

Collection of projects posters





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Executive summary



Jean-Luc Maté - EURIPIDES² Chairman

“*Electronics is an “enabling” technology and a “propulsive” sector directly contributing to at least 10% of the World GDP.*”

Electronics is an “enabling” technology and a “propulsive” sector directly contributing to at least 10% of the World GDP. **The electronics industry today employs about 2.5 million people in Europe.** This very large industry will grow nearly twice as fast, during the coming years, as the total world GDP.

Europe has a strong position in professional “embedded” electronic systems. This position rests on European excellence in a number of industrial leaders, such as high performing technology for aerospace, defence, transport and high technology with best cost due to high volume in automotive, industrial engineering, machinery and energy. This is a two-way synergetic relationship ; **European excellence in embedded systems also consolidates the position of the downstream incorporating industries.**

Today European industry has the opportunity to acquire strong initial positions by targeting the new markets for heterogeneous electronic product integration, smart sensors and power electronics, **enmeshed and implanted systems.** This is where the value added by the positioning of European industry and its know-how are the greatest. Europe must from the start become a major player in these revolutionary new markets.

This virtuous innovation cycle and value chain must be maintained and developed. The EURIPIDES² cluster aims to support cooperative industrial research in Europe in the crucial domain of **smart electronic systems integration.** EURIPIDES² will focus on research and development close to actual applications and marketable products that could be manufactured in Europe with competitive prices. This involves exploiting the complementarities of all the different players in the electronics scene, such as academia, SMEs, large companies, integrating companies and end-users, as partners in cooperative projects.

The heterogeneous character of the EURIPIDES² ecosystem, and of the EURIPIDES² projects partners, echoes the concept of heterogeneous electronic integration and smart electronic system integration. Maintaining and developing the strength of European industry in the field of advanced technology and production, and as a consequence, to boost employment and growth in Europe is also the ultimate objective of EURIPIDES².

The EURIPIDES² ecosystem covers activities that range all the way up the electronic systems integration value chain, from materials, equipment and technologies, through components, modules, up to embedded, mechatronics, enmeshed and implanted systems. **In 2012, these activities involve about 1.7 million employees in Europe, out of the 2.5 million employed in all the European electronics industry.**

By the end of the current decade, in 2020, the players in the EURIPIDES² domain could provide about 700 000 new jobs. Naturally all these new jobs are not only the result of the action of EURIPIDES² and its members. But in an industry where technology and innovation play a key role, supporting research and development, international cooperation and harmonisation, and the position of SMEs is a crucial factor of growth. **In this way EURIPIDES² cooperative R&D projects have a direct impact on employment and economic growth in Europe.**

EURIPIDES² Vision: European Leadership in Smart Electronic Systems Integration design development and manufacturing

This is a global strategy to set up a virtuous cycle of R&D-innovation-manufacturing in Europe, focussed on the fields where European industry is powerful. A strong leading-edge European capability will have the greatest downstream impact on incorporating industries or in every new domain where market positions are still to be established.

EURIPIDES² Mission: Innovation hub for smart sensors, smart power modules and more generally heterogeneous electronic product integration for all leading industry sectors in Europe

EURIPIDES² Strategy:

- ▶ Focus on heterogeneous electronic products integration, advanced smart sensors and power electronics
- ▶ Increased participation of SMEs building on EURIPIDES² “savoir faire” and network
- ▶ Involve European industrial leaders in supporting the definition of the innovative electronic hardware platforms
- ▶ Capitalize on its partnership with DG Connect (European Commission) to further cooperate with the EU Horizon 2020, the R&D&I framework and Key Enabling Technology areas (printed electronics, robotics, photonics, ...)
- ▶ Promote multi-sectorial projects through the EUREKA cluster co labelling
- ▶ Priority stress on following-up European innovation for manufacturing in Europe

Today the major challenge is to improve the competitiveness of European industry, and as a consequence to maintain and **create new manufacturing and employment opportunities in Europe.**

The prospects of employment evolution in the EURIPIDES² domain in Europe over the coming decade, where 700 000 new jobs can be created in Europe, show the major importance of the action of EURIPIDES², which can help make part of these new job prospects become real, through the power of the European Smart Electronic Systems technology, design and manufacturing.

¹ See Annexe 1 of *Vision, Mission and Strategy* : Methodology

² The words enmeshed and implanted systems are defined, hereunder.

The three categories we distinguish in electronic systems are :

- stand-alone electronic systems, such as TVs, mobile phones, PCs... ;
- embedded systems, such as automotive or aerospace electronics for instance, which are systems conventionally incorporated into larger pieces of equipment or platforms belonging to the electrical or mechanical engineering sectors ;
- enmeshed or implanted systems, which are a new and emergent domain, where electronic smart systems and devices are beginning to be used as inclusions in products, materials, or even living bodies, such as in textiles, clothing, building materials, animals, and the human body for health and bio applications.

³ In particular, through the experience gained in COWIN, a support action (FP7) to strengthen the European competitiveness in miniaturized smart systems. This initiative is dedicated to commercial exploitation of advanced technologies coming from collaborative European research work. In particular, COWIN facilitates interaction between public and private investment in Europe.

Introduction

EURIPIDES² is industry driven and projects involve an increasing number of participants, large companies, SMEs but also European research organizations. To-day, more than 400 organizations are or have been involved in EURIPIDES² consortia, coming from 17 countries.

In terms of participation, SMEs counts for 40%, Large companies and research organizations for 30% each.

Projects are the core business of EURIPIDES². The EURIPIDES² Council is granting the label twice a year. Since its launch, around 50 projects worth 400 million Euros in R&D have been labeled.

This booklet provides an insight on a collection of EURIPIDES² projects.

EURIPIDES² launches two calls per year, in a two-step approach, in order to maximize the chances for success and avoid unnecessary time consuming efforts in setting up projects.



Participants may submit a project Outline (PO) or a Full project proposal (FPP) either at the PO deadline or the FPP deadline.

At both stages, the EURIPIDES² office will check whether public funding would be available for partners through the Public authorities' network.

At each step, the two EURIPIDES² experts selected by the Technical Committee will assess the proposal against 34 criteria and their conclusion will be delivered in full transparency to the consortium.

Step 1: Project outline

The Project Outline (PO) provides a short overview of the concept, the objectives of the project and the partnership even if they are not entirely settled. This document allows early advice and feedback from the Technical Committee (TEC) supported by the evaluations of two external experts. The PO will facilitate preliminary discussions with and feedback from the relevant public authorities.

This step is highly recommended, but participants may submit a Full Project Proposal straightforward.

Step 2: Full project proposal

The second step in the EURIPIDES² evaluation procedure is, for projects that have been accepted at PO (Project Outline) level, to submit a Full Project Proposal (FPP).

The FPP is an important document within EURIPIDES². It is used for the evaluation and labelling of new projects and it is also the basis for the reporting and monitoring procedure.

1. 3DICE

3D Integrated Of Chips Using Embedding Technologies

PROJECT GOALS	KEYWORDS
<ul style="list-style-type: none"> - To develop up to industrial demonstration new 3D integration architectures 3D-WLSiP (3D Wafer Level System in Package) & 3D Polymer SiP - Compatible with high volumes production - For Nomadic application : Telecom & SmartCard 	<ul style="list-style-type: none"> 3D-WLSiP 3D-Polymer SiP Die embedded in Die (DeD) 3D Wafer Level Packaging High volumes / Low costs markets Functional demonstrators

MAJOR CHALLENGES & ACHIEVEMENTS

- Copper interconnect**: Die 2 die Cu interconnect
- Cu / Cu Sn cap interconnect**: Cu buttons 50um diam, 8um height
- Thick dielectric interconnect**: High topography lithography
- TSV Etch A/R = 10:1**: No Bowing / Low scalloping
- High A/R TSV / TPV**
- HAR Cu filled TSV**: Voids free
- Wafer level Molding**
- Wafer thinning & stress relief**
- Chip to Wafer (C2W) assembly**
- Thin Wafer handling**
- Thin wafer sawing**
- Modeling & mechanical characterization**



2. BoB

Board on Board

Board On Board



Starting date : 01/12/11 (3 years)

Budget : 5.3 M€

Coordinators : Agnès Fritsch, agnes.fritsch@thalesgroup.com

Paul-Henry Morel, paul-henry.morel@thalesgroup.com

Abstract

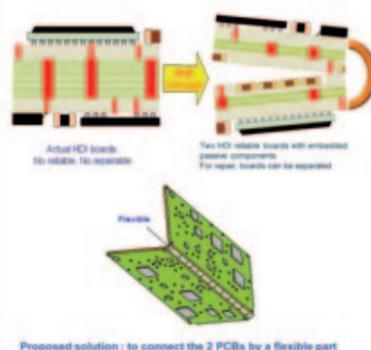
Very High density board (PCB & components) is not always compatible with reliability in harsh environments and reparability. BoB will propose a set of emergent technologies to go beyond the results of IPITECH (Euripides project N° 06-1 86 ended on April 2011) to meet the goals of :

- reliability with low placebound and mirror design with reparability
- cost effectiveness in low volumes

To reach these goals, an architecture based on 2 high density PCBs connected by a flexible is proposed with several challenging solutions

