners:	LEONARDO, Rheinmetall Landsysteme GmbH, INDRA, OTHERS

EDF 23 -SDAM4PRD SATELLITE DETECTION, ANALYSIS AND MEASUREMENTS SYSTEM FOR PROACTIVE AND REACTIVE DEFENCE

TOTAL COST:	7.377 M
Coordinator:	INTEGRASYS SA
Sentech Activities:	Sat Interference/jamming simulation and localization
Others Main Partners:	AICOX SOLUCIONES SA, ECLIPTIC DEFENCE AND SPACE LTD, EXUS SOFTWARE

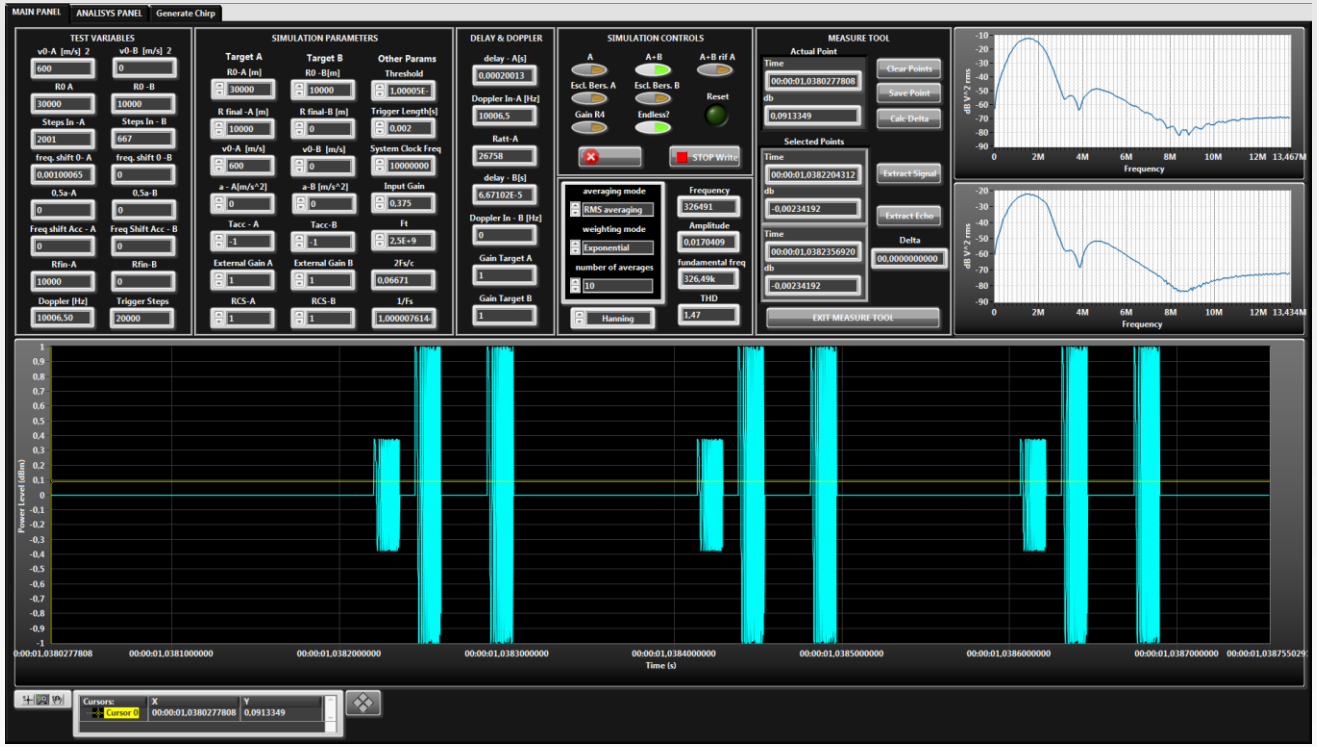
1 - Scenario Simulator - Radar Target Generator & EW environment simulator

Radar Target Generator (RTG) and **Electronic Warfare Simulation System (EWSS)** are essential tools for testing and training RADAR and EW systems in real environment.

The SenTech RTG receives the radar pulses and in real time is able to respond with echoes simulating multiple air targets and/or missiles with phase Coherence and Doppler Shift. RTG response can include Electronic Counter Measures. The motions of the targets are realistic and varied (multiple targets, planes launching missiles, variations of all parameters such as position, speed, acceleration).

Among the three possible approaches for radar testing (radar test range, simulation, and pulse replication) the last one is the best solution because:

- allows testing in a controlled environment;
- could include intentional (Electronic Counter Measures) and unintentional interferers;
- can create e realistic scenario and do not require knowledge of the radar system architecture;
- has the capability to record the detected reaction from the radar under test;
- It is easily deployable.



RTG Main Panel

1 - Scenario Simulator - Electro-Optical sensors

Generation of **synthetic datasets** and **complex scenarios** in the various optical bands (IR and VIS) through the use of latest generation graphics engines for training neural networks on classes / targets with unavailable datasets

Sentech creates military simulated scenario useful for the following purposes:

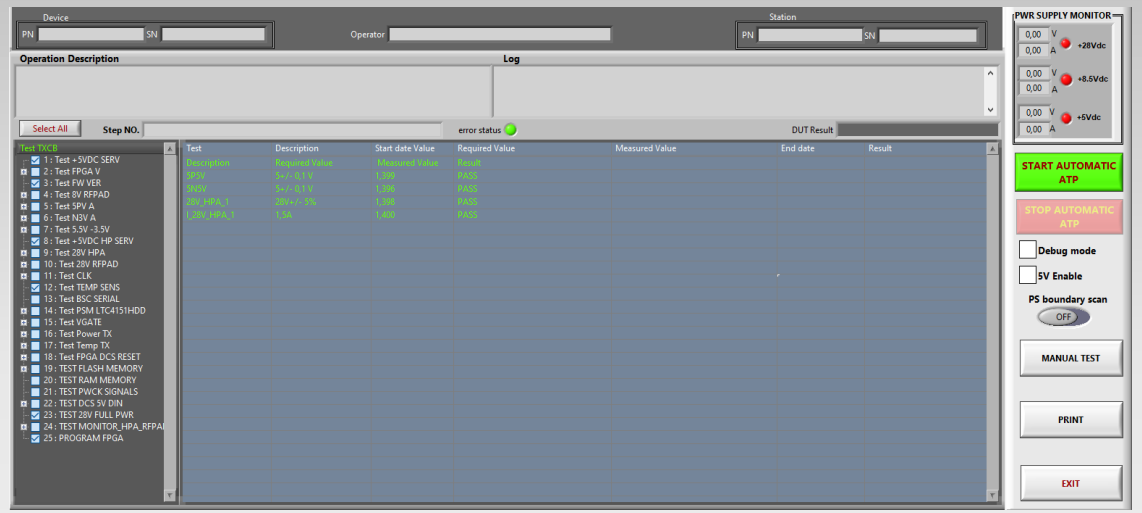
- Neural Networks training and testing
- Computer vision algorithms testing
- Feasibility study on military systems

Main Pros of simulated scenarios are also:

