isep

École d'ingénieurs du numérique

RESEARCH @ ISEP

LISITE

ISEP'S RESEARCH LAB

ISEP leads many research projects in collaboration with academic and industrial partners within LISITE, its research lab. It is composed of three teams, working on multidisciplinary projects :

- MINARC team, specialized in green electronics and highly constrained Embedded Systems
- RDI team, specialized in Big Data, recommendation systems and Data mining.
- SITe team, specialized in medical imaging, video coding and ressources allocation for advanced mobile networks.

RESEARCH AT ISEP
KEY FACTS

1 LABORATORY
3 TEAMS
4 RESEARCH AREAS : ELECTRONICS, INFORMATION TECHNOLOGIES, MULTIMEDIA, TELECOMMUNICATIONS
21 RESEARCHERS
18 PHD STUDENTS

MAIN PARTNERS:

CEA
LETI
THALES
CHNO DES QUINZE-VINGTS
BNF
TELECOM
PARISTECH
ORANGE
ALTEN
CAP 2020

MINARC

Professors, associate professors :
Rahma Abdaoui, Amara Amara, Frédéric Amiel, Costin Anghel,
Francis Chan Wai Po, Andrei Vladimirescu, Kenneth Yun, Xun Zhang, Kyoo Itoh

Micro-Nano Electronics & Radio Communications

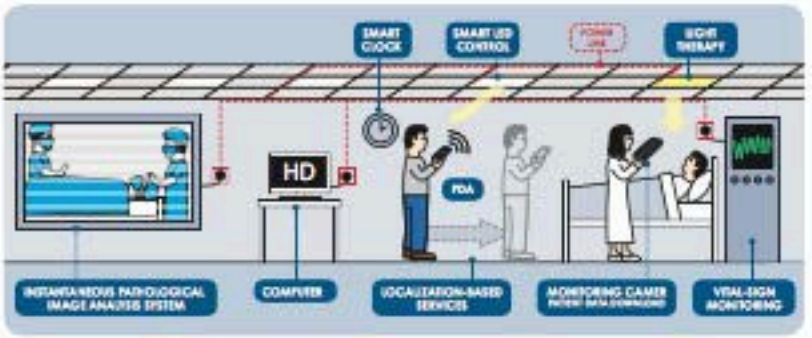
RESEARCH AXES

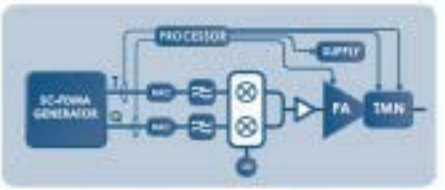
1. WIRELESS AND BIOMEDICAL APPLICATIONS

1. ULTIMATE CMOS SCALING & BEYOND CMOS

KEYWORDS: Architecture & Digital Design, RF design, Visible Light Communication, Memory Design, SRAM, NVRAM, CMOS, FDSOI, TFET

▸ ARCHITECTURE AND RF SYSTEMS ◂





OUR EXPERTISE

- RF circuit design
- Power optimized architecture
- Wireless Communication system
- Power Management
- Performances analysis
- Prototyping and testing

MAIN PARTNERS

- TsingHua University
- Ledpower

OBJECTIVES

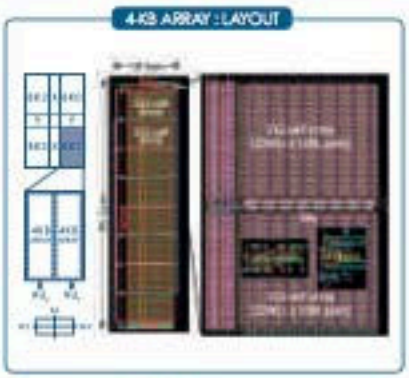
- The objective consists to imagine methods in order to reduce the power consumption of new systems that use connected devices.
- This team is active in radio link power optimization and in system architecture for connected devices.

TARGETED APPLICATIONS

- Internet of things, visible light communication, indoor localization, embedded real time signal processing, PMR radio

CONTACT:
frederic.amiel@isep.fr • xun.zhang@isep.fr
francis.chan-wai-po@isep.fr • rahma.abdaoui@isep.fr

▸ SRAM CELLS IN FDSOI AND TFET TECHNOLOGIES ◂



TARGETED APPLICATIONS

- Mobile Systems
- Storage & Routing

OUR EXPERTISE

- The design and optimization of SRAM cells in FDSOI technology, TFET technology or hybrid CMOS/TFET
- The analysis of the performance and yield
- Prototyping and implementation

OBJECTIVES

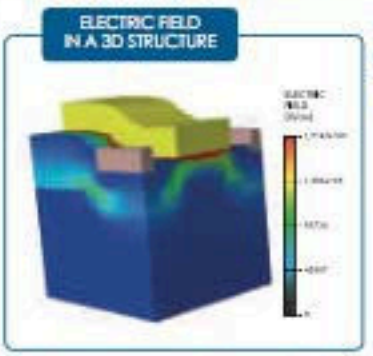
- The objective of this research is to design and optimize the SRAM cells, to reduce the power dissipated by general purpose applications like computation systems, storage and routing. Our team has hands-on experience in the development of new cells and memory architectures. This activity is strongly linked with the development of devices for "green" electronics.