Keywords

High density, signal & power integrity, reliability, harsh environment, low volumes, cost effectiveness, repair, simulation



Fields of Application

Radio communication products based on embedded systems, low power and highly reliable such as PMR for rescue teams, secured governmental phones



Consortium overview

Requirements & Specifications

THALES

Process Development

AT&S, Celestica, CIMULEC

Design

THALES

Reliability tests

LEMS, THALES, CERB

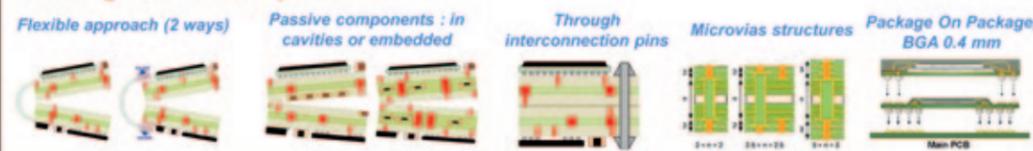
Simulation

LEMS, THALES, TU WIEN

Main challenges

- More than 10 000 interconnects / dm²
- Keep board thickness between 1.6 and 2 mm
- Gain 30 to 50% integration level
- Use of a flexible with a very low bending radius
- Integrate passive components in cavities
- Signal integrity
- Respect harsh environment constraints including mechanical
- Reliability after rework and repair (mounting, un-mounting)

Technologies under development

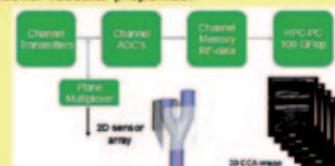


3. CARUS

Carotid 3D High Frame Rate Ultrasound Scanner For Advanced Diagnosis Of Cardiovascular Disease

Aims

The CARUS project aims at the development of early predictive and advanced diagnosis technology for atherosclerosis in the carotid artery in response to the major health issues associated with cardiovascular diseases. The ultimate technological goal of the project is to develop an innovative high frame rate matrix ultrasound system for non-invasive real-time three-dimensional quantitative assessment of structural and functional vascular properties.

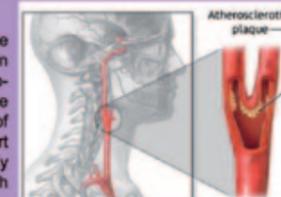


Requirements

- The project intelligently combines:
 - A high-density matrix sensor,
 - Integrated novel package of imaging electronics,
 - High frame rate 3D ultrasound beam forming,
 - Specialized 3D software.

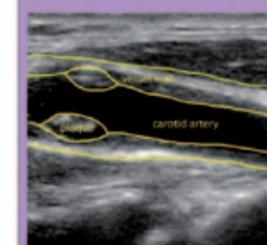
Atherosclerosis

Cardiovascular diseases including stroke are the most important causes of mortality in the Western World. The cause of these diseases is atherosclerosis. Atherosclerotic plaques near the bifurcations of the carotids form the major cause of stroke. Coronary artery disease (causing e.g. a heart attack) and carotid vascular disease are strongly related. The carotid artery can be assessed with ultrasound much better than the coronary arteries.



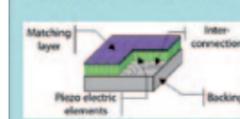
3D Ultrasound

Ultrasound is the most widely used diagnostic technique for cardiovascular patients, because of its versatility, ease of use, cost effectiveness, reproducibility and patient's tolerance. The presence and properties of atherosclerotic plaques within a single plane of observation can be shown by two-dimensional (2D) ultrasound (US) imaging techniques.



However, the properties of a plaque, such as size, location and the presence of angiogenesis, can be presented in more detail, without out of plane motion, with three-dimensional (3D) ultrasound techniques allowing an early predictive and advanced diagnosis.

Probe development



The 2D probe is developed by Vernon, Tours. It consists of 32 by 32 elements, sized 0.4 mm squared. The first prototype is ready and ErasmusMC (Rotterdam) is currently measuring the impedance and pulse echo response.



Electronics

The matrix probe will be connected to a 128 channel transmitter/ receiver system. Addressing 1024 elements means requires complex switching/multiplexer electronics. ErasmusMC designed the interfacing electronics. Esaote (Maastricht) will physically realize this design and Vernon takes care of the interconnect between probe and electronics.

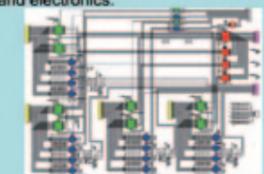
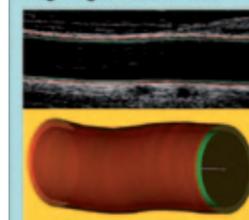


Image segmentation

Pie Medical (Maastricht) has already realized the segmentation of 2D images along the vessel, intima media thickness is found and measured. The current challenge is to perform image segmentation in 3D.



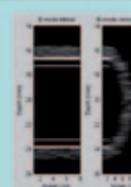
Clinical testing

Clinical testing of the CARUS probe will take place in HEGP (Paris) and ErasmusMC. The future clinical research is targeting at disease of the arterial wall, biomechanics and pharmacology of large artery remodeling.

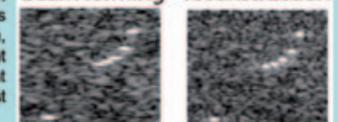


Beam formation

Both CARIM (Maastricht) and Esaote work on simulations of the beam formation. CARIM researches the dependency of angle between surface and beam, such that the image of a (circular) vessel is independent of the observation angle. Esaote simulated different transmit and receive beams in order to find the fastest mode, which still provides quantifiable images.



Traditional beam forming vs Plane wave reconstruction



4. CERAMJET

Ceramic Electronic Components By Inkjet Printing

Ink-Jet Printing : generalities

3D micro-positioning system
Patented technology (PCT/FR04/02150)
Multi-nozzle printhead
Specific inks (metal, ceramic, etc.)
Material 1
Material 2
CeraPrinter X-Series

Before printing : preparing the right ink

- Choose the right powder according to the targeted application
 - conduction, insulative, properties
 - entering temperature
- Adjust particle size to avoid nozzle clogging → milling step
 - fine powder → Milled powder
- Adjust dispensing nature and concentration for each powder to avoid powder settlement
 - Bad ink → Good ink
- Introduce the right additives to adjust
 - quality of ejection
 - droplet spreading
 - layer drying
 - printed part mechanical properties

$Re = \frac{\rho \cdot v \cdot d}{\eta}$ $We = \frac{\rho \cdot v^2 \cdot d}{\gamma}$
 $1 < \frac{Re}{\sqrt{We}} < 10$

A software adapted to all the applications: CeraSlice

- Slicing software
- High level of flexibility and freedom in printing parts
- Specific tools for MLCC components
- Conversion for experimental designs in fabrication

- Design 3D component
- Select every parameters for each material
- Component slicing
- Simulator check
- Actions addition

Printing head information
 Calculated fabrication parameters
 Inks information
 Filing strategy

MLCC

Progressive fabrication without moving the sample

- Ceramic cover
- Second electrode
- First electrode
- Internal dielectric layers

- Automatic change of printhead for use of both inks
- High precision for electrode printing: 120 μm margins respect

Complete component : 15 electrodes
Height : 800 μm

- Crack-free parts
- Straight sides in the 3 dimensions
- Use of a removable organic substrate: no binding after sintering
- Required thicknesses for internal electrodes and dielectric layers are reached

Thick Films

Ag components on dense ceramic substrate

Test Vehicle #1
Test Vehicle #2

Demonstrator

- Good droplet positioning, excellent repeatability
- Good line definition
- About 10 μm thick
- Reproducible manufacturing
- Crack-free green and sintered tracks

Component 100% underfilling
Good silver adhesion on the substrate
Correct conductivity after sintering

HTCC

W/Al₂O₃ tracks

W/Al₂O₃ via filling feasibility

- Good continuous and crack-free tracks
- Al₂O₃ ratio 7% → no cracks after sintering but substrate torn on the edges
- Al₂O₃ ratio 9% → tracks conductivity 3x (better when tracks are buried)

Vias (80 & 200 μm) can be filled by ink jet printing process
When substrate taken off the chuck, filled vias stay on the chuck
Addition of a removable organic sheet between substrate and chuck

MLCC

- Identify final metal ink
- Control dielectric properties
- Print completely straight parts
- Reach the same results on bigger components
- Develop new functionalities of CeraSlice too allow printing of crack-free big parts.