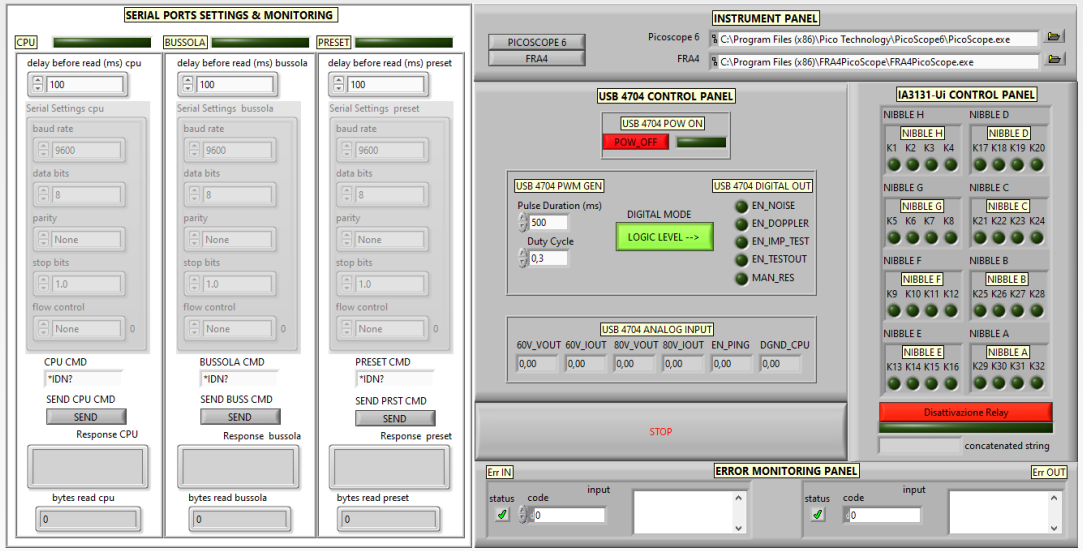
- Supports keyframe animations and SQF scripts
- Thousands of vehicles, equipment and scenarios available;
- Realistic graphic;
- Realistic and scriptable effects (Daylight, fog, rain, dust, explosions, etc.);
- Realistic IR models;
- Simulated custom dataset generation.

Seeker view (up left) Military targets (up right) and scenario (down)

2 - AUTOMATIC TEST EQUIPMENT



ATE Main Panel



ATE Manual Panel

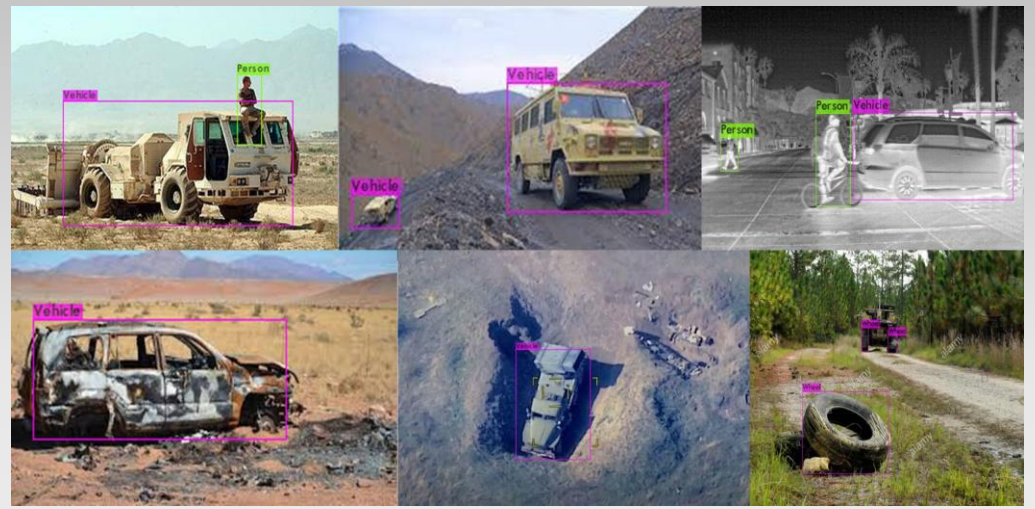
Sentech design and develop **custom made ATE** with the following characteristics:

- Automatic execution of the entire test chain or test groups/single test selection;
- Automatic generation of Test Data Report on custom templates (Word, Excel, Xml, Others);
- Manual Panel;
- Debug Mode
- Instrument management (oscilloscopes, relay cards, COM boards, other peripherals/instruments);
- Error and error log management;
- Management of different communication protocols (Canbus, Canopen, EtherCat, others);
- Easy Installer with all needed library included;
- Auxiliary file management for automatic parameter settings, measurement offset;
- User Friendly interfaces.

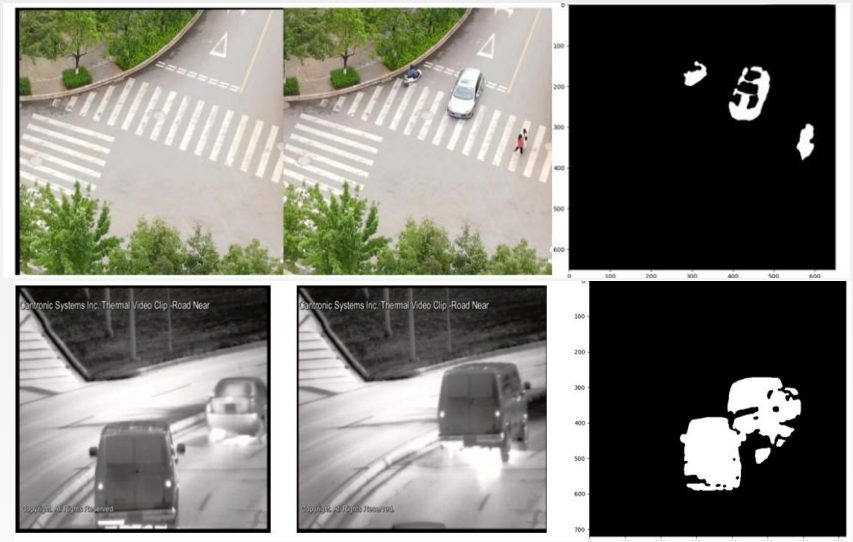
3 - CV & AI Algorithms Design & Development - ATR & CD on Vis/IR/Lidar Data

Design and implementation of complex multi-domain CV & AI systems for Terrestrial, UAV and aerospace platforms:

