



# Smart case for Accidental spill Monitoring intervention

## SAMi

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<http://ali.mansour.free.fr> & <https://labsticc.fr/fr/annuaire/mansour-ali>

# 2 CENTURIES OF HISTORY



5,400 ENSTA Bretagne Alumni  
(MSc, PHD)

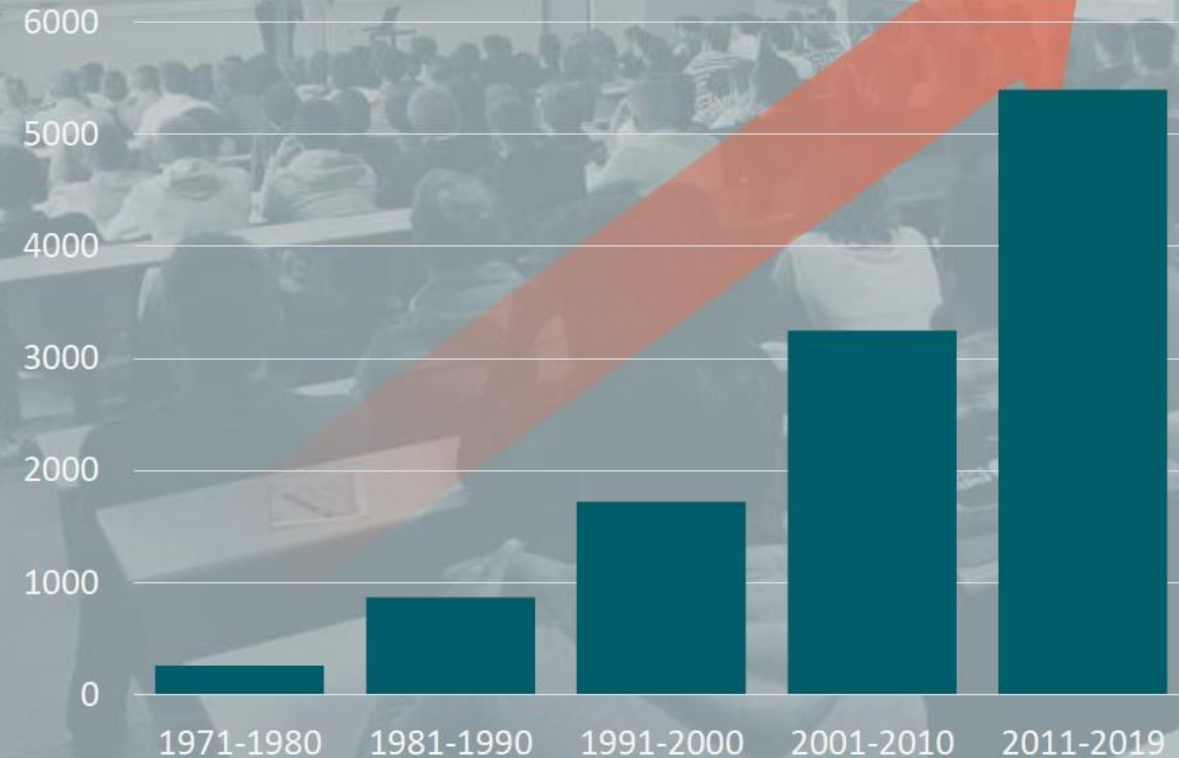
**1819:** creation

**1971:** started to deliver ENSTA Bretagne engineering degrees

**2003:** MSc & PhD Graduates reached 150

**2018:** MSc & PhD Graduates reached 300

>> **340** MSc & PhD Graduate  
in 2019



## TRAINING



### MOBILE ROBOTICS

### HYDROGRAPHY & OCEANOGRAPHY (CAT.A)

## RESEARCH

- / Reliability and security of systems
- / Wave physics and remote sensing
- / Robotics & sensing
- / Data processing, decision theory and AI

## Lab-STICC Laboratory

In partnership with CNRS,  
IMT Atlantique, UBO, UBS & ENIB  
& Joint laboratories with Industry

### OBSERVATION SYSTEMS & AI

### SECURITY & DIGITAL SYSTEMS

### EMBEDDED SYSTEMS

## TRAINING



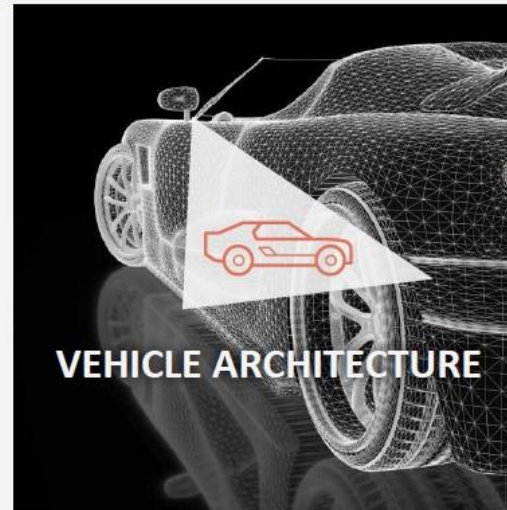
## RESEARCH

- / Composites
- / Assemblies
- / Interaction & Structures
- / Energetic Systems
- / Durability

## IRDL Laboratory

In partnership with CNRS,  
UBO, UBS & ENIB

& Joint laboratories with Industry



## TRAINING



ENGINEERING PROGRAM :