MAIN PARTNER

CEA leti

CONTACT:
amara.amara@isep.fr
costin.anghel@isep.fr

▸ ADVANCED DEVICES FOR GREEN ELECTRONICS ◂



OBJECTIVES

- The objective of this research is to design «green» systems for low power applications capable of reducing the dissipated power by a factor of ten. Our team works for the development of a new «green» transistors (TFETs) that work to basic quantum tunneling effect.

TARGETED APPLICATIONS

- Mobile Systems Sensors

OUR EXPERTISE

- Device Optimization
- DC and AC Analysis
- Transient Analysis and Optimization
- Standard Cell Optimization

MAIN PARTNER

CEA leti

CONTACT: costin.anghel@isep.fr • andrei.vladimirescu@isep.fr

For more information: http://liste.isep.fr/minarc or contact: costin.anghel@isep.fr

SITe

Professors, associate professors :
Florence Rossant, Maria Trocan, Lina Mroueh, Sahar Hoteit

Signal Image Telecommunications

RESEARCH AXES

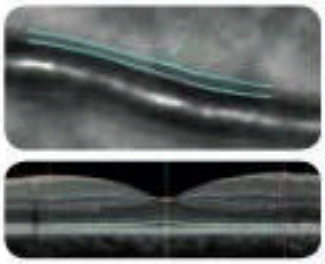
1. ADVANCED METHODS FOR IMAGE PROCESSING AND ANALYSIS
2. CELLULAR AND AD-HOC NETWORKS

KEYWORDS: medical imaging, digital document, segmentation, a priori knowledge modeling, radio resource dimensioning, digital transmission with high data rate, video compression, compressed sensing

SIGNAL PROCESSING AND IMAGE ANALYSIS

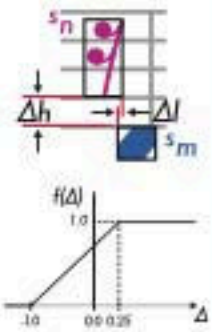
MEDICAL IMAGING

- Segmentation of retinal structures in various image modalities (Optical Coherence Tomography (OCT), Adaptive Optics (AO), standard eye fundus images)
- Segmentation of tumor vascular networks
- Derived measures for clinical research, correlation of morphological and functional data, digital models.



DIGITAL DOCUMENT

- Optical recognition of music scores (OMR)
- Digital edition of documents acquired in image mode

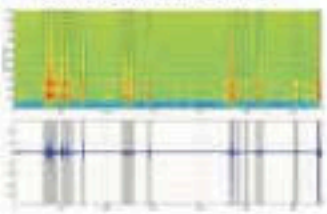


BIOMETRICS

- Iris identification

SUSTAINABLE AGRICULTURE

- Automatic counting of insects
- Follow-up of tomato maturation



MAIN PARTNERS

- CHNO des Quinze-Vingts (OIC 1423)
- INSERM, Institut Gustave Roussy (IGR), Bnf, etc.
- Telecom ParisTech, Institut d'Optique, etc.
- Imagine Eyes, Oneto, Orange, Alten, Cap 2020, etc.

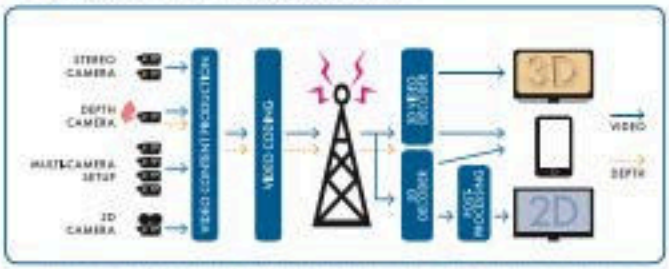
FUNDING

- ANR TecSan, Cifre, Inserm, FUI, Feder, ...

CONTACT: florence.rossant@isep.fr

VIDEO PROCESSING

- Small acquisition cost for different video formats and high resolutions
- Efficient coding adapted to both new resolutions and network capacities
- Transmission reliability on heterogeneous networks