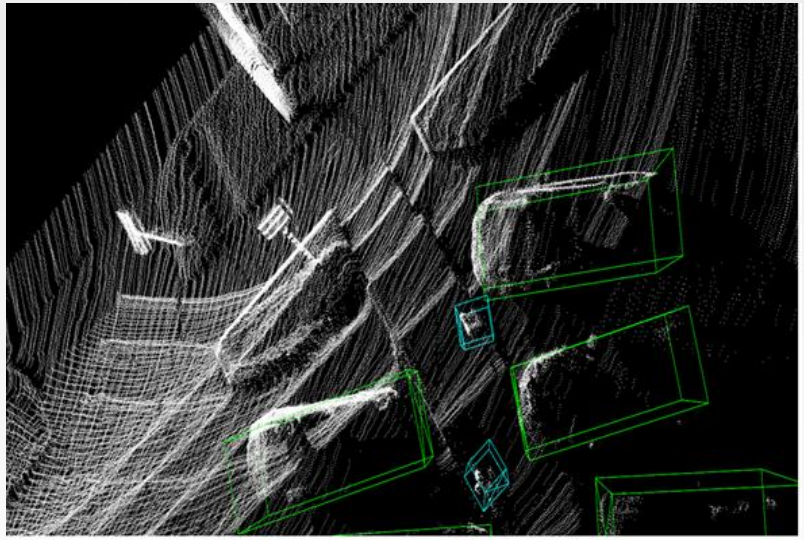
- Change Detection on Lidar Point Cloud and Electro-optical data;
- Object Detection on Lidar Point Cloud and Electro-optical data;
- Object Classifiers;
- Integration with ESRI GIS;
- Neural Networks Training and Testing on custom specs and dataset;
- Registration and Data Fusion Algorithms
- Data Augmentation for training Datasets



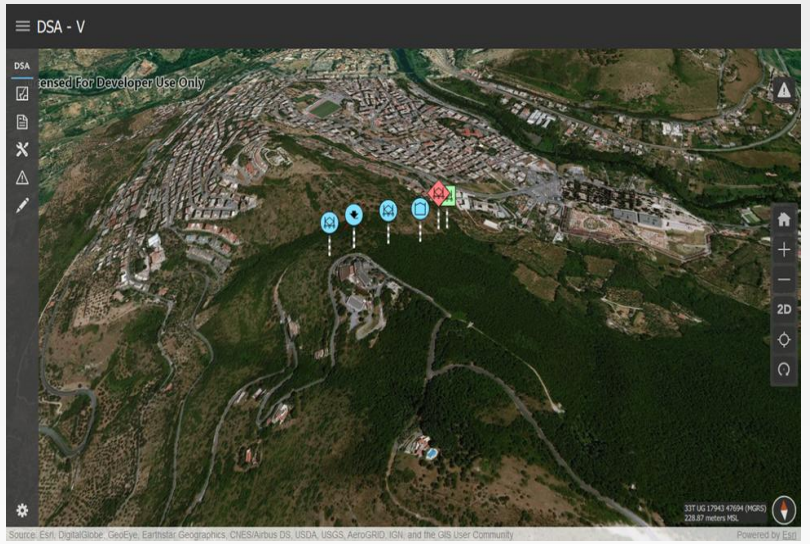
Object Detection on Vis and IR Data



Change Detection on Vis and IR Data



Object Detector on Lidar Data



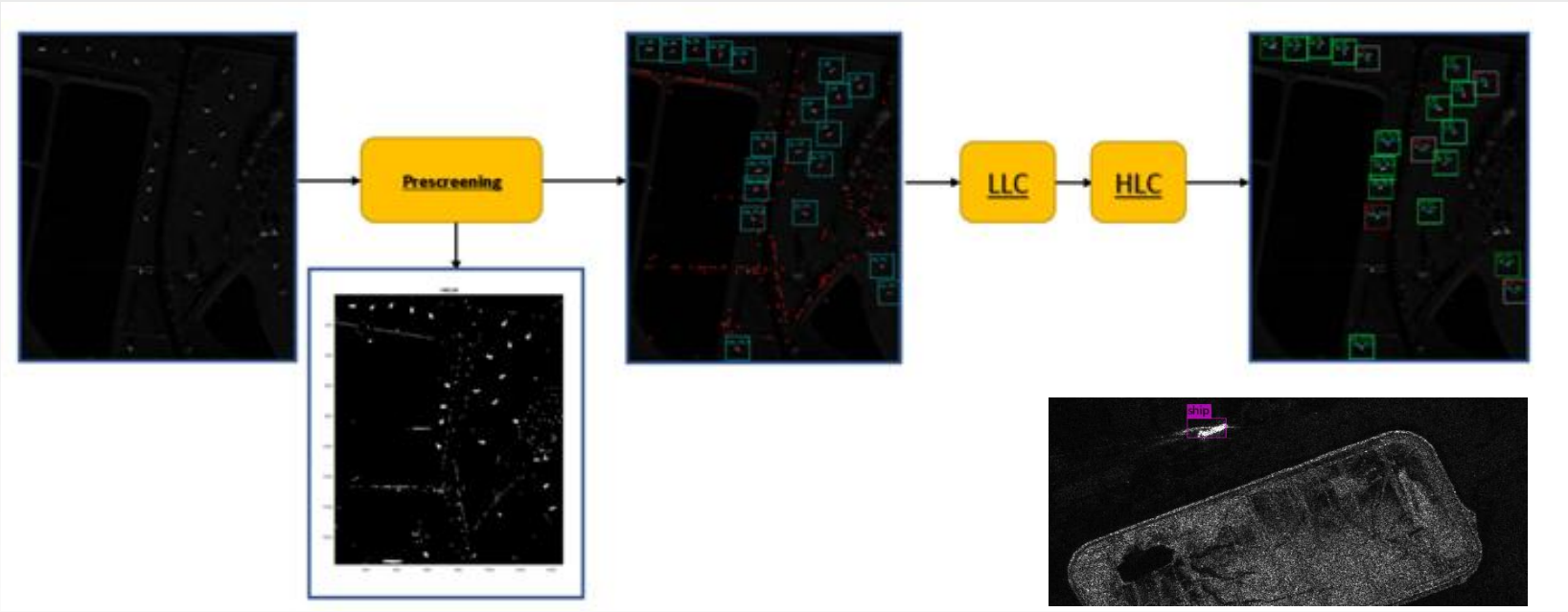
Warning Generation on ESRI GIS

3 - CV & AI Algorithms D&D - ATR & CD on SAR Data

SenTech **CD & ATR** (Change Detection & Automatic Target Recognition) system in the SAR field includes the following Functions:

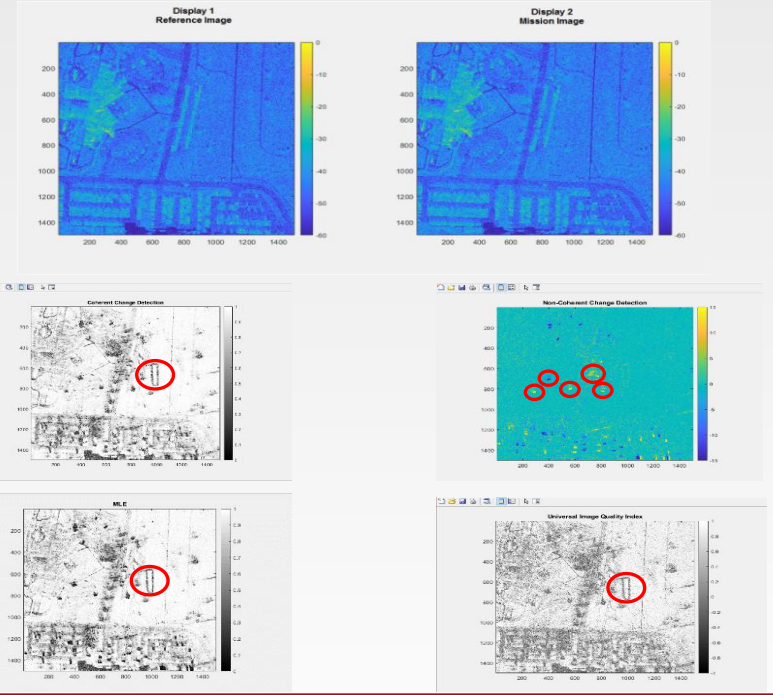
ATR Pipeline Functions

Pre-screening: Despeckling Filter and CFAR (Constant False Alarm Rate) Methods (in-house development of innovative methods e.g. Seg-CFAR, Seg-KDE)
LLC (Low Level Classifier): Elimination of Natural and Non-Clutter residues + Chip candidate selection for the next stage
HLC (High Level Classifier):Target classification using AI techniques (Both Machine Learning (ML) and Deep Learning (DL))