FOREIGN LANGUAGES  
AND CULTURE



ENGINEERING & SOCIETY,  
GRAND CHALLENGES

## RESEARCH

- / Exploring Engineering training and careers
- / Innovative processes & responsible innovation

## FAP Laboratory

In partnership with CNAM Paris  
& Agrosup Dijon



PERSONAL DEVELOPMENT,  
LEADERSHIP

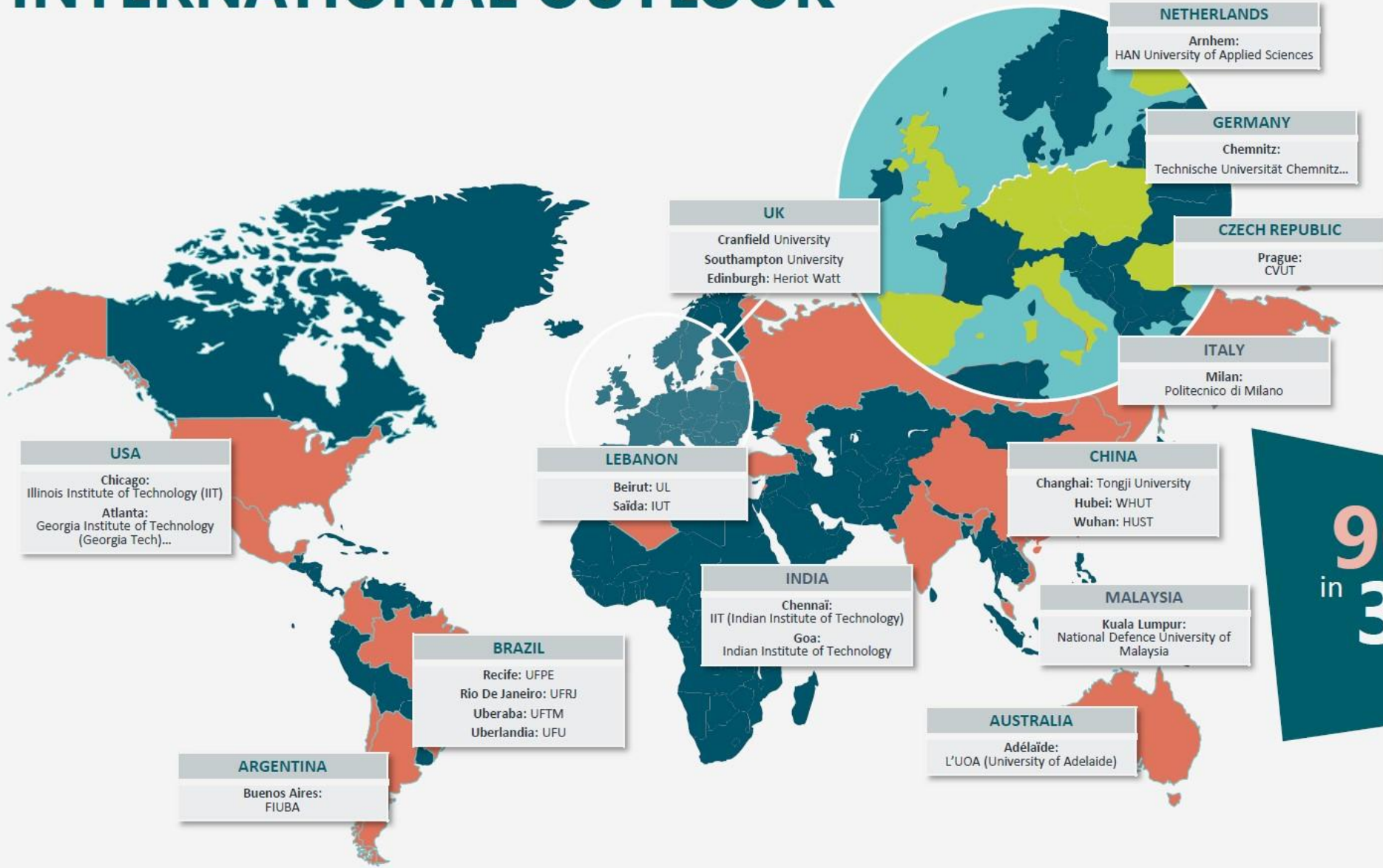


MARKETING,  
HUMAN RESOURCES,  
FINANCIAL MANAGEMENT



MARITIME PROJECT  
MANAGEMENT

# INTERNATIONAL OUTLOOK



**90** partners  
in **30** countries

 **32** DOUBLE DEGREES

# STRONG RELATIONS WITH INDUSTRIES IN THE MOST INNOVATIVE DOMAINS:



/ NAVAL & OFFSHORE INDUSTRY (oil & gas & MREs)



/ ELECTRONICS – ICT – TELECOMS



/ SPACE AND AERONAUTICS



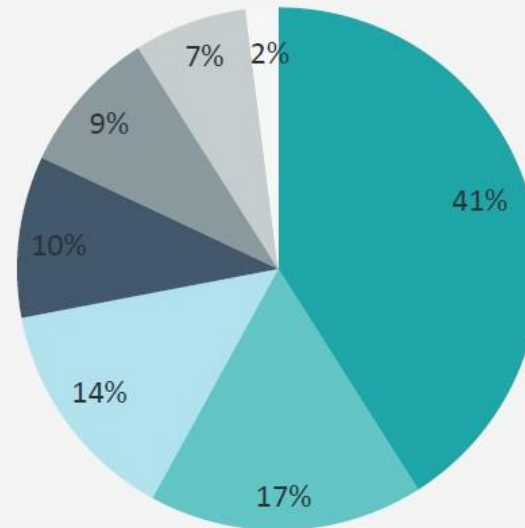
/ ENERGY



/ AUTOMOTIVE INDUSTRY



/ TRAINING & RESEARCH



Class of 2018  
employment sectors

About **20%** graduates obtain a first contract abroad.

