

JIP-ICET contracts



Call	Start of contracts	Contracts placed
1. Monitoring and Control	Late 2009/Early 2010	HECTOR, SESAMO, SARINO, NICE
2. Data Capture and Exploitation	Second semester 2010	APIS, E-STAR, NANOCAP, PATCH, METALESA, SARAPE
3. Nanomaterial integrated in textile for soldiers / Metamaterials in radar application	First semester 2011	METAFORE, NANOTEX

Contract A-0930-RT-GC “HECTOR”



Helicopter fuselage Crack Monitoring and prognosis through on-board sensor network

Indicative total value: 2.2 Million Euro

Duration: 24 months from 01/2010

Politecnico di Milano (IT) — **Augusta Westland** (IT) — **Vitrociset** (IT) — **Consorzio Milano Ricerche** (IT) — **SINTEF ICT** (NO) — **University of Zilina** (PL) — **AGU University of Science and Technology** (PL) — **University of Patras** (EL)

The main purpose of the project is to propose modelling techniques for the analysis of multiple sensors in producing a unified and comprehensive methods for identification, monitoring and prognosis of potential damages (like cracks) in the fuselage of a helicopter.

This goal will be obtained through the combined use of advanced models for the assessment of the state of stress in the system and the identification of likely areas of nucleation and growth of cracks, and the use of a network of on-board sensors of last generation (Comparative Vacuum Monitoring, Optical Fiber Sensors, Crack Propagation Gauges, etc). Fuselage modelling methodologies will be addressed and techniques in the area of computational sensor data analysis, event diagnosis and prognosis will be included. Particular attention will be also paid to methods to elaborate the sensor network data with the purpose to create a reliable and robust system for on-line fuselage health monitoring.

Contract A-0931-RT-GC “SESAMO”



Sensor for Structural Monitoring

Indicative total value:

1.6 Million Euro

Duration:

24 months from
01/2010

MBDA Italia (IT) — University of Pisa (IT) — LTSM, University of Patras (EL)

The goal of the proposal is to study innovative sensors to be employed for advanced structural monitoring of stressed materials, deterioration assessment as well as the response to external events which may occur during both normal operation or special occurrences. The technologies under study allow dense instrumentation of structures at relatively low-cost. Two technologies will be employed: MEMS and optical fibres.

Two application scenarios are interesting for the defence market: solid rocket motors and composite materials.

Contract A-0932-RT-GC “SARINA”



SAR-based Augmented Integrity Navigation Architecture

Indicative total value: 2.3 Million Euro

Duration: 24 months from 01/2010

Ingegneria des Sistemi (IT) — Polyvionics (FR) — Warsaw University of Technology (PL)

The main goals of the project are:

1. Feasibility Study of hierarchical and distributed navigation filters which can accept SAR and Interferometric SAR (InSAR) measurements, based on the Extended Kalman Filter (EKF) approach for providing enhanced Fault Detection, Isolation and Recovery or Reconfiguration (FDIR) capabilities.
2. Feasibility Study of mission-suited SAR sensors for terrain landmark extraction and Digital Terrain Model (DTM) reconstruction
3. Design and assessment of SAR autofocusing, terrain landmark extraction and classification algorithms for calibrating the a/c position and attitude, thereby enabling the recovery of possible course deviation caused by uncompensated IMU drift due to GPS lack of integrity.
4. Feasibility Study of SAR interferometric techniques for DTM retrieval, useful for geo-referencing the scene under investigation in presence of gap filling of terrain landmarks
5. Improvements in the fidelity of extended SAR image simulation, driven by sensor signal processing characteristics and environmental representations, useful for testing and assessing the technological demonstrator

Contract A-0933-RT-GC “NICE”



Nonlinear Innovative Control designs and Evaluations

Indicative total value: 2.9 Million Euro

Duration: 24 months from
03/2010

ONERA (FR) — LAAS (FR) — University of Rome (IT) — Technische Universität München (DE) — University of Siena (IT) — E&Q Engineering (ES) — IRIDA LABS (EL) — DLR (DE) — Bertin Technologies (FR) — Dassault Aviation (FR) — LFK (DE) — MBDA France (FR) — MBDA Italia (IT)

The majority of control laws implemented in the European defence aeronautic and space industry are still designed and analyzed using predominantly linear techniques applied to linearized models of the vehicle dynamics despite highly nonlinear effects.