CD Methods

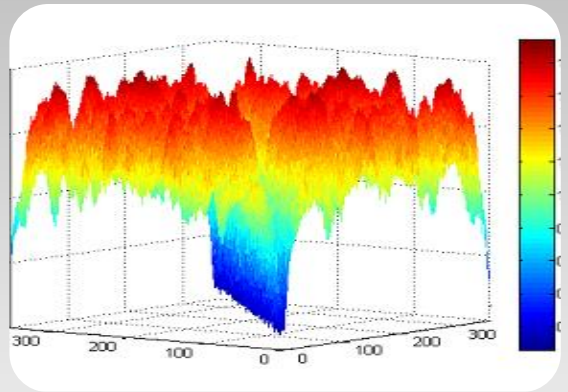
- Coherent Change Detection (CCD);
- Non - Coherent Change Detection (NCCD);
- Maximum Likelihood Estimate (MLE);
- Universal Image Quality Index (Q Index): Q1, Q2 and Q3;



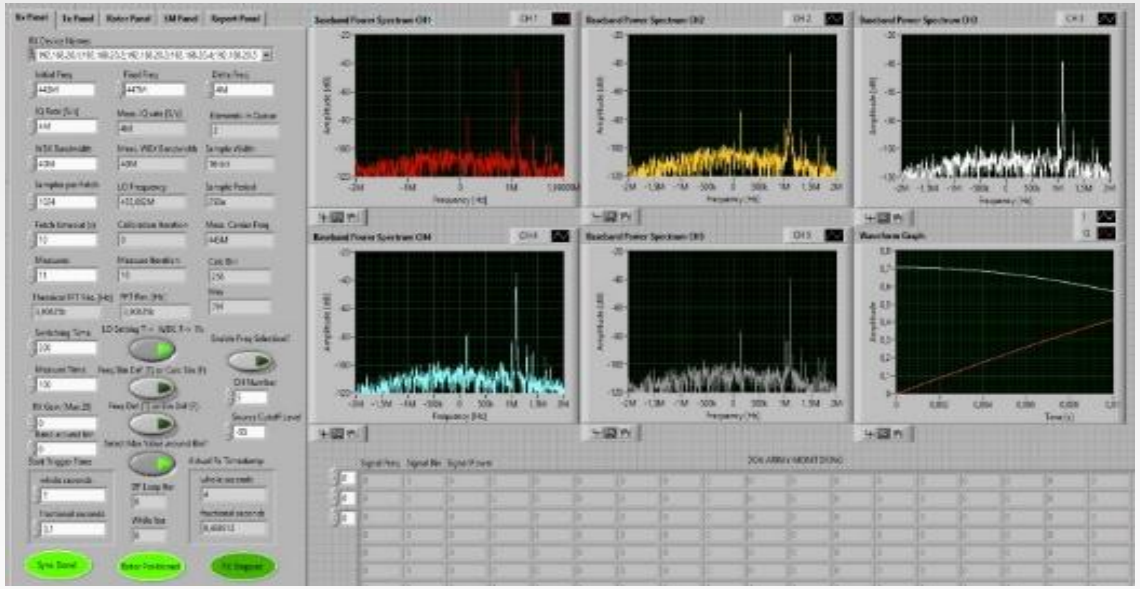
4 - Electronic Support Measures and Direction Finder Systems

Sentech has the capabilities to

- Design and construction of **custom direction finding antennas** for special applications
- Study, design and implementation of **advanced Direction Finder algorithms** such as Super Resolution, Multipath Signals DOA, Low Signal Noise Ratio DOA;



Direction Finding Algorithm Study, Simulation and implementation



Direction Finding System HMI

High accuracy Antenna 20-3400 MHz frequency range

DF Antenna with lightening pole 100-400 MHz frequency range

DF Antenna 100-3400 MHz frequency range

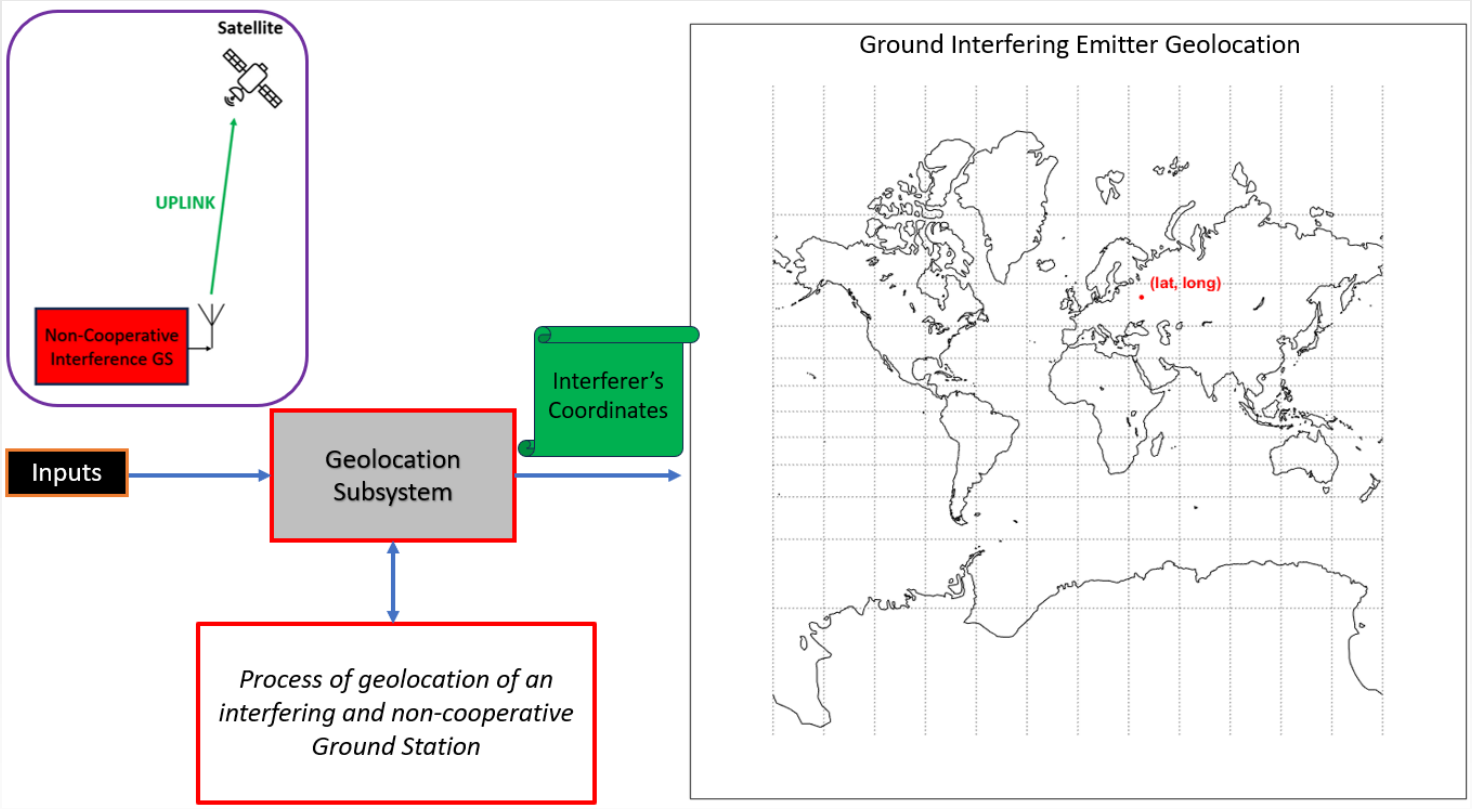
4 – COMM-ELECTRONIC SUPPORT MEASURES SYSTEM