About **50%** graduates work in the Defense sector (State and industrial)

About **50%** graduates work in the Maritime sector (State and industrial)

# RECRUITMENT & RESEARCH PARTNERS / INDUSTRY



~ 1000 companies

in **France**  
and in the  
**world**







*From SENSORS To KNOWLEDGE: Communicate & Decide*

<https://labsticc.fr/en>





ENSTA

# Locations



IMT Atlantique  
Bretagne-Pays de la Loire  
Ecole Mines-Télécom

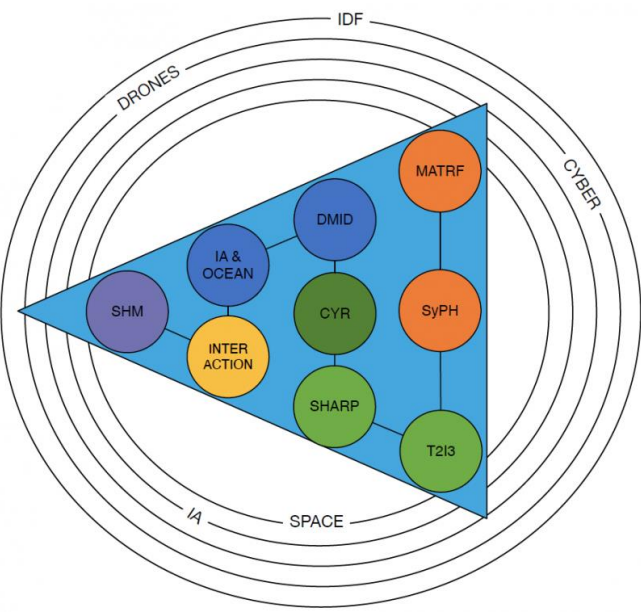


ENIB  
ÉCOLE NATIONALE D'INGÉNIEURS DE BREST



ENSTA  
BRETAGNE  
UBO  
université de Bretagne  
occidentale





9 groups in total,  
5 @ENSTA Bretagne

Lab-STICC = 5 institutions + CNRS  
630 members (90 ENSTA Bretagne)  
~ 2,5M€ of annual revenues  
~ 50 journal articles/year

IA & Ocean

DMID

SyPHE

T2I3

SHARP

**ROBEX**  
ROBotic for  
Exploration  
**M3**  
Marine Mapping &  
Metrology  
**OSE** Observations  
Signal &  
Environment

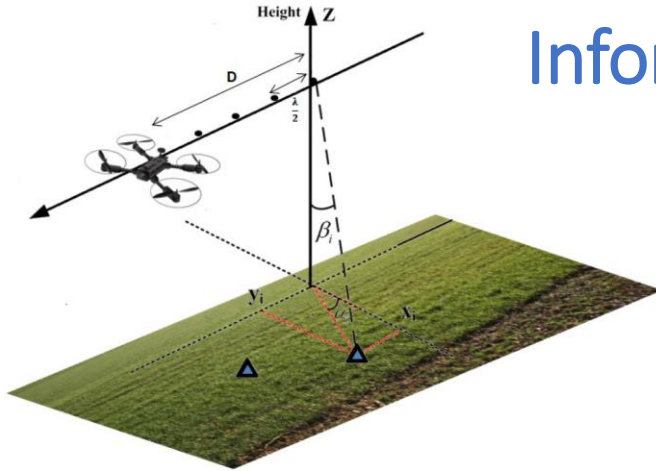
**DECIDE**  
Information  
Discovery and  
Decision Support  
**MATRIX**  
Models and  
Algorithms for  
processing and  
extracting  
information

**ASMP**  
Microwave &  
Photonic  
Architectures and  
Systems  
**PIM**  
Propagation and  
multi-scale  
interactions

Information  
Processing and  
Transmission,  
Algorithm and  
Integration

**ARCAD**  
Hardware  
architectures and  
CAD tools  
**P4S**  
Processes for Safe  
and Secure Software  
and Systems  
**SHAKER**  
Software, hardware  
and environment  
interactions