Relying on significant theoretical advances that have been performed in the theory of nonlinear control in recent years, the NICE project aims at studying a wide spectrum of innovative nonlinear control and guidance techniques beyond the state of the art applied to realistic, highly nonlinear military applications. The innovative techniques to be studied within the project will be tested with three realistic models (a combat aircraft, a missile and a UAV).

The results of the project will allow flight domain extension of already existing systems, better robustness, enhanced safety, and improved predictability in case of unattended events, new airframe designs (lighter structures, unstable balance concepts) and new operation modes.



Array Passive ISAR Adaptive Processing

Indicative total value: 1.9 Million Euro
Duration: 24 months from 07/2010

Indra Sistemas (ES) — Consorzio Nazionale Interuniversitario per le Telecomunicazioni (IT) — MTA-SZTAKI (HU) Universidad de Alcalá Dpto. Teoría de la Señal y Comunicaciones Escuela Politécnica (ES) — University of Cyprus (CY) — Vitrociset (IT)

The objectives of this project are:

- Study and realize a demonstrator of a multichannel, multistatic single receiver configuration for Array Passive Radar, making use of digital signals of opportunity. The passive radar can exploit multiple frequency channels of the same Illuminator of Opportunity (IO) and/or multiple IOs located in different positions and operating in the same band (DVB-T repeaters) and/or other possible combinations. Terrestrial, airborne and space borne platforms will be taken into account.
- Define and implement an adaptive SAP-ISAR processing technique (Space Adaptive Processing- Inverse Synthetic Aperture Radar). SAP is used to filter out direct signal, direct multipath interference, jammer and hot clutter (direct signals and their multipath coming from other signal sources than the reference one) and spatially correlated clutter to have high level Signal to Disturbance. New ISAR algorithms will be developed and applied to the SAP filtered signals.

Contract A-1084-RT-GC “NANOCAP”



Novel NANOstructured optical Components for CBRN detection and high performance opto-microwave links

Indicative total value: 1.9 Million Euro

Duration: 24 months from 10/2010

DAS Photonics (ES) — Universidad Politecnica de Valencia (ES) — University of Cyprus (CY) — Selex Sistemi Integrati (IT) — Politecnico di Milano (IT) — Institute of Protein Biochemistry CNR (IT) — Centre National de la Recherche Scientifique (CNRS)/Institut Franco Allemand de St. Louis (FR)

The objective of NANOCAP is to show that the photonic integrated circuit (PIC) technology is a suitable and appropriate solution to opto-microwave filters in high performance (high rejection ratio, high Q) analog links as well as in chemical sensing applications.

The idea is to show the capabilities of a single nanotechnology platform for both applications via the development of a common device front-end building block for either tuneable optical filter for Microwave Photonics functionalities in EW systems or for optical sensors for chemical sensing. This platform will also be considered from the perspective of being compatible with mainstream CMOS electronic tools and processes.





Explosive detection – Spectroscopy, Terahertz technology and Radar

Indicative total value: 2.0 Million Euro
Duration: 24 months from
10/2010

Jožef Stefan International Postgraduate School (SI) – ONERA (FR) – Industrial Research Institute for Automation and Measurements (PL) – University of Ljubljana (SI)

The aim of the E-STAR project is to develop a prototype of a new close to real time 3D Terahertz imager and spectrometer for remote detection of hidden items with data fusion possibilities. The main emphasis of the project will be:

- The development of new algorithms and computational techniques to increase the resolution of terahertz 3D images and to make computation faster - near realtime.
- To use a new detector and antenna design to increase the sensitivity and range of the system at room temperature.
- To develop data fusion possibilities with UWB radar for exact determination of the position and shape of investigated object as well as NQR to determine the chemical composition of the object at near distances if necessary.

All the above 3 tasks are innovative and not available at present. They should significantly improve the possibilities of THz detection of hidden items. They allow for the construction of a new and improved near real time 3D THz imager and spatially resolved spectrometer with data fusion possibilities.