Thick Films

- Make exactly the same parts as industrial actors today by ink-jet printing
- Transfer Ink-Jet Printing process to industry

HTCC

- Work on W/Al₂O₃ formulation (ejection is still too changing in time)
- Electrical characterisation of other test vehicles
- Sintering trials on other test vehicles
- Enlarge ink formulation so as it can be used for several applications
- Improve vias filling

5. COSY3D

CCompact Secure SYstem in 3D

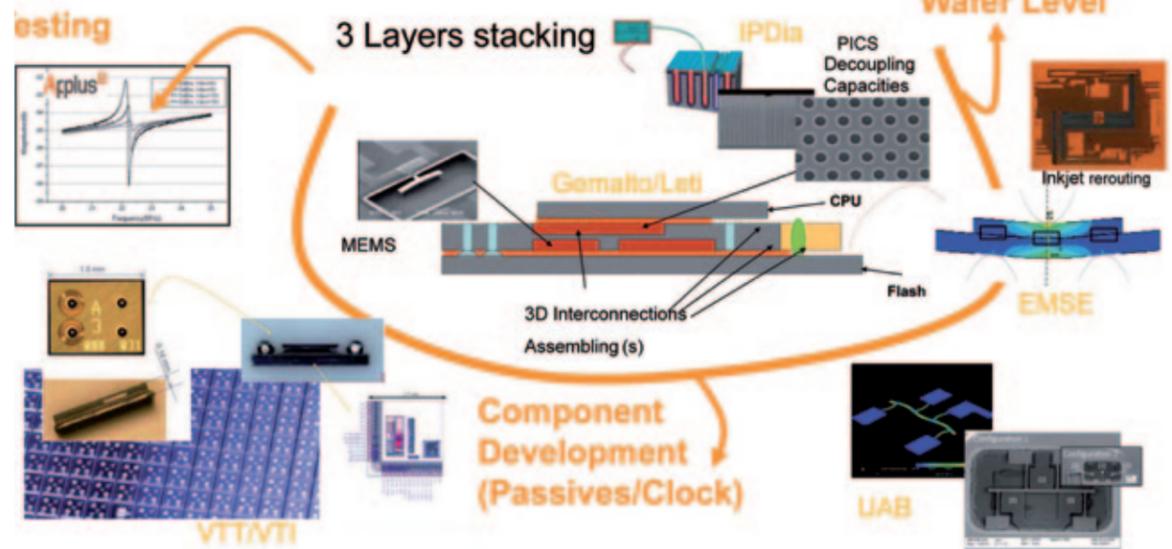
Objectives :

Collaboration with industrial, research centres and academia to create an innovative, highly secure and portable intelligent system, for:

- advanced telephony,
- multimedia,
- secure transactions,
- enterprise access (digital & physical).

Solutions:

- Structured 3D system enable the functions of Memory & CPU in smallest volume as possible (LETI/GTO/Datacon)
- Stable MEMs based Oscillator for USB (48MHz) (VTI/VTI/UAB)
- Si Integrated Capacitor (PICS). Enlarge Capacity/mm² (250nF).
- Comparison between vias in Si/vias in Polymer (Via Belt).
- All of these components will be integrated in a vertical manner at Wafer Level ; "Front Side Connected Die Stacking" (Gemalto-Assembly/LETI-ViaBelt/IPDIA-TSV/EMSE-Jetting&Modelisation/Datacon)
- and will exhibit very short, vertical low capacitance interconnections with associated performance improvements over more conventional MCM approaches (Testing Applus/Gemalto)



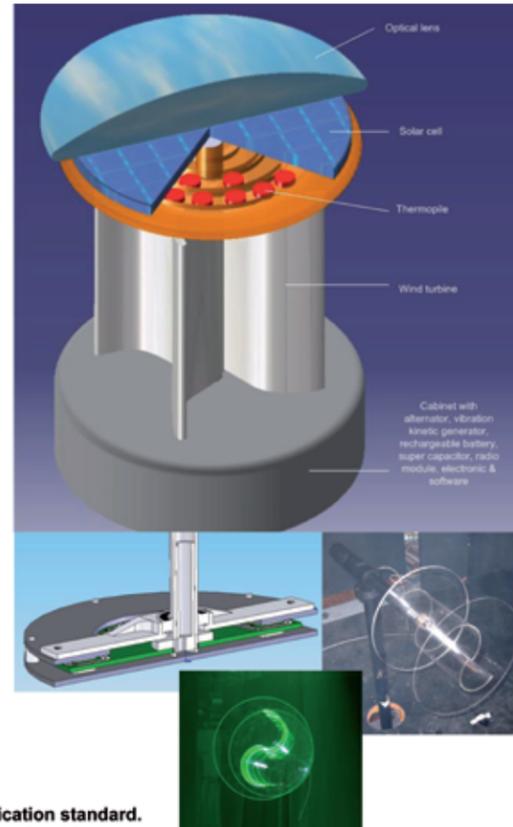
6. ENERPACK

Multi Low Power Energy Source Packaging

Main objective

Packaging a new multi low-power energy source system with :

- High integration scale of multiple technologies : optic, silicon, mechanic, piezoelectricity, thermo engineering.
- Use of renewable energies : sun, wind, t², mechanical vibrations and pulses.
- Improvement of the global efficiency by closed association of the different micro sources.
- Electrical energy production : up to 20Wh per day.
- Wireless control.
- Substantive cost cuts in regard with the usual hardwired solutions.
- Low cost and free maintenance.



Challenge

- Getting a smart and low cost package.
- Integration of all the necessary micro renewable energy transducers.
- Outdoor environmental constraint consideration.
- Regular energy production everywhere in the world.
- Multi function component and circuit interconnection.
- Embedded processing architecture.
- Research for efficient association of the micro sources.
- Research for efficient energy storage architecture.
- Use of low-power circuits and components.
- Use of CMOS technology.

Solution

- Electronic core : low-power processor and wireless communication standard.
- Embedded software: Absolute Maximum Power Point Tracking algorithm.
- Complementary micro renewable energy sources : solar cells, thermopiles, micro kinetic generator, original wind turbine, fuel cells.
- Energy storage components: complementary components like lead or lithium battery, super capacitor.
- Standard wireless communication for sensor data and meteorological forecast data to and from the supervisor.
- Thermal integration and interconnection for increasing the temperature delta inside the package.

Applications

- Environment monitoring: quality and toxicity surveillance of the air and water, seismic surveillance, flood sensors, great infrastructure surveillance (bridge, ...).
- Surveillance and protection of sensitive sites : nuclear plants, atomic research centers, energy distribution networks, water tanks, Seveso industrial factories, pipelines, borders, containers.
- Outdoor public area surveillance and control : crossroad, highway, airport, harbor, train station.
- Nomad smart device supplying (smart phones, laptops, play stations, GPS, ...).

Project started in December 2009



7. FLEXILVIA

Flexible Inlays In Large Volume For Identification Application

Introduction : Project outlines, partnership

1 The RFID (Radio-Frequency Identification) market is promised to be a huge one for the coming years and will be deployed through a wide range of applications both for people and products identification.

RFID Market

2 The main goal of the project is to develop flexible RFID inlays and associated reel-to-reel processes compatible with a high volume production.

- The RFID inlays are made of flexible substrates on which small silicon chips are assembled by flip-chip.
- The proper reel-to-reel mass-production processes suitable in making antennae on flexible substrates and assembling the chips on them with both increased yield, throughput, reliability, and high volume while being low cost is the key objective

Overall RFID system

Scope of the project

Partnership aims at enabling a complete value chain of inlays

Key Technologies

3 Antenna design&Testing

- Impedance matching
- Wave propagation
- From 13.56 Mhz to 900 Mhz

Anechoic chamber for UHF measurement

Flex substrates

- Thin PET handling
- Etching, Printing and plating
- Reel to reel process

Cylinder for gravure printing and additive Copper metallization

Assembly&Packaging

- Ni/Au and Au Bumping
- High speed adhesive bonding
- ACP and NCP adhesives

Flip chip on flex

converting

- Reel to reel process
- Adhesive bonding
- Labelling&Slitting

Structure of a RFID label

Main Achievements

4 Designs in HF and UHF antennae have been simulated and measured meeting the requirements of the final demo which have been selected and focused on textile and libraries applications

Antenna Design and typical Radiation pattern of UHF antenna

Reading distance measurements test bench

Libraries demo in HF

Trolley for RFID reading

5 Antennae have been manufactured in reel to reel based on PET substrates and additive Copper processes (printing and plating).