## Information Processing & Transmission, Algorithm and Integration



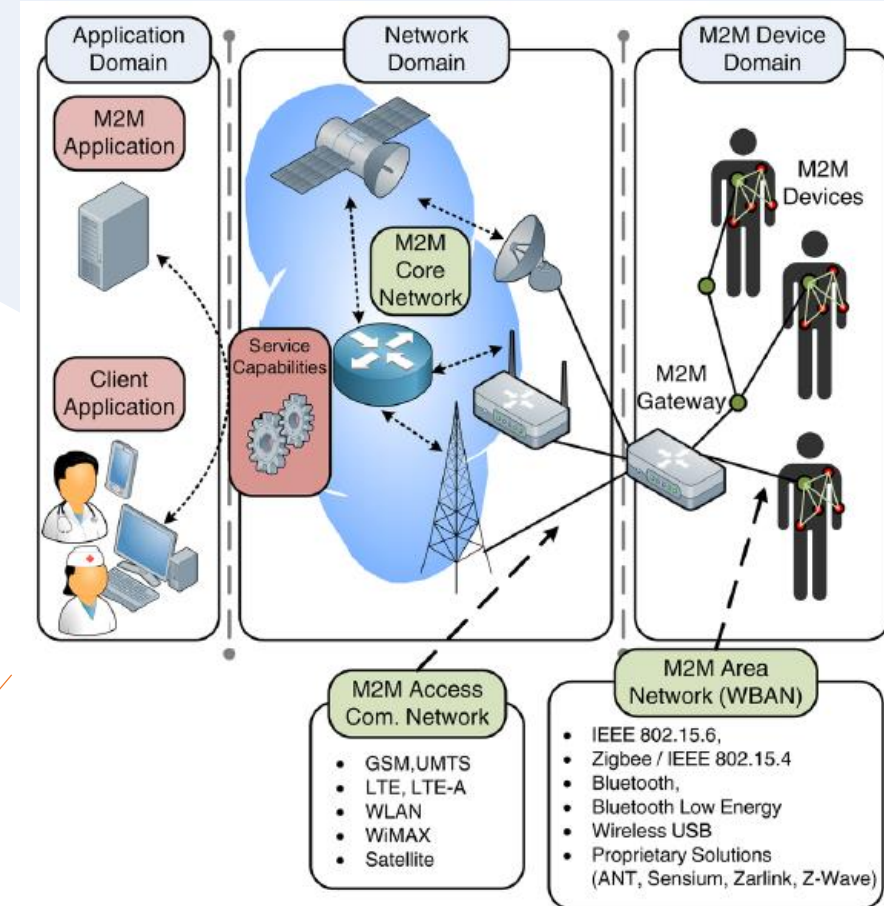
Two major scientific fields:

- **information transmission and processing,**
- **hardware integration.**

Keywords: Algorithms & architectures for hardware design of complex digital systems.

#Communication system  
#Information processing  
#Information coding & decoding  
#Algorithm-architecture matching  
#Physical layer security

#Artificial intelligence  
#Digital Telecommunications  
#Algorithm  
#Transmission channel



# Research Interests & Contributions

Of

**Ali MANSOUR**

In Few Words & Images



Statistical Approaches & Signal Processing

**Major Applications:**

Wireless Communication, Electronic Warfare,  
Biomedical Engineering & Robotics

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# My Professional Carreer

1. Post-Doc at TIRF-INPG, **Grenoble, France** (1997)
2. Researcher at BMC, **Nagoya, Japan** (1997-2001)
3. Teacher-Researcher at ENSIETA, **Brest, France** (2001-2008)
4. Senior Lecturer Curtin Univ., **Perth, Australia** (2008-2010)
5. Invited Prof. At ULCO – **Calais, France** (Jan. 2009)
6. Prof. University of Tabuk, **Tabuk, KSA** (2010-2012)
7. Prof. ENSTA-Bretagne, **Brest, France** (2012~)

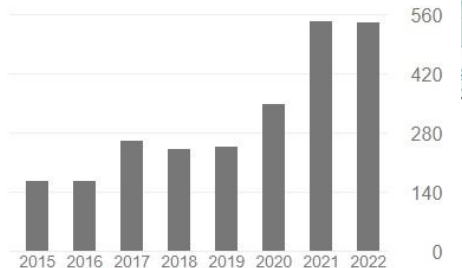


*“What A Wonderful World”*

1. Blind Signal Processing
2. Biomedical Engineering
3. Electronic Warfare
4. Smart Antennas & Beamforming
5. Robotics
6. Cognitive Radio

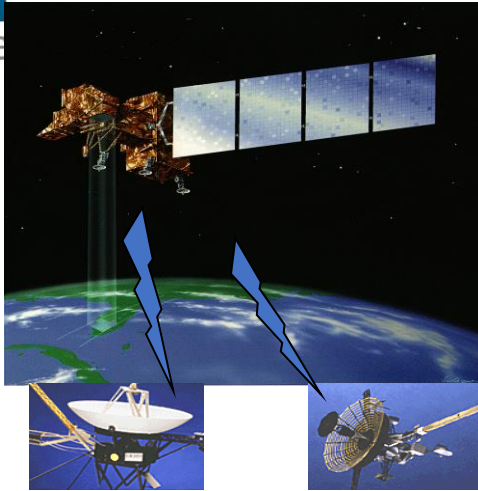
### Projects

	All	Since 2017
Citations	3984	2198
h-index	31	20
i10-index	78	48



# National & International Collaborations





## COMINT *Problem*

Automatic recognition of digital modulated signals

### *Applications*

#### Warfare

Control of civilian authorities over the radio-band frequency

Control of communication quality (i.e. satellite communications, mobile phone )