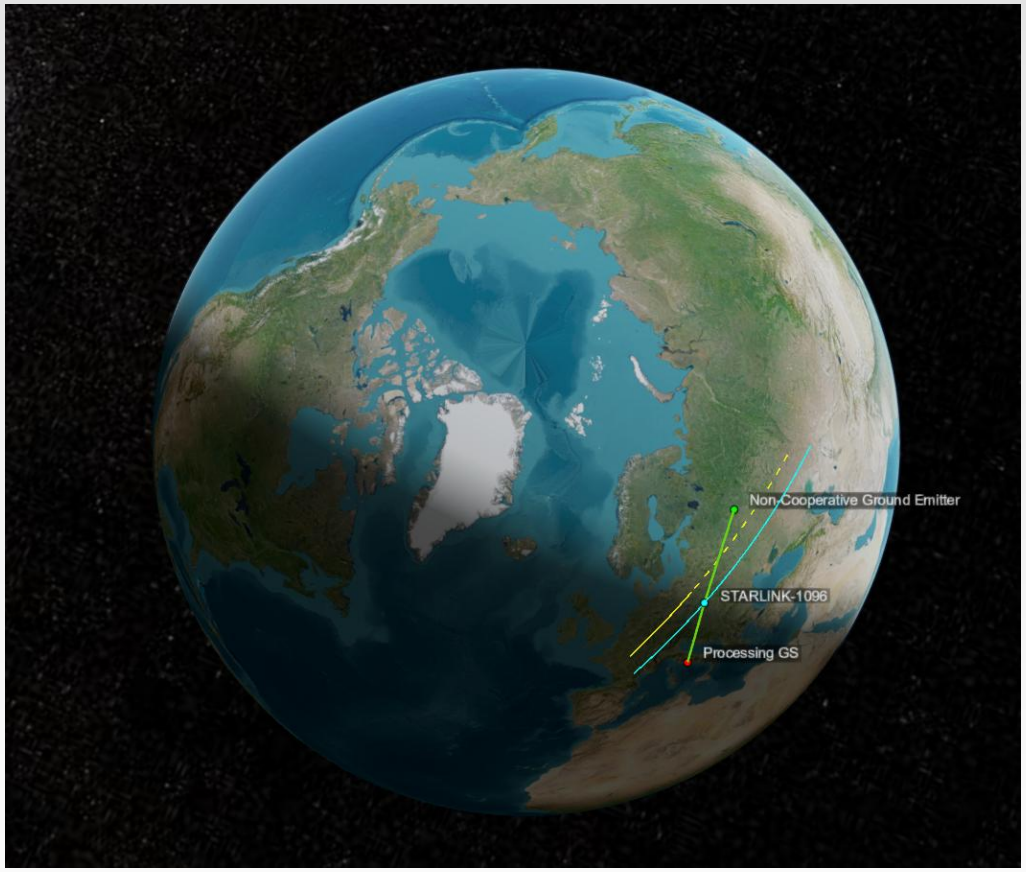
- C-ESM-RDF is the technological solution for direction finding and geolocalization of targets through detection and processing of their broadcast RF signals. Wide receiving frequency bandwidth, fast spectrum analysis and smart DOA (Direction Of Arrival) appraisal algorithms (such as vector correlative interferometry or super resolution) are the cornerstones of the C-ESM-RDF.
- Direction Of Arrival is assessed also against very short duration emissions as well as modern signals (such as TDMA, CDMA, OFDM, Frequency Hopping).
- Design, manufacturing and calibration of antenna system and main items is made all in house thus allowing the maximum flexibility and accuracy.

Using several systems located in different positions or a mobile station, it is possible to geolocate the broadcasters.

5 – Geolocation of Ground Station Jammer using one Satellite

SenTech simulates and develops algorithms for geolocating a ground-based, non-cooperative interference Emitter (attempting to jam the Uplink) using a single LEO/GEO Satellite.





C-PNRM: 5G4MIL

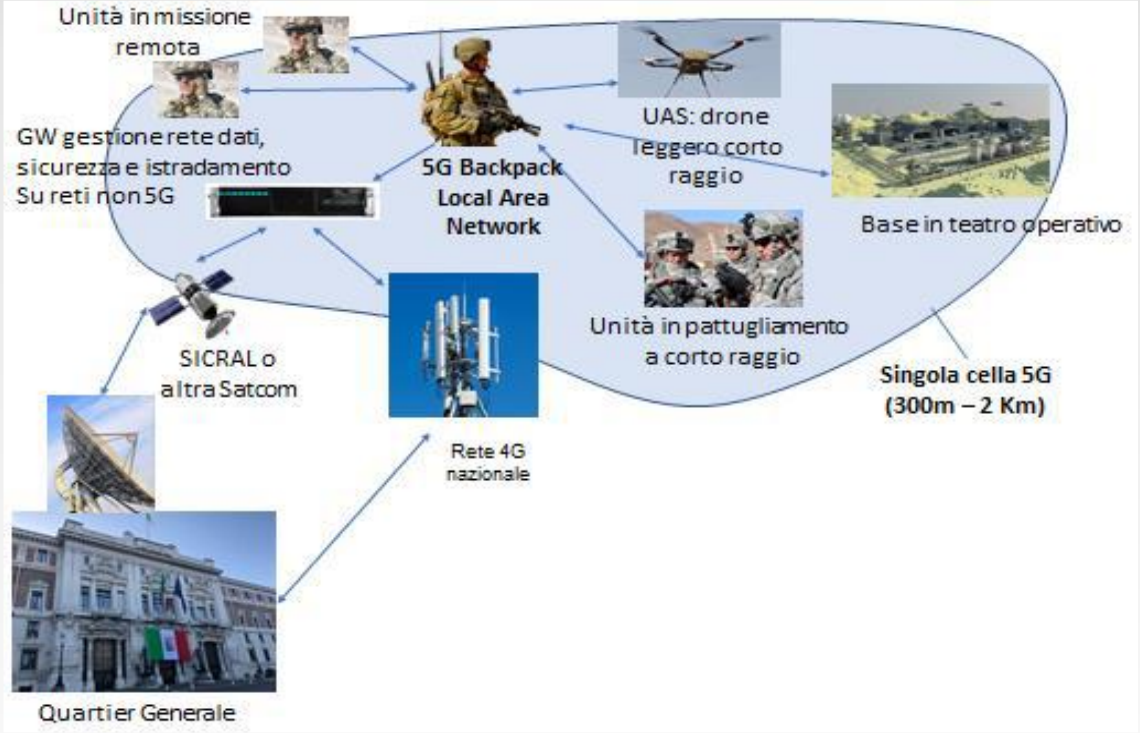
Titolo: **Dedicated, secure and integrated 5G mobile network for military applications**