- Dice less than 0.4 mm SQ on wafer form has been assembled with a high speed equipment on the flex in reel to reel form by the means of adhesive
- Converting process has been successfully carried out

Additive process web multi rows

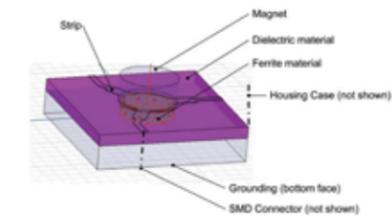
During roll converting process

Antenna pads area. Chip and Die Attach



8. IMICIMO

Integrated Miniature Circulators For Microwave Modules



Circulator Design Simulation with Co-sintered Materials

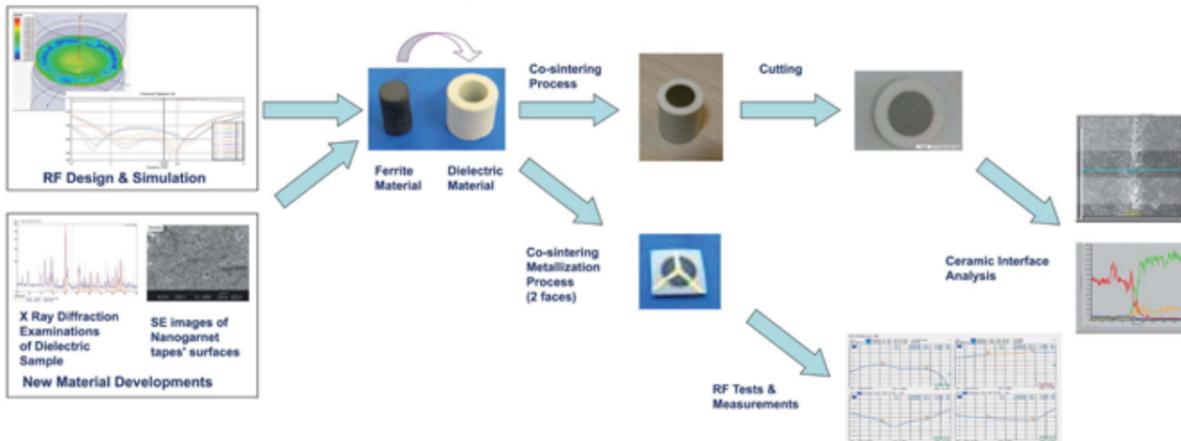
Targets:

◆ New materials and manufacturing technologies for microwave ferrite circulators and isolators

- Reduction of the device size, weight and cost
- Facilitate integration and packaging in mobile telecommunication equipment of new generation
- Low cost and high volume reproducibility

◆ Low temperature co-fired systems (LTCC) for low cost, multi-layer ferrite device structures, integration of ferrite devices with active semiconductor and/or advanced microwave interconnection and packaging techniques for future large volume mm-wave applications.

◆ Set up an high-efficiency European supply chain of microwave ferrite components



Fields of Application: Microwave Transmit/Receive modules for Radars and Telecom applications

Duration: 36 months

Partners:

	Cobham Microwave	France
	Thales Research & Technologies	France
	Thales Systèmes Aéroports	France
	LABoratory of Sciences and Technologies for Information, Communication and knowledge (Lab-STICC UMR CNRS 3192)	France
	Temex Ceramics	France
	TKI-Ferrit Development and Manufacturing Ltd.	Hungary
	Budapest University of Technology and Economics	Hungary
	Pro Patria Electronics	Hungary
	Jožef Stefan Institute	Slovenia
	Keko Equipment	Slovenia
	Telecommunication Research Institute (PIT)	Poland

9. INTEX

Intelligent Sensing And Communicating Textile

Abstract

Kick off meeting: 17. - 19. 05. 2010 Project start: 01. 05. 2010
2nd Progress meeting: 25. - 26. 05. 2011 Project duration: 4 years

Keywords

Intelligent textile, advanced screen printing, gas sensors, vapour sensors.

Fields of application

Personalised health and safety care, integrated sensor modules for textile products and intelligent beds.

Key project achievements

- Very fine line prints obtained using innovative screens.
- Non-conventional stainless steel meshes and new emulsions.
- Integrated low cost sensor elements on organic and inorganic basis for smart textile.
- Technological platform for industrial exploitation in place.

Consortium overview

TESLA BLATNA, a. s. Czech Republic – project leader
G.BOPP + CO. AG, Switzerland
BVK Hradec Kralove, s. r. o. Czech Republic
CEA Leti, France
Kissel + Wolf GmbH, Germany
Microcircuit International, France
University of West Bohemia, Czech Republic

Project objectives

- Development of a new generation of printing process: ultra thin film deposition below 1 μm, printing on alumina, silicon and textile substrates.
- Development of functional building blocks of the smart micro system for intelligent working clothing, beds, and similar applications including system communication.
- Smart system application in firemen clothing and other working clothing.

Project results

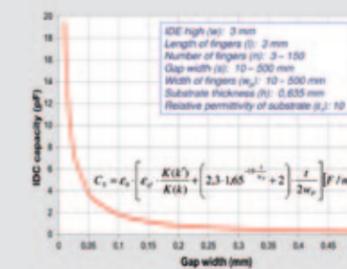


Fig. 1: UWB sensor structure design based on the conformal mapping method.

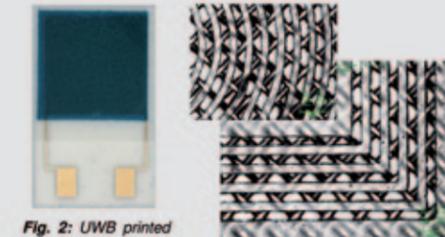


Fig. 2: UWB printed organic sensing film on the TESLA interdigital electrodes structure.



Fig. 3: 25 μm circle lines and lines with sharp corners - KIWO emulsion.

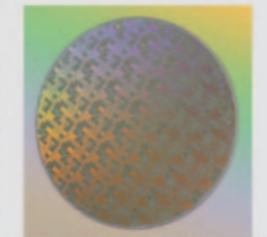


Fig. 4: CEA-Leti silicon wafer with Bulk Acoustic Waves (BAW) resonators using screen printing procedures for gas sensitive polymers deposition.



Fig. 5: MCI advanced screen with BOPP precision mesh and KIWO emulsion.

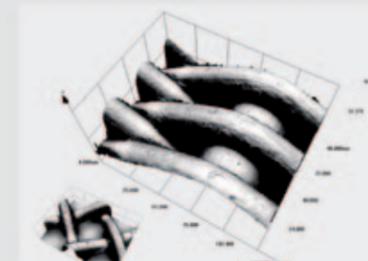


Fig. 6: BOPP non-conventional stainless steel precision mesh in comparison to square mesh.



Fig. 7: Screen printing on alumina substrate in TESLA.



10. IPITECH

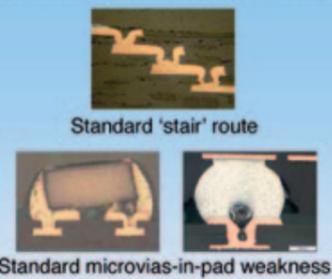
Innovative Pcb (Printed Circuit Board) Integration Technologie For Hdi Board In Harsh Environment

Objectives

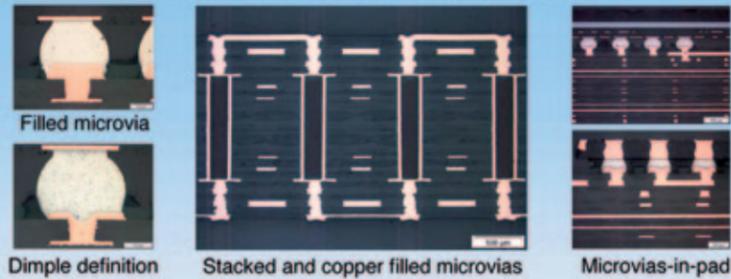
- ❑ Assess, adapt and validate new High Density PCB technologies in HARSH ENVIRONMENTS
 - Copper filled microvias
 - Stacked-microvias
 - Microvias-in-pad
- ❑ Assess the impact of these new technologies on Signal Integrity
 - Define by an experimental approach the contributions of the IPITECH technology on Signal Integrity
 - Establish new design rules to ensure reliable multi-gigahertz data transmissions

Microvia Technology

Standard microvias technology



New High Density PCB technologies

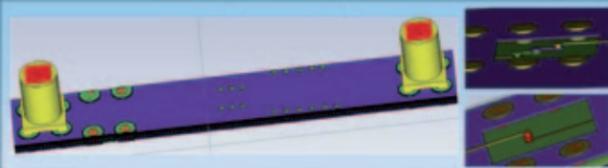


Technical Advantages

- ❑ Route BGA with a pitch as small as 0.4 or 0.5 mm
- ❑ Allow densification of routing and surface components
- ❑ Improve the thermal impedance of vias

Signal and Power Integrity

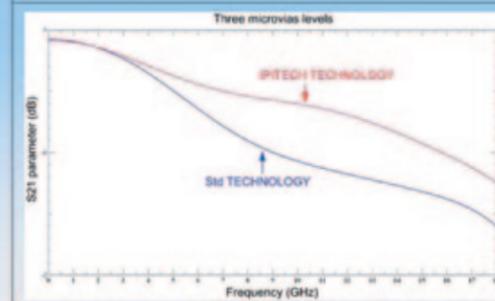
3D Signal Integrity models



Technical Advantages

- ❑ Reduce line impedance discontinuities
- ❑ Improve the integrity of powers planes

S21: Transmission coefficients



11. IQFUEL

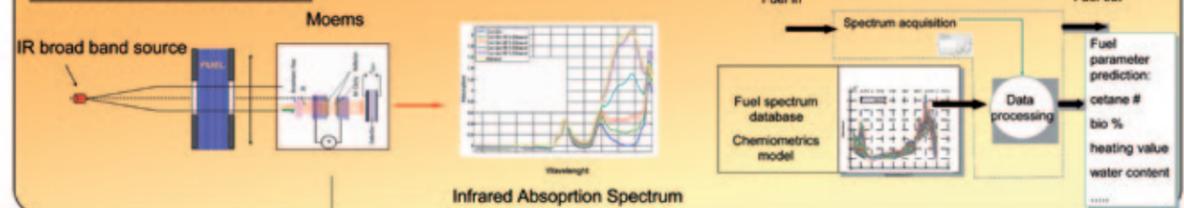
Integrated Sensor For Determining Quality Of Fuel

INTRODUCTION:

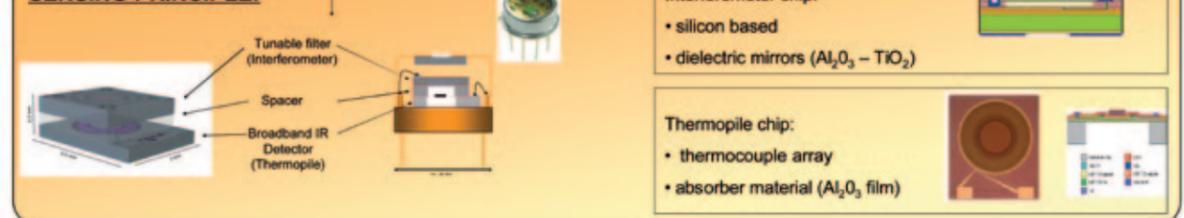
"IQF sensor project" is devoted to development of one automotive embedded sensor (MOEMS based) for real time measurement of used fuel composition together with related engine and exhaust gas aftertreatment control function. Fuel type can be either diesel or gasoline.