### *Framework*

Transmission of modulated signals (QAM, PSK, FSK, etc), Noisy channel



### *Constraints*

4x bandwidth sampling  
1 emission per bandwidth  
>100 symbols  
SNR < 10dB

### *GOAL:*

#### *Features extraction*

carrier frequency  
type of modulation  
symbol duration

⇒ Automatic system based on time-frequency approach



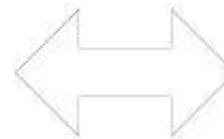
## ELINT



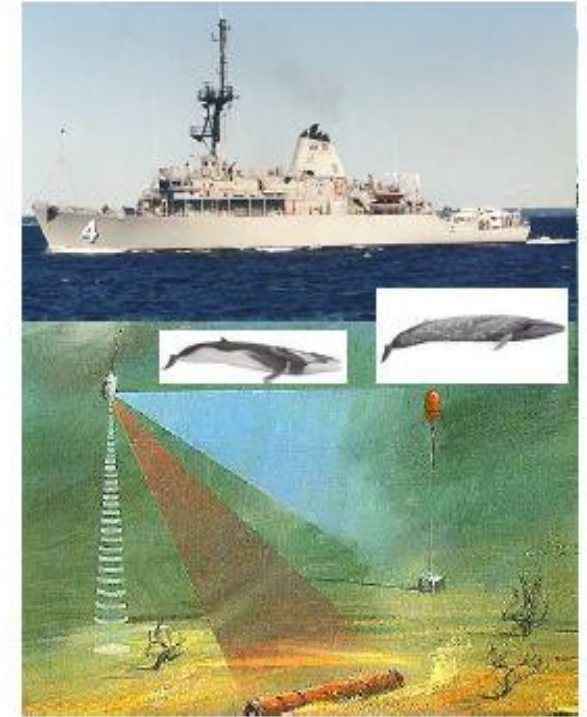
Electronic INTElligence

"HOS Criteria & ICA Algorithms  
Applied to Radar Detection."

ICA'2003



Passive Acoustic Tomography





ENSTA Bretagne

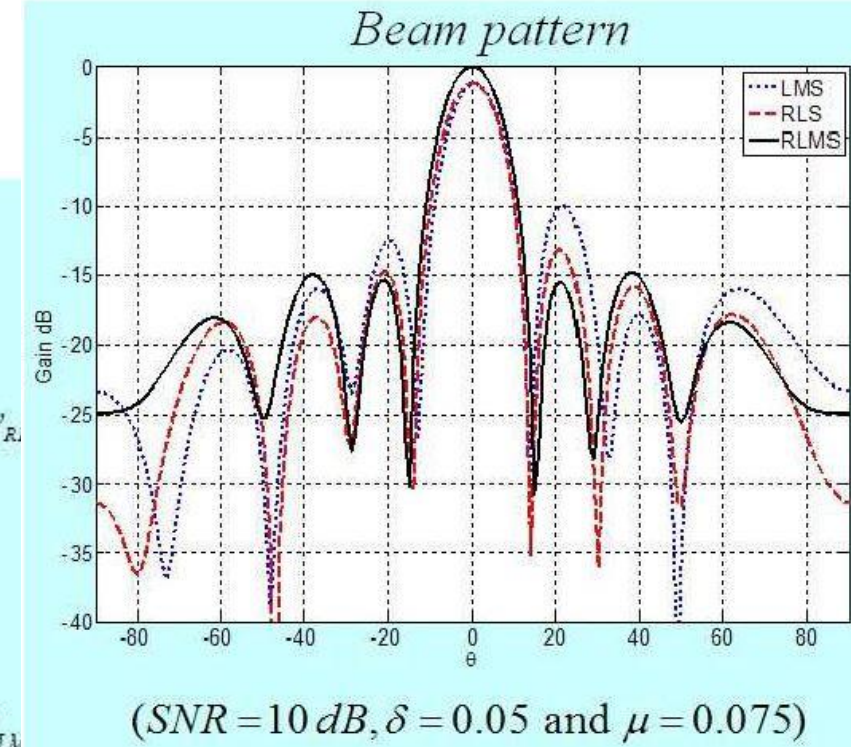
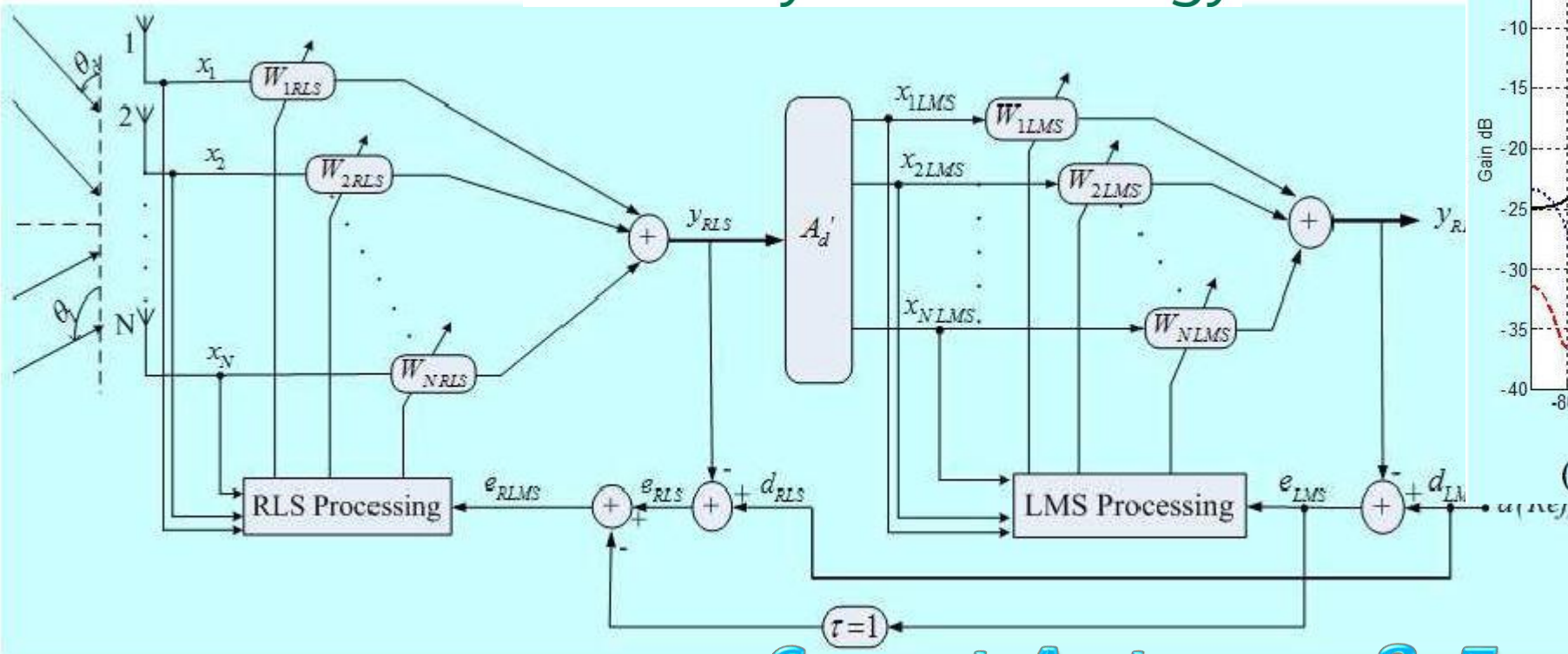
# Wireless Communication