Personal biological aerosol tester for exposure control with high efficiency

Indicative total value: 1.4 Million Euro
Duration: 24 months from 10/2010

Bertin Technologies (FR) — EADS Deutschland (DE) — Ecole Normale Supérieure de Lyon (FR) — Inštitut Za Fizikalno Biologijo (SI) — INASMET-Tecnalia (ES) — Technological Institute “La Marañosa” (ES)

The objective is to provide a small, portable and robust device that can be integrated with the soldiers’ combat suit, for collecting biological aerosols that he/she may be exposed to during a mission. This device will allow for the discovery of airborne biohazards that may have not been detected by “detect to warn” subsystems, and will provide direct individual exposure information so that appropriate medical treatment can be administered as soon as 24 hours after inhalation.

By using newly developed chemically treated nanofibres, in conjunction with enhanced electrostatic filtration (EEF) the PATCH project is expected to overcome all major shortcomings of the current systems. Together these two innovations can provide a device that has breakthrough performance which significantly surpasses anything currently available, and is well suited for use as an integral part for soldier protection against airborne biological threats.



Metamaterials for active electronically scanned arrays

Indicative total value: 1.3 Million Euro

Duration: 24 months

Tafco Metawireless (ES) — Fraunhofer Institute for High Frequency Physics and Radar Techniques (DE) — Università degli Studi di Siena (IT) — Universidad Pública de Navarra (ES) — ONERA (FR) — Thales Systèmes Aéroportés (FR)

In this project novel metamaterial concepts are used to improve the limitations of active electronically scanned arrays. The approaches studied in the project are following:

- The reduction of the coupling between radiating elements that will result in the improvement of radiation patterns and in particular the elimination of blind spots
- The use of planar electromagnetic band gap surfaces for reducing disturbance caused other radars or active jamming in phased planar antennas
- The use of a metamaterial based radome to reject the out of band interference and, simultaneously, the in-band sidelobe interference
- The use of metamaterials in series feeding networks allows a larger frequency and better phase stability and the design of low-cost and compact RF feeding networks with higher bandwidth will be possible.





Metamaterials for active electronically scanned arrays

Indicative total value: 1.6 Million Euro

Duration: 24 months

Fraunhofer Institute for High Frequency Physics and Radar Techniques (DE) - — Warsaw University of Technology (PL) — Pro Patria Electronics (HU) — University of Cyprus (CY) — Slot Consulting (HU)

The project concentrates on the development of a new real time SAR algorithm with high resolution for UAV applications. A miniaturized broad band SAR sensor operating at a centre frequency of 94 GHz with slotted array antennas will be developed to provide the necessary raw data for processing. The radar including a pre-processing unit will fit in a small tactical UAV. The pre-processed data and telemetry information will be transmitted to ground station where it processed online to SAR images with high resolution and quality. This system design allows military and civilian user to detect, locate and identify moving targets from an airborne platform in all environment conditions. Because of the very high flexibility of the data link, the system can be extended to multiple airborne platforms in future.





Forecasts in metamaterials with extreme parameters for disruptive antennas, radomes, and cloaking in radar applications

Indicative total value: 0.3 Million Euro
Duration: 12 months

Tafco Metawireless (ES) — Fraunhofer Institute for High Frequency Physics and Radar Techniques (DE) — Ecole Supérieure d'Electricité (FR) — Universidad Publica de Navarra (ES)

This study consists of a technology forecast, the identification of areas where defence technology research is needed (the research needs are not covered by civilian research) and the establishment of roadmaps for European defence technology investments. The results of the study will allow a common understanding on the future R&T needs forming a base for joint European R&T projects in this area.



Forecast Study on Nanomaterials Integrated into Textiles for Protection Applications

Indicative total value: 0.3 Million Euro

Duration: 12 months

ISDEFE (ES) - — OUVRY (FR)

This study consists of a technology forecast, the identification of areas where defence technology research is needed (the research needs are not covered by civilian research) and the establishment of roadmaps for European defence technology investments. The results of the study will allow a common understanding on the future R&T needs forming a base for joint European R&T projects in this area.