The sensor is using Near Infrared Absorption spectroscopy together with mathematical model (chemiometry) to predict the fuel parameters relevant for engine combustion and exhaust gas aftertreatment efficiency. The spectrometer and detection units are based on 2 MOEMS components integrated within one single package.

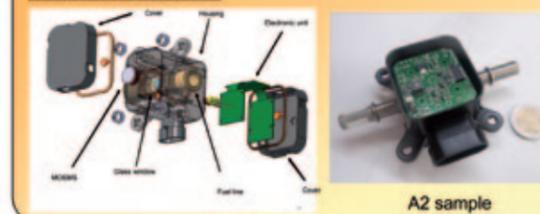
MOEMS SPECTROMETER:



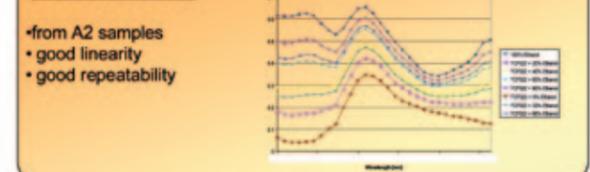
SENSING PRINCIPLE:



SENSOR DESIGN:



LAB RESULTS:



TARGET SPECIFICATION:

Measurement location: in fuel line	Measurement Range	Accuracy
Pressure Range: <10bar	Heating Value	±0.5%
Temperature range: -40°C to +85°C	Water content	±0.1gpt
Sensor Signal: CAN, SENT	Dependence on SOI	±4%
No field calibration	Specification tightness	±2%
	Resolution	±0.01gpt
	Element Concentration	±1.00% vol ±1.5%
	Other info	±2
	Red upper pressure	200-1100 mPa ±20 mPa

BENEFITS:

- Optimization of engine and after treatment units efficiency (DPF, SCR, CO): reduction of CO₂, NO_x, particle emission and fuel economy
- Improvement of drivability (e.g.: engine knocking, cold start)
- Engine component reliability improvement
- Same concept can be used for Oil and AdBlue diagnostic

PROJECT DATA:

Starting: April 2008
Closure: October 2011
Budget: 8.1 Meuros
Man Power: 519 MenMonths

SP1: specification/added value - completed
SP2/SP3: sensor/MOEMS design - 50%
SP4: engine control function - 10%
SP5: test/validation - 0%



12. MEGA

Next Generation Intelligent Microsystems Based On Wide Band Gap Materials

Abstract: Intelligent and Integrated Micro-Systems (IMS) represent the next electronic evolutionary step for the simultaneous integration of sensing, processing, actuation and power management, in order to achieve advanced functions such as multi-spectral processing, real time data analysis and adaptability in response to a changing environment. The IMS will have to achieve autonomous and self-reconfigurable operations, for real-time and efficient self-optimization of their performance. MEGA project is aimed at bringing together advanced microwave functions using wide band gap (WBG) devices along with RF MEMS active interconnections.

Fields of Application

Applications
The technological trends for transmit and receive front end systems for many kinds of applications will be considered like:

- Communications with narrow or wideband frequency ranges
- Civilian airborne applications with important functionalities like maritime surveillance or weather radar, both in X band
- Civilian space applications like environmental monitoring and cartography in X-band

Core Application Markets: **Aeronautics & Aerospace; Sensors**



We can see that the today GaAs process will be replaced in a narrow future by GaN process for power circuits and also low-noise circuits; concerning the power switches, today we use circulators, which are big, high cost and not available for all applications; so MEMS power switches are mandatory for better integration with lower cost, and sometimes just for feasibility aspects.

Project vision & innovation

Technology

- ✓ WBG semiconductors such as GaN exhibit unique physical properties that make them very attractive for RF applications, e.g. in the base station market, as well as for creating a new generation of sensing devices able to work in harsh environments (temperatures higher than 600 °C) and suited for numerous applications in the fields of aeronautics and aerospace, automotive, oil drilling, etc.
- Power performance
- Efficiency
- Suitable reconfigurable architectures
- Adaptability to operational changes

✓ RF-MEMS appear as a complementary technology to achieve the re-configurability required for IMS thanks to their high RF performances, low-power consumption, high linearity and high level of integration.

Innovation

- Integration of WBG devices with RF MEMS functions
- WBG devices: GaN-based MMICs (LNA and HPA)
- MEMS functions: SPDTs, phase shifters

Challenges

- ✓ MEMS fabrication must be compliant with those adopted for GaN RF device production
- ✓ Integration of both MMICs and MEMS functions onto the same substrate
- ✓ Demonstration of a smart phased array antenna
 - Several T/R modules emitting 10 W at 10 GHz
 - For next-generation communication systems: capability to reconfigure the radiated beam
 - For many applications: Integrated high-power front-end will be necessary

MEGA Overview

- ✓ Total cost: 8.5 ME
- ✓ Euripides contribution: 30 %
- ✓ 6 European Partners
- ✓ 3 countries
- ✓ 2 large industries
- ✓ 2 innovative SMEs
- ✓ 2 academic institutes
- ✓ Coordinator: Thales Research & Technology Fr
- ✓ Duration: 3 years (T₁ = 1st Nov 2008)

Work Plan

- ✓ WP1: MEMS switch design on AlGaIn/GaN thin film technology
- ✓ WP2: GaN based MEMS switch fabrication and test
- ✓ WP3: Design, fabrication and test of SPDT
- ✓ WP4: AlGaIn/GaN HEMT and MEMS integration
- ✓ WP5: Antenna demonstrator
- ✓ WP6: Exploitation activities
- ✓ WP7: Management activities

Core Technology Competences: Conception, design & simulation; Active material; Technologies

Target Specifications (@ 10 GHz)

Specification	MEMS Technology	Power	Power	Power
Power	10 W	10 W	10 W	10 W
Efficiency	30 %	30 %	30 %	30 %
Linearity	30 dBm	30 dBm	30 dBm	30 dBm
Size	10 mm	10 mm	10 mm	10 mm
Cost	10 €	10 €	10 €	10 €

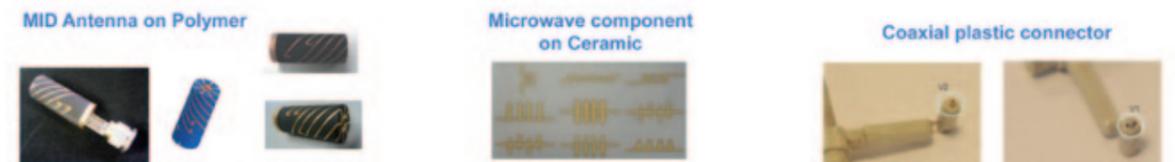
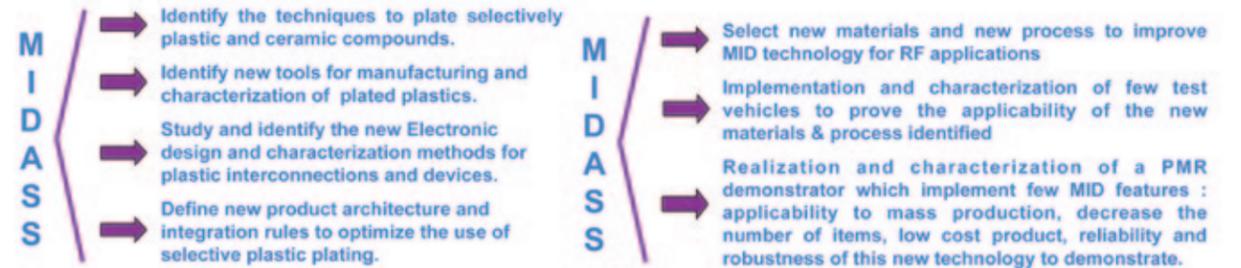
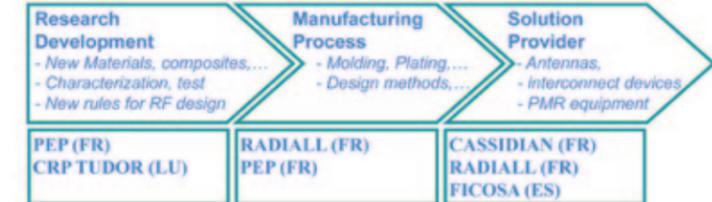


13. MIDASS

Moulded Interconnect Device Applied To Smart Systems

Project Organization

6 Sub-projects
Duration : 36 months
Leader : CASSIDIAN
Kick-off : January 2008
End of project : December 2010



Vehicular AM/FM antennas

GOAL: Substitute the external flexible PCB corresponding to AM/FM fractal antenna from the Rear-View Mirror and have conductive tracks directly to the plastic piece.