PhD Srar

## Smart Antenna

# Curtin University of Technology



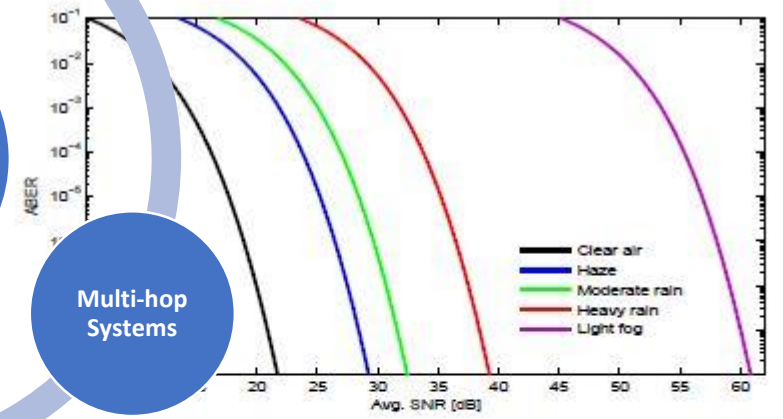
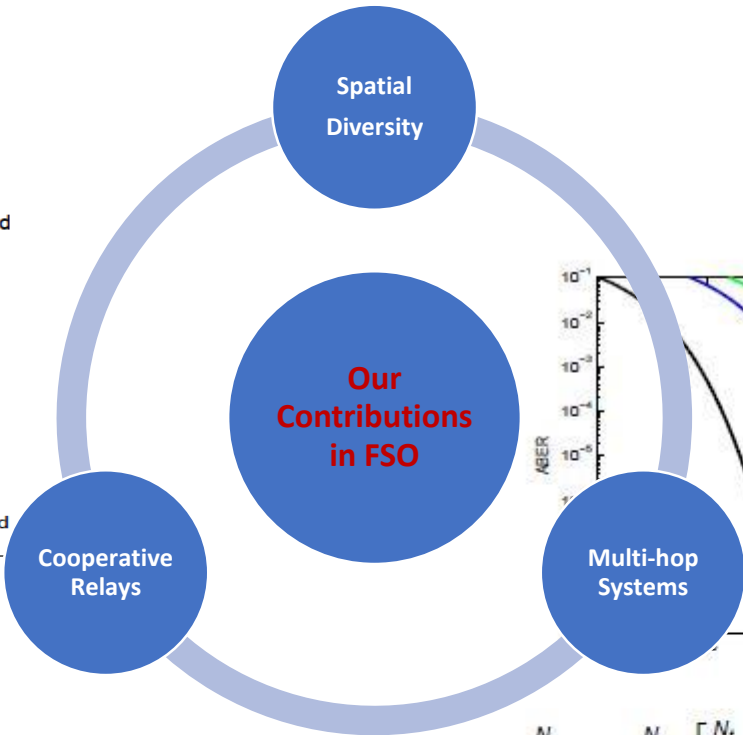
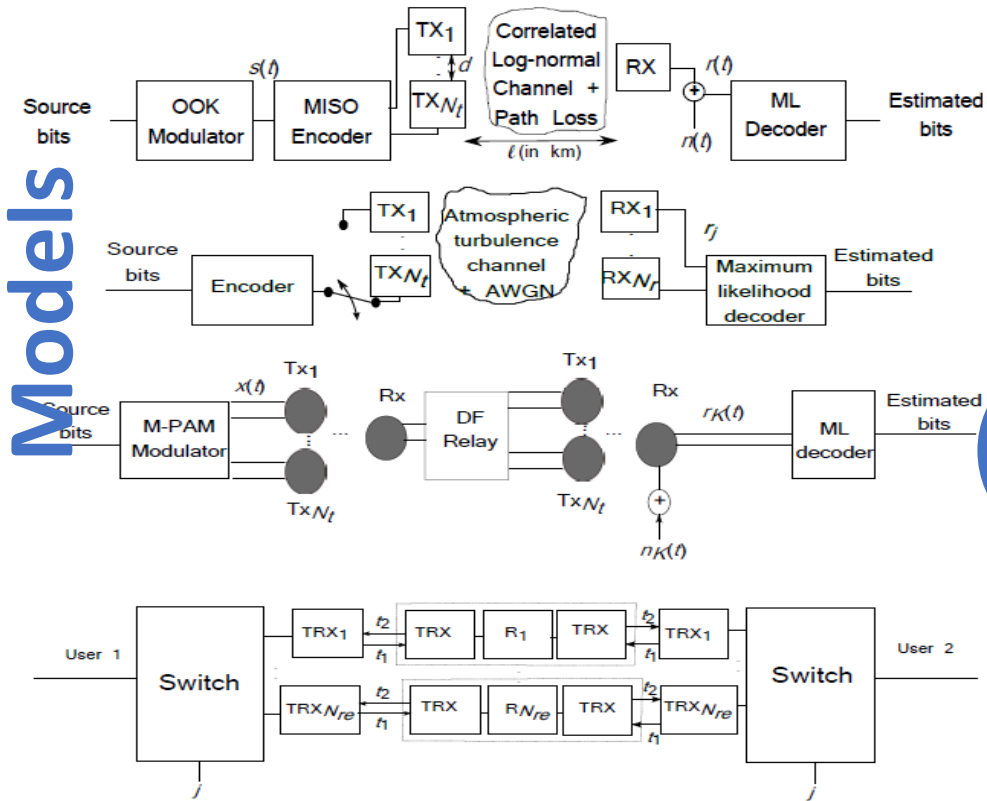
## PhD Ghattas