Acronimo: **5G4Mil**

The project focuses on **studying and prototyping 5G networks for military use**, integrated with satellite communications (e.g., Sicral) and existing civil infrastructures. Key activities include:

- **Designing secure 5G network slices** for classified military communications over shared civil core networks.
- **Assessing vulnerabilities** and implementing specific security configurations beyond standard 3GPP specifications.
- **Integrating 5G with legacy military networks** and satellite segments to ensure resilience and extended coverage.
- **Field testing** to validate use cases such as low-latency remote control of UAVs, augmented reality, and large-data transfer in mobile operations.

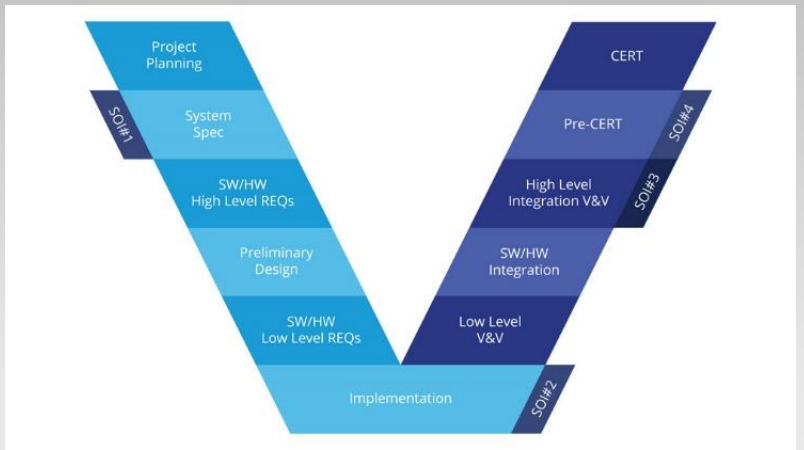
The importance lies in enabling **flexible, high-performance, and secure connectivity** for future defence applications, leveraging 5G's potential (low latency, high bandwidth, network slicing, edge computing) while mitigating the security risks arising from sharing infrastructure with civilian operators.



6 - DO 178 SW Development, Test and Documentation

SenTech develops **avionic software** compliant with **DO178C standard**:

- DAL-A for one of the major Italian Defence company;
- DAL-C for a foreign Defence company.



DO178 SenTech Activities

- Equipment specification analysis.
- High level software requirements redaction.
- Low level software requirements redaction.
- Software interface requirement.
- Coding (C language MISRA).
- Software verification and testing.
- Code coverage.
- Software release.

- DO178C DAL (Design Assurance Level)
  - DAL-A: Software failure determines catastrophic failure condition for the system
    - ✓ Statement Coverage
    - ✓ Decision Coverage
    - ✓ MC/DC Coverage
  - DAL-C: Software failure determines major failure condition for the system
    - ✓ Statement Coverage

7 – UAV Advanced Functions Development

SenTech develops **advanced functions for AI/ML based software** UAV/UGV missions.

In particular:

- EO/IR based Tracker for target course monitoring and target engage;
- AI based ATR function with target identification (Class, Type, identifier);
- Taylor made functions development for custom specs-based missions;
- SLAM and autonomous navigation functions.

Such functions can be implemented on AMD, Nvidia, STMicro boards or other SoM producers upon request.

Sentech can develop also digital twin and complex scenario simulators for Feasibility study and AI model training.

SENTECH Core Medical Expertise & Technological Portfolio

Our core competence lies in creating end-to-end systems that seamlessly integrate AI-driven image analysis, 3D visualization, and secure, collaborative platforms to support diagnosis, surgical planning, rehabilitation, and remote care.

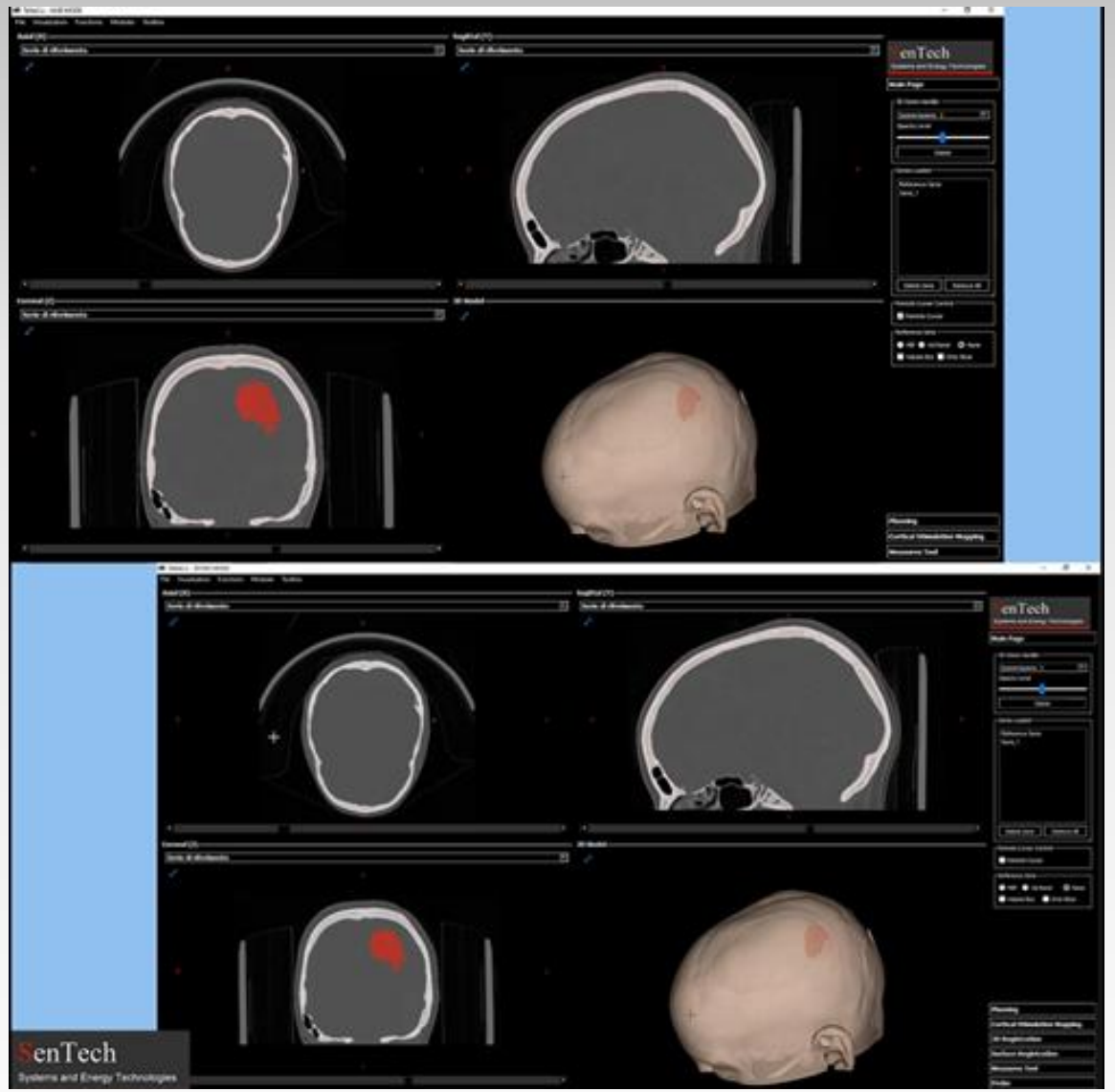
1. ADVANCED NEUROIMAGING & SURGICAL NAVIGATION