PROCESS:

1. The moulded piece material (PC/ABS) is substituted by PC/ABS Xantar LDS3710
2. Activation and Plating
3. Assembly in final mirror



PMR Handheld UHF antennas



14. MIDIMU-HD

Mixed Microwave & Digital Multiplayer Pcb For High Density Applications

Abstract
The MIDIMU-HD project is aimed at the development of a new technology making possible the design and manufacture of high density mixed microwave and digital printed circuit boards made of multilayer dielectric material. The major innovations include integrated frequency filters and other microwave functions coupled with stacked copper-filled microvia and HDI technologies. This new approach will enable significant improvement of the long-term reliability of printed circuit boards, which is a strong demand of end users in professional electronics.

The project will offer an opportunity to develop a highly integrated transceiver module operating in a target bandwidth of 40.5 – 43.5 GHz, which will allow a major advance in WLAN networks, satellite communications, point-to-point and point-to-multipoint networks, mobile network (3G, 4G) applications.

Keywords
Radio Frequency
Printed Circuit Board
40-45 GHz Bandwidth / Wireless Access
Embedded Pass Band Filter / Transmitter
Fine Pitch Components / High Density Interconnect
Dielectric Substrate
Industrial Manufacturing

Fields of Application
The MIDIMU-HD project is dedicated to the development of transmitter modules for microwave Point-to-Multipoint Backhaul applications. The target Wireless Access Networks are designed to provide connection between NTE (Network Terminal Equipment) and Operators Core Networks for the mobile or stationary telecommunication services such as voice, data, or video transmission.

Consortium members / Complementaries / R&D share
A consortium has been formed to take benefit of the partners' best complementary skills. The project objective can be fully reached due to the highest competences, background, and complementary skills of the team of partners. All partners have been carefully chosen for the consortium in order to guarantee high synergy level and high probability of success in terms of matching market requirements.

AT&S (Austria) is the largest PCB manufacturer in EUROPE ranking among the largest manufacturers worldwide. PROTEONS GTB (France), a partner of Thales for the concept and manufacturing of microwave PCB, is the best complement to AT&S. PANASONIC (Austria) has established the production facilities for PCB substrates in the world's key market locations and capitalizes on leading technology to research, develop, and manufacture substrates for multilayer PCBs. SWEREA IVF (Sweden) offers support having many years of experience and using well-established test methods for electronics. LABSTICC (France) is a modern laboratory dedicated to establishing a standard for developments in the communication field, it has been selected for its background and great experience in frequency filters design. FLEXTRONICS (Sweden) is involved in this project to make sure that the assembly and repair of the assembled boards are done in the best possible way to guarantee that the processes are commercially feasible. THALES Global Services (France) provides competitive advantages to the consortium by transferring leading edge ideas & skills to the partners; it is involved in MIDIMU-HD project particularly due to the expertise in torsion tests and thermal shock tests with continuous monitoring. THALES Communication & Security (France) is in charge of electrical tests, compiling specifications, coordination and links with the operator and equipment suppliers.

Project Objectives

- Development and validation of a substrate material matching the dielectric and loss properties for high frequency application, available in a large range of laminates and prepregs in order to be compatible with multilayer structures.
- Conception and design of a pass band filter for Q-Band (40-44 GHz) on an organic substrate using industrial manufacturing rules.
- Build-up and integration of multilayer PCB for high frequency applications (board integration concept, HDI, fine pitch BGA).
- Combining RF functions (including pass band filter, power amplifier and up-converter), and HDI design on a same organic multilayer PCB.
- Validation of the structure; assembly and repair process development; electrical tests; reliability estimation.
- Cost-effective production and testing of a Tx/Rx test vehicle for LTE node equipment.

Project Solutions / Results
The MIDIMU-HD project has been started in January 2012. The first step of the project, substrate selection, is completed with the recommendation of a resin-based material suitable for upgrading to meet specific electrical requirements.

Specifications are reaching the approval point; the work packages 3 and 4 have been started to specify the frequency filter build-up, HDI interconnection, and integration technologies. The pictures below present the first concepts of filter build-up, filter integration, and HDI interconnection concept.

The first test vehicles have been manufactured. They are aimed at the substrate and conductive material validation and production process development.



15. MINIMEMMS

High-Reliability, High-Power & High Speed Rf Tuning Applications Based On Miniaturised Mems. Switched Capacitors

TECHNOLOGY & INNOVATION

	Standard MEMS	MiniMEMS Coats
Beam size	250x100 µm ²	20x10 µm ²
Gap	2 µm	0.25 µm
Capacitance ratio	30-150	3-30
Switching time	> 1 µs	200 ns
Reliability	< 10 ¹¹	> 10 ¹²
Power handling	< 5 W	5 W

Miniaturization of RF-MEMS allows:

- ✓ Faster switching time at standard actuation voltage
- ✓ Improved mechanical/thermal stability
- ✓ Improved repeatability of fabrication process and relaxed packaging conditions
- ✓ Improved reliability

MiniMEMS will develop two routes for the miniaturised MEMS fabrication process:

- ✓ A secure and low-risk fabrication process using standard MEMS with Si technologies, compliant with short time-to-market transfer to foundry.
- ✓ The challenging but very promising miniaturization route

PROJECT OBJECTIVES & WORK PLAN

Component level: MiniMEMS switched capacitors

Functional level:

- ✓ Tunable (multi-bits) matching/ filtering circuits on Si / GaN substrates for frequency-agile (multi-band) LNA
- ✓ Phase-shifting cells (3-16-bit) for X-Band reflect array antennas

System level: Demonstrators

- ✓ Partial reflect array antenna for weather Radar
- ✓ Replacing mechanically scanned parabolic reflector antennas for reliability, agility and low cost
- ✓ Partial reflect array antenna for wake vortex detection
- ✓ Adaptive receiver for ATM applications
 - Hybrid integration (external limiter and LNA)
 - Monolithic integration of tunable filter and the LNA on the same GaN substrate

Aerona Business (TRN) (Working frequency: 11 GHz)	
Function level: Tunable Filter	
Tuning range	200-1000 MHz (0.5 bits resolution)
Losses	< 1.5 dB
SWR (dBS)	10 MHz (high-Q filter)
Bandwidth	500-1000 MHz (medium-Q filter)
Reliability	> 10 ¹¹ @ 25 MHz from 1. High-Q
Size	20x20 µm (2x1 GHz from 1. medium-Q)
Power consumption	< 10 mW
System level: Adaptive receiver	
Integration	Hybrid / Monolithic
Control	GPS
Operating range	200-500 MHz (0.5 bits resolution) / 200-1000 MHz (0.5 bits resolution)
Loss	1.5-11 dB
SWR	1.4 dB
Noise Figure	3.4 dB
Linearity	Power handling: 2W Loss: 1 dB IMD3: +16dB 1st harmonic: 20dBm Gain: 13 dB
Linearity	Depends on the robustness of the GaN LNA
Linearity	Gain: 10-40 dB Flatness: 2 dB Noise figure: 2 dB
Linearity	Power consumption: < 10 mW (1W)

PARTIAL REFLECT ARRAY (PRA) (Working frequency: 5.5-6 GHz)	
Function level: Phase Shifter	
Phase range	0-360°
Phase resolution	3°
Insertion loss	< 1 dB
Switching time	< 100 ns
Power handling	20 W (peak), 2 W (average)
Reliability	> 10 ¹¹ cycles
System level: Partial Reflect Array	
Size	~200 mm x 250 mm (corresponding approx. to 450 radiating elements and 50 phase shifters)
Element	TBD
Polarization	Two orthogonal polarizations with matching scan losses
Side lobes	< -10 dB
Cross-pol	< -35 dB

PARTIAL REFLECT ARRAY (PRA) (Working frequency: 11 GHz)	
Specifications: Phase Shifter	
Size	12 x 12 mm ²
Phase range	0-360°
Phase resolution	3 bits
Dispersions	Phase: 0.1 mrad
Insertion loss	0.6 dB (peak)
Switching time	< 100 ns
Power handling	0.2 W (average), 1 W (peak)
Reliability	> 10 ¹¹ cycles
Specifications: Partial Reflect Array	
Size	Gain = 60mm for a hexagonal sub-array of 18 phase shifters Total diam = 200 mm (7.9 wavelength)
T' range	-40°C to +70°C (storage) / 0°C to 70°C
Polarization	Linear
Cross-pol	< 20dB

APPLICATIONS & MARKET FIELDS

- Targeted applications and markets
 - ✓ Weather radars
 - ✓ Wake vortex detection radars
 - ✓ Air Traffic Management
 - ✓ RF wireless communication systems, consumer electronics