# Smart Antenna & Embedded Systems

Jalal SRAR's PhD

24 Nov 2022

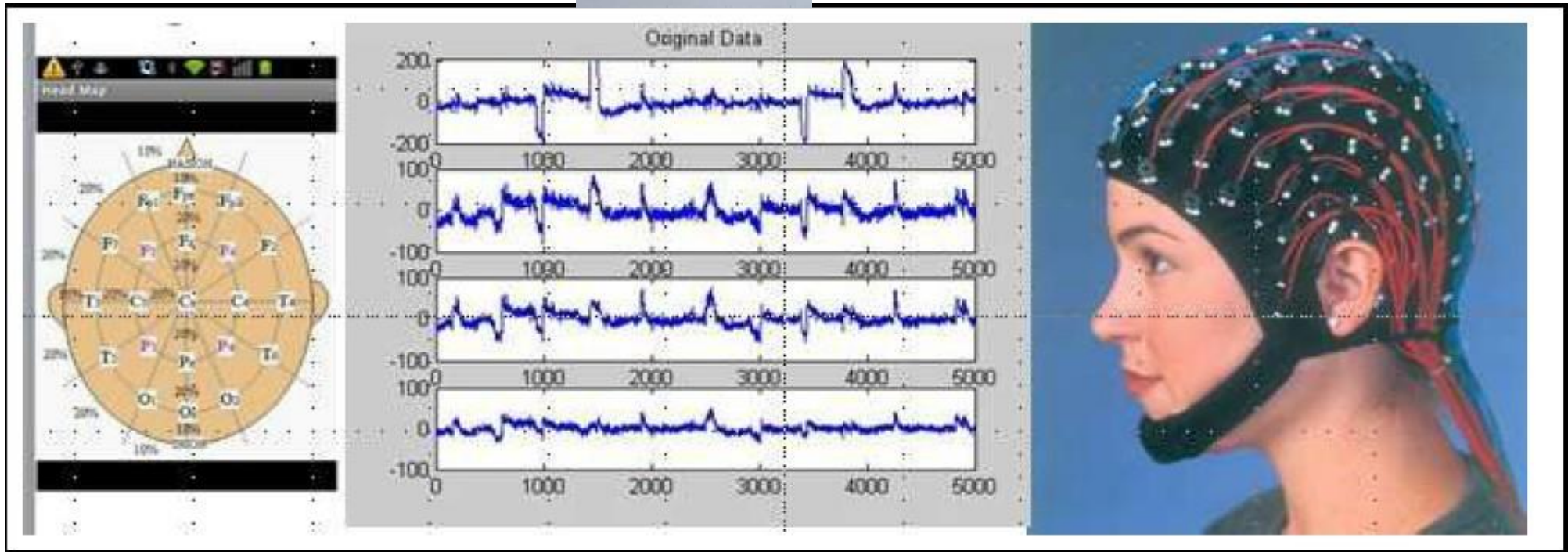
Our Proposed Models



$$ABER \approx \sum_{n_1=1}^N \dots \sum_{n_{N_t}=1}^N \left[ \prod_{i=1}^{N_t} \frac{w_{\eta_i}}{\sqrt{\pi}} \right] Q \left( \sqrt{\frac{\beta 2^{\bar{\gamma}}}{2N_t} \sum_{i=1}^{N_t} \left[ \exp \left( \sqrt{32} \sum_{j=1}^{N_t} c_{ij} x_{\eta_j} - 4\sigma^2 \right) \right]} \right)$$

Weather conditions	$\beta$ (B. He <i>et al.</i> , 2009)
Clear air	0.9057
Haze	0.3802
Moderate rain (12.5 mm/h)	0.2630
Heavy rain (25 mm/h)	0.1202
Light fog	0.01