We develop software that turns complex medical images into quantitative, actionable intelligence for diagnosis, planning, and treatment.

- **NeuroMRI Suite:**
  - **Multi-Modal Visualization & Analysis:** Advanced platform for 3D visualization and processing of MRI (T1, T2, FLAIR, DWI/DTI, Perfusion, Spectroscopy) and hybrid PET-MRI.
  - **AI-Powered Segmentation:** Utilizes deep learning models (U-Net 3D, nnU-Net) for automatic, precise segmentation of tumors, anatomical structures, and organs at risk. Features an **AI-assisted interface** for clinician correction and active learning.
  - **Quantitative Biomarker Extraction:** Goes beyond basic morphometry to extract **radiomics, functional (tractography, perfusion), and hybrid biomarkers** for comprehensive profiling.

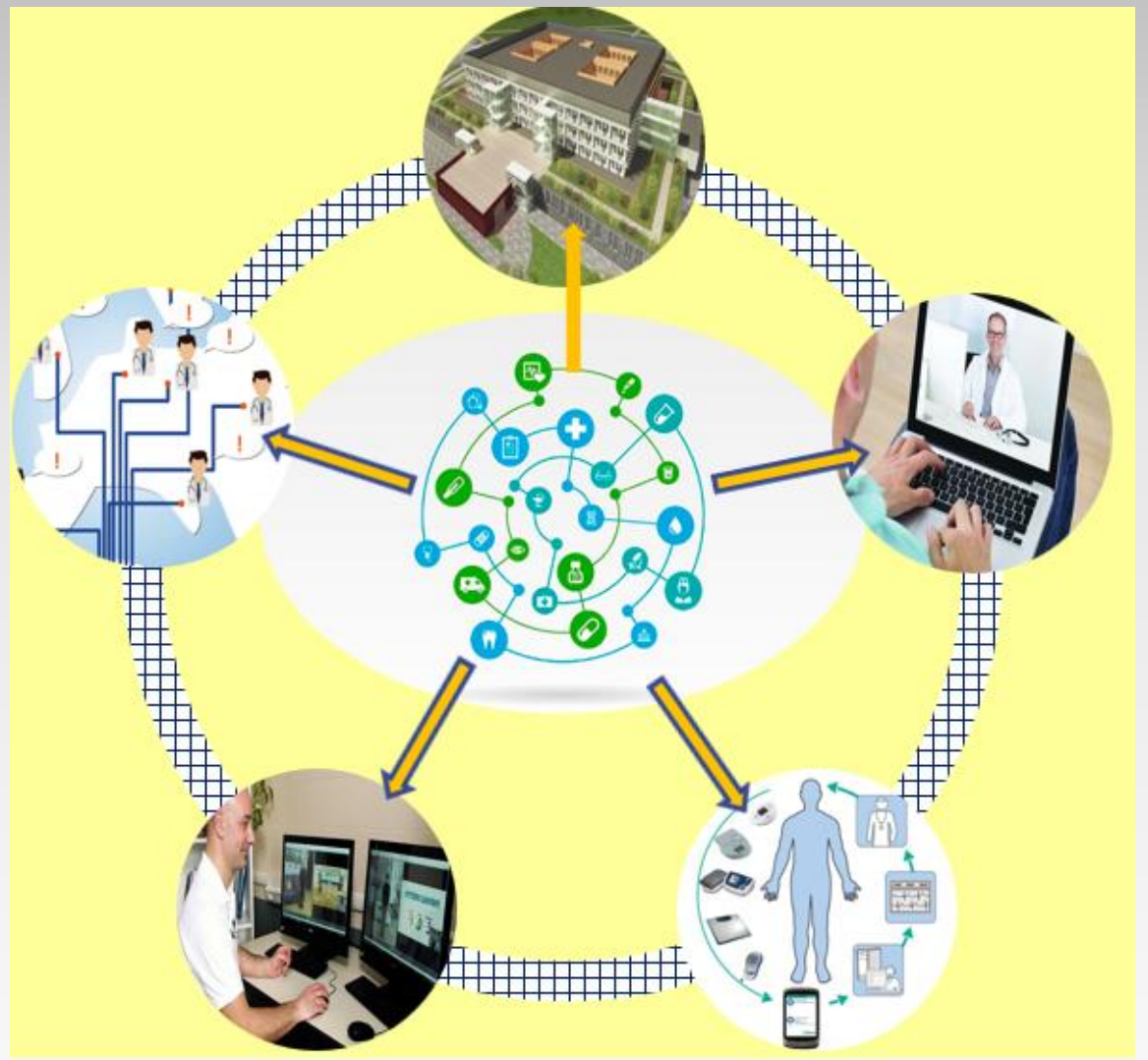
- **Surgical Navigation & Telementoring Ecosystem:**
  - **Neuronavigation System:** Provides real-time 3D guidance for neurosurgery by fusing multi-modal images (CT, MRI, fMRI, PET) and tracking surgical instruments.
  - **Patented Hub-and-Spoke Telementoring:** Enables remote surgical expertise transfer. Specialists at a central **Hub** can guide surgeons at a **Spoke** site in real-time.
    - **Key Innovation:** Synchronizes 3D models and navigation views between sites using an efficient event-based protocol (MQTT), optimizing bandwidth—a critical advantage for satellite or low-bandwidth connections.

Navigated TMS (Transcranial Magnetic Stimulation): Integrates EEG source localization for real-time visualization of cortical activation during therapeutic TMS sessions.



G.C.A.: A Digital Neuro-Rehabilitation Ecosystem

Is a comprehensive, end-to-end digital platform designed to transform the care continuum for patients with Severe Acquired Brain Injury (GCA). It breaks down institutional silos and geographical barriers by creating a **seamless, technology-enabled care pathway** from acute hospitalization through post-acute rehabilitation to supported community living.