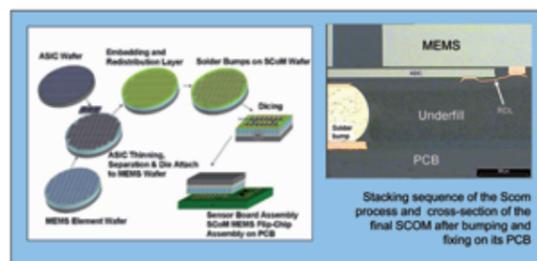
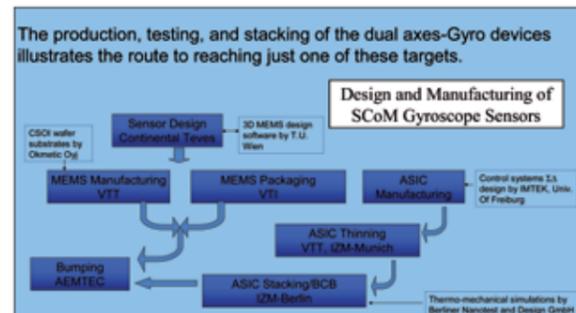
16. RESTLES

Reliable System Level Integration Of Stacks Chips On Mems

RESTLES is a project with partners from Finland and Germany. Partners: Continental Teves, coordinator (Germany), VTI Technologies (Finland), Sensitec (Germany), Okmetic (Finland), AEMtec (Germany), Berliner Nanotest and Design (Germany), FhG IZM (Germany), Saarland University, LSR (Germany), University of Freiburg, IMTEK (Germany), VTT Technical Research Centre of Finland (Finland).

Targets for the project:

Developing a reliable Stacked Chip on MEMS (SCoM) technology to reduce the size and profile and increase the functionality of MEMS sensors, including 2-axes gyroscopes, 3-axes accelerometers, AMR Wheelspeed sensors as well as 3-axes MEMS magnetometers



SCoM Milestones achieved to date:

- 1) AMR sensors in the SCoM package are fully functional. Reliability testing of the stacked chip is underway
- 2) Gyro designs have been optimised for the SCoM package
- 3) Successful production and testing of 2-axes accelerometers. Excellent temperature stability has already been demonstrated. SCoM preparation is underway
- 4) First "production" CSOI wafers delivered to customers.

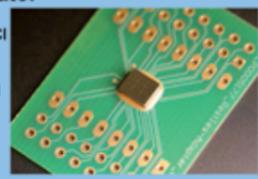
Final tasks

- In the final phase of the project, the SCoM concept nears realization with all the optimised MEMS elements to be combined
- 1) ASIC for stacking in the design phase
 - 2) Optimization of SCoM embedding and flip chip assembly
 - 3) Optimized gyro element redesign for SCoM finished
 - 4) Stacking of 3-axes accelerometers in the SCoM package is now underway

A Technology Demonstrator

RESTLES SCoM-device after full TCI process mounted on PCB.

Photo courtesy T. Baumgartner, FhG IZM

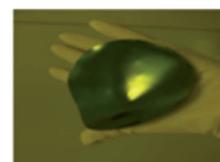


Along the way to achieving these goals, Restles requires advancing a number of technologies:

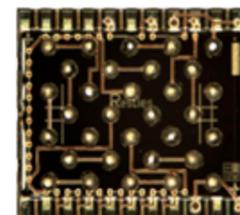
- 1) Thinning and stacking of thinned chips on MEMS (IZM and VTT)
- 2) Demanding deep trench specifications for the MEMS designs
- 3) Magnetic foils and screen printing for Sensitecs compact AMR wheelspeed sensor
- 4) Sophisticated $\Sigma\Delta$ control systems for the dual axis gyro (IMTEK)

Combining the Key Elements of SCoM

(Left) A thinned AMR wafer from Sensitec for the wheelspeed sensor application. Photo courtesy Joachim Hölzl, Sensitec



(Right) After stacking (IZM) and Bumping at AEMTEC. The ASIC dummy contains all its redistribution in a compact footprint. The stacked MEMS sits beneath the ASIC. Photo courtesy R. Schachler, AEMTEC



Mems wafer + asic chips = SCoM



(Left) 25 um thick ASIC dummy chips, ready for stacking on the MEMS wafer. Photo courtesy James Dekker, VTT



17. SEAMOVES

Sensor Enabling Autonomous Motion By Optimized Visual Environment Sensing

Abstract
Navigation of small unmanned vehicles equipped with bulky laser scanners or visual sensors, demands computationally intensive algorithms. A key to the development of autonomous systems market (cars, care or assistant robots, security agents ...) is the availability of compact, low cost smart sensors for navigation.

Consortium overview / Complementaries / R&D chain
Around an innovative chip designer (AIT), the consortium is composed of partners involved in sensors and subsystems design for imaging and robotics (Thales R&T, TOSA, LASMEA) and end users in the field of automation of vehicles (LASMEA, ECA, TOSA), or personal robotics and assisted living (Aldebaran)

Keywords
Smart sensor, neuromorphic chip, visual navigation, embedded processing, panoramic vision

Project objectives
Develop an innovative smart sensor for autonomous visual navigation based on a neuromorphic vision chip, 360° fast panoramic scanning
Embed low-level processing, and intelligent navigation functions

Fields of Application
The main fields of application are autonomous systems (cars, automatic vehicles for factory automation...), assisted living (awareness, home robotic platforms ...), security and safety (area surveillance, anti-intrusion ...)

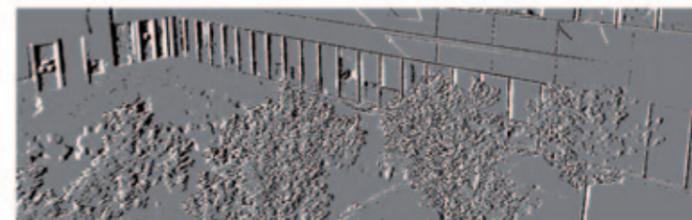
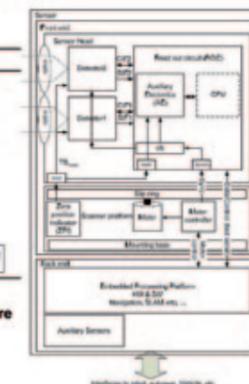
Technical challenges
Optimize the linear detector : resolution, sensitivity, pixel rate
Re-visit the processing for this innovative, event driven imager
Develop a small-size, low consumption scanning system
Optimize the processing architecture

The functionality and performances will be tested on various robotic platforms
The system will also be evaluated for security applications on stationary and non-stationary platforms.

Project Solutions / Results

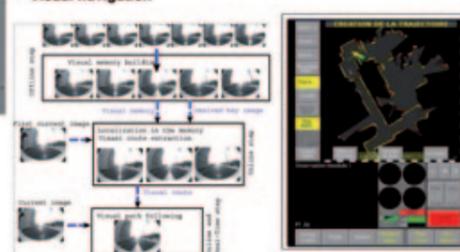
- Specifications**
- the base sensor requirements have been derived from use cases analysis, and from sensor market situation
 - the neuromorphic chip specifications have been defined
 - The sensor architecture has been settled
- Next steps**
- design of the opto-mechanical scanner
 - chip design
 - architecture of the processing electronics

Website : <http://www.seamoves-eureka.eu/>



Sensor architecture

Visual navigation



Neuromorphic chip



Panoramic scanner



Test platform



Gradient image



18. SINETRA

Smart Integration For Rescue Teams

The **SINETRA** System is dedicated to **PS organizations** (First responder, fireman, policeman, rescuer) **operating outdoor and indoor**

The first responder is equipped with **sensors** which measure information such as his **location** (indoor and outdoor), his **health parameters** and his **environment parameters**

After local processing, data are:

- **processed** before transmission and **stored** for after crisis management
- **displayed** to the First Responder himself
- **uploaded** to the Mobile Command Centre

The SINETRA System is embedded in the suit of the user, it is an industrial proof of the so-called wearable PMR concept

Keywords

Smart clothes, textile, wearable computing & electronics, embedded sensors, Interconnection & Packaging, Heterogeneous Integration

Fields of Application

SINETRA is missions oriented for Fire Brigades operating outdoor (forest fires, water flood, earthquakes...) and/or indoor (underground, parking, critical infrastructures...), police forces in typical mission (ID control) or urban guerrilla, rescue teams, lonely worker (power plant, seamen...)



Consortium overview
 CASSIDIAN (FR - FI) - SOFILETA (F) - FRANCITAL (F) - FhG IZM (Ge)
 CETEMMSA (Sp) - HYPERTAC (F) - TWINLIX (F) - ADTEL (Sp) - VARTA μB (Ge)
 Interactive-WEAR (Ge) - ESYS (Ge) - TRADIA (Sp) - FICOSA (Sp) - MICROOLED (F) - MOVEA (F) - VTI (Fi) - TTY-SÄÄTIÖ (Fi) - IRIS (Ge) - HEIMANN (Ge)

Project objectives

The SINETRA system aims at providing Public Safety users with dedicated services (location, cartography and navigation, user monitoring and environment monitoring...) provided by sensors and technologies to be embedded in the user's suit : the main innovation is therefore the integration of wearable computing and electronics into personal protective equipment and work wear combined with professional communication system : Integration of microelectronic components into textiles still means typically independent units which are attached to the textile or concealed in the textile structure

=> The SINETRA program will transform this research activity into product vision for professional markets with wide spread technology acceptance by end users and integration into sophisticated communication system.