# Biomedical Engineering: *ECG, EEG, EMG, EOG*



# SAMi (Smart case for Accidental spill Monitoring intervention)





# SAMi (Smart case for Accidental spill Monitoring intervention)



## Deepwater Horizon – BP Gulf of Mexico Oil Spill - environmental disaster risks

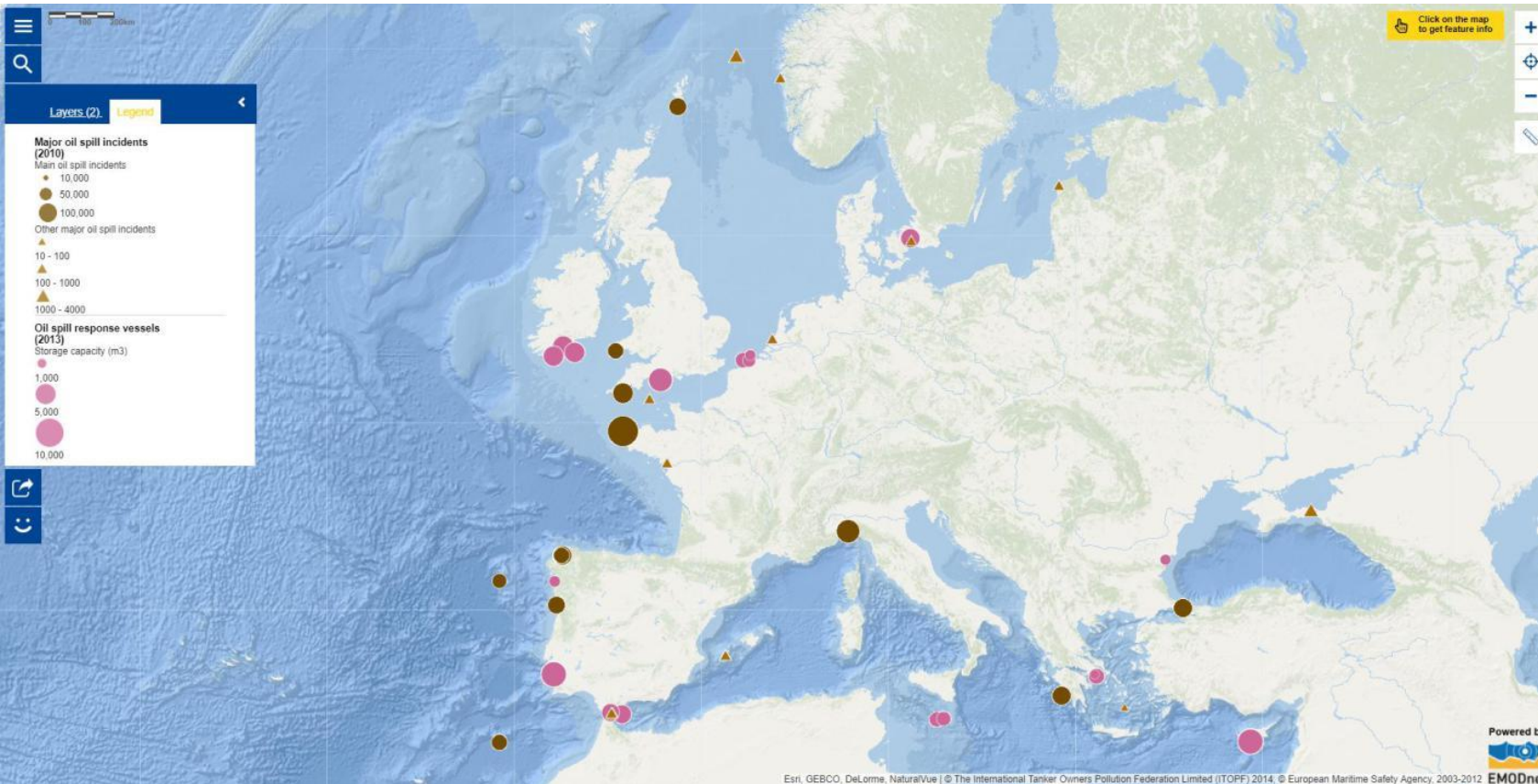
On April 20, 2010, the oil drilling rig *Deepwater Horizon*, operating in the Macondo Prospect in the Gulf of Mexico, exploded and sank resulting in the death of 11 workers on the Deepwater Horizon and the largest spill of oil in the history of marine oil drilling operations.

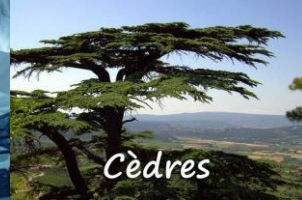
4 million barrels of oil flowed from the damaged Macondo well over an 87-day period, before it was finally capped on July 15, 2010.

On December 15, 2010, the United States filed a complaint in District Court against BP Exploration & Production and several other defendants alleged to be responsible for the spill. The record-setting settlement with BP Exploration & Production for an unprecedented \$5.5 billion Clean Water Act penalty and up to \$8.8 billion in natural resource damages.



# SAMi (Smart case for Accidental spill Monitoring intervention)





## Our main Goals:

- 1) Data Type
- 2) Data Exchange Protocol
- 3) Dynamic Transmission Rate
- 4) Available Networks & Spectrum
- 5) Best Transmission Mode
- 6) Transmission Protocol
- 7) Transceiver Design

*Proposal: In order to create a dynamic adjustable communication unit allowing our SAMi to connect to the data center from different possible positions and relying on various existing wireless communication networks.*