1. Clinical Coordination & Decision Support Pillar

- **Teleconsultation Hub:** Enables **real-time, multi-disciplinary case conferencing** between distant specialists (neurologists, neuroradiologists, rehab therapists) with secure sharing of complex clinical data (DICOM, fMRI). Provides clinicians with **standardized, data-driven tools** for evaluating patient status, replacing subjective judgment with measurable metrics to guide diagnosis and treatment planning.

2. Remote Rehabilitation & Therapy Delivery Pillar

- **Home-Based Telerehabilitation:** Allows physiotherapists and therapists to **conduct and supervise rehabilitation sessions remotely** (1-to-1 or 1-to-many). This ensures **continuity of care** after hospital discharge, bringing high-intensity therapeutic support directly into the patient's home.
- **Sensor-Guided Monitoring:** Uses wearable and ambient sensors to **remotely track patient mobility, activity, and vital signs** at home. This provides therapists with objective data on adherence and progress, enabling **personalized adjustment of rehab plans**.

3. Psycho-Social Support & Community Pillar

- **Caregiver-Centered Social Network:** A **secure, web-based community platform** connecting patients, family caregivers, and professional therapists. It facilitates peer support, problem-solving, and knowledge exchange, directly combating **isolation and burnout**. Provides **on-demand, certified training** for caregivers and family members on medical care, rehabilitation techniques, and psychological coping strategies.

5. Next-Generation Support & AI Readiness Pillar

- **Explainable AI (XAI)** to make algorithm-driven recommendations transparent and trustworthy for clinicians and families.

SmartMe&You-TELEMAIA: An AI-Powered Platform for Predictive Cognitive Health Management

Core Innovation: We move beyond traditional clinic-based cognitive assessments by building a **continuous, real-world digital phenotype of brain health**. Our platform leverages inexpensive consumer devices and AI to detect subtle early warning signs of cognitive decline—turning the home into a proactive clinical observatory.

How It Works: A Two-Stream Data Fusion System

The platform operates through two synchronized, commercially available devices that create a **24/7 cognitive-physiological profile**.

1. The Physiological Stream (Galaxy Watch)

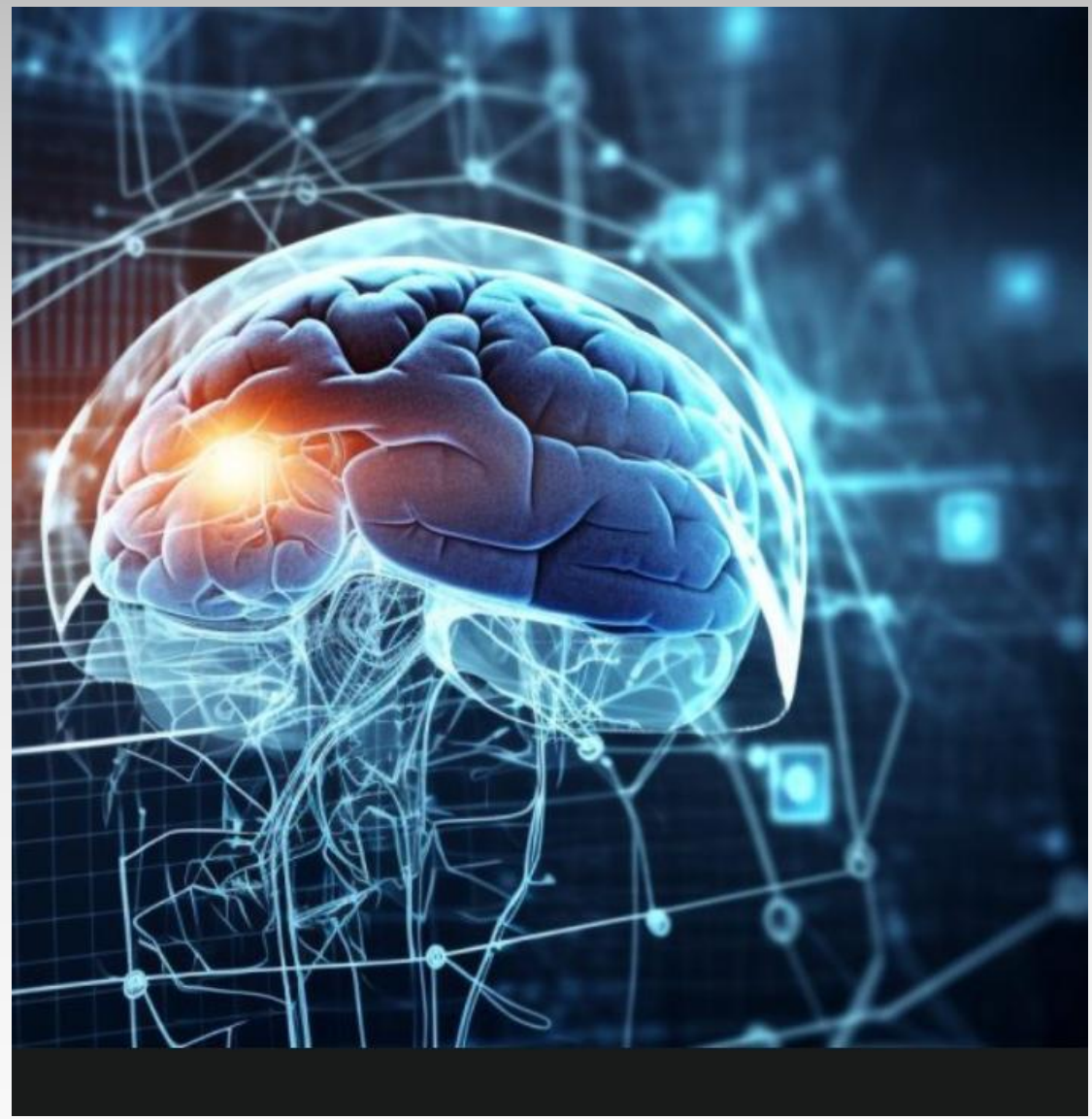
- **Tracks Modifiable Dementia Risk Factors:** Continuously monitors **physical activity/sedentary behavior, sleep architecture (quality, efficiency, cycles), and heart rate variability (HRV)**.
- **Provides Objective Biomarkers:** Delivers quantifiable, real-world data on **cardiovascular stress and autonomic nervous system function**—key indicators of neurovascular health and resilience.

2. The Cognitive Stream (Serious Games on Tablet)

- **Daily Cognitive Vital Signs:** Seven scientifically designed video games (≈20 min/day) assess **core executive functions**: vigilance, visuospatial attention, and executive control.
- **Dual Function:** Serves as both a **sensitive monitoring tool** (detecting subtle performance declines) and a **personalized training gym** for the brain.

3. The AI Engine (GARR Cloud)

- **Machine Learning Integration:** Our cloud platform **fuses physiological and cognitive data streams** to identify complex, multidimensional risk patterns invisible to single metrics.
- **Generates Predictive Insights:** AI models analyze longitudinal data to provide **individualized risk stratification** and early deviation alerts, moving from episodic assessment to **continuous predictive monitoring.**



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