Project Solutions / Results

The services to be provided to the end-user are E2E emergency & location, cartography (navigation, POI...), user monitoring (dead man alarm, heart rate, T°...), environment monitoring (C, T°, explosive...), vision capability improvement (visible, IR), SW services (database, automatic report).

These services lead to huge technical requirements: hands free (easy to wear, discreet), autonomy (reduced consumption + chargers), MMI (displays, keyboards, helmets), RF perfs (antennas, power) and connectivity (ad-hoc, gateways, DRM).



19. THOR

Striking Technologies For Power



Project Objectives

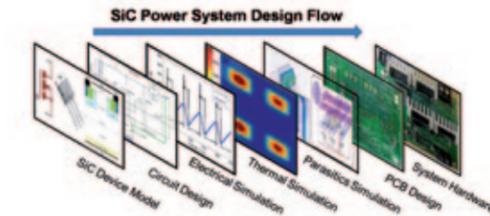
- Develop 20% more energy efficient power technologies
- Demonstrate high performance power electronics systems with SiC, GaN and SOI components
- Develop thermal management systems, embracing components and packaging

Unique Selling Points / Business Value

- Three application domains
- Economy of scale
- Wide applicability due to reduced weight and reduced volume

Expected Results

- 20% efficiency increase
- Innovative thermal solutions
- Improved EMC performance
- Enhanced reliability



Towards a 'hot' power unit !

The problem:

Wide band-gap technologies are promising, but wide-scale industrial application is hampered by limited missing elements in the value chain. Fragmented market has prevented sufficiently deep investments so far.

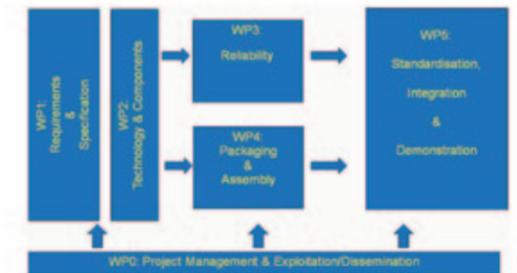
The approach:

Bring three application domains together so as to create economy of scale and apply the resulting leverage for the design of common power technology.

The solution:

Novel power technology based on wide band-gap materials which is more heat resistant and hence more compact, leading to increased applicability and integral lower cost.

THOR levels	Automotive	Aeronautics	Healthcare
power system			
module			
component	Common power devices		
process technology	Common process technology		



THOR Consortium:
18 partners, 3 countries

THOR partners

- Large companies (9)
- Small companies (7)
- Universities (2)

The Netherlands

Bruco, NXP-NL, Philips, Prodrive, TU/e

Flanders

NXP-B

France:

Ampere INSA Lyon, AVX/TPC, BATSCAP, CIRTEM, EADS-F, Epsilon Ingénierie, HCM, HISPANO-Suiza, Soitec, ST-Microelectronics, Université Yvelines, Valeo

Liaisons:

Daimler (G), Cissoid (W), EHP (W), Semikron (G/F)



20. VECTOR

Vibrating European Compass

Gyrocompass : position of the problem

SOLAS (SAFETY OF LIFE AT SEA) requires that ships above 500GT shall be equipped with a gyro compass

- Gyrocompass provides at any time the safe North independently from any external device thanks to inertial technology
- Gyrocompass requirements are currently addressed with a 100-years old sensor technology, based on a mechanical sensor



These gyros (ball bearings) are subject to wear and tear and limit the lifetime of a gyro sensor to 2 – 5 years. A sensor exchange is necessary.

In most of the gyro compasses the sensor is "swimming" in a liquid to enable a smoothly movement and the power supply of the sensor. This liquid needs to be exchanged every 1 to 2 years.

In addition some compasses are still using mercury

VECTOR - Proposed solution

Alternative, maintenance free gyro technologies exists

- Fiber optical gyros (FOG)
- Ring laser gyros (RLG)

High manufacturing costs and a high purchasing price prevents and has prevented a market success

A new maintenance free technology is emerging thanks to basic research works performed in France for dual applications :

Vibrating Gyro

MEMS - Microelectromechanical Systems



Only 3 mechanical parts

- Competitive technology
- High reliability & safety
- High accuracy

A patented key design : flat electrodes

- Easy to machine
- Easy to assembly
- Competitive

VECTOR - Benefits expected

Technical benefits

- A highly sophisticated European technology
- Providing a safe autonomous heading
- Increase of ship's safety :
 - Maintenance-free gyros
 - Appropriate integrity monitoring algorithms
- Protection of the environment
 - Replacement of about 10 000 gyrocompasses in service using mercury liquid
- Possible future transverse dissemination to other transport activities (especially air)

Economical benefits :

- Decrease of ship's delay shipping risk.
- Cost savings for Shipowner Industry
- Suppression of maintenance task on gyrocompass for commercial shipping
- Increase of European market share versus Asian & US technology
- "Re-localisation" of jobs in Europe : maintenance tasks performed throughout the world vs development & production activities in Europe

VECTOR - Consortium overview

Company	Type	Role during the project	Project data (total cost)
Raytheon Anschutz	LE	System manufacturer	~ 8 ME 3 years T9 + 01/1000
Sagem Defense of Security (Leader)	LE	Gyro technology provider	
SYSNAV	SME	Accelerometer	
Symetrie	SME	Inclinometer design	

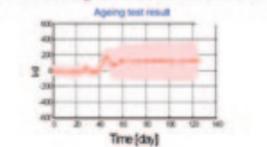
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VECTOR - Collaborative results

Successful evaluation of an innovative digital MEMS accelerometer ...

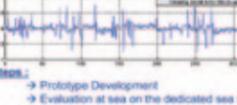
Design of Digital MEMS accelerometer



Development of simulation tool for "hardware in the loop" testing (see data simulator)

VECTOR - Collaborative results

Encouraging at-sea evaluation of the gyro technology during a 4 weeks trial with a mock-up of the gyrocompass function

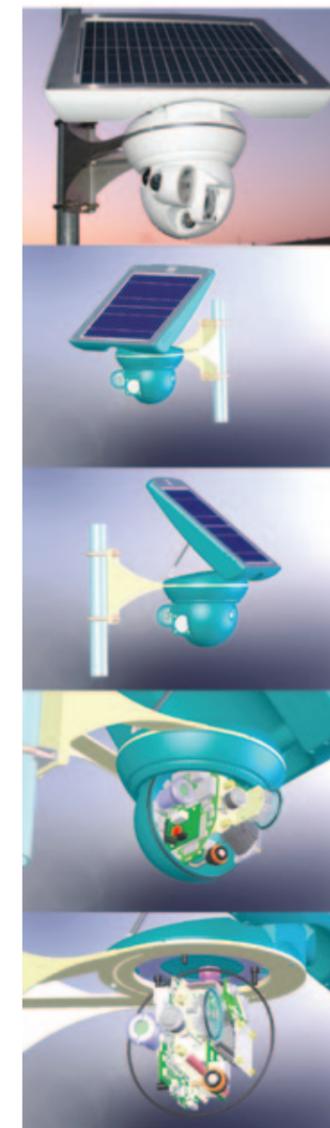
Next steps :

- Prototype Development
- Evaluation at sea on the dedicated sea simulator
- At-sea evaluation




21. VISIOPACK

Vision System in One Package



Main objective

Packaging a new intelligent and autonomous vision system with :



- High integration scale.
- Low energy consumption.
- Autonomy for energy and processing.
- Low cost.
- Multi application availability.
- Public private life consideration.
- Free maintenance.

Challenge

- Getting a smart and low cost package.
- Integration of all the necessary functionalities.
- Outdoor environmental constraint consideration.
- Multi function circuit interconnection.
- Embedded processing architecture.
- Research for efficient built-in autonomous supply system.
- Use of low-power circuits and components.
- Use of new video optical technology.
- Use of new video human detection algorithm.
- Use of CMOS imager.

Solution

- Electronic core : ARM11 processor with ten layer 400 micro PCB.
- Self-powered: solar panel with patented charger and temperature compensation.
- Wireless transmission of the only relevant data after processing (image transmission is optional): bluetooth vector.
- Auto focus : controlled liquid lens.
- Wake up system : passive infra red sensor.
- Night operation : led lighting with day/night sensor.
- Interconnection : extremely low profile connectors.

Applications

- Sensitive site perimeter surveillance.
- Border control.
- On board surveillance for public transport.
- Indoor and outdoor public area surveillance (crossroad, highway, airport, train station, metro).
- Human detection, pedestrian counting, object surveillance.

Up to date results (project completed late 2008)

- Industrialization in progress from the operational demonstrator.
- A new product in catalog.
- Market research confirmation.
- Commercial proposals in progress (1500 pieces for the end of 2009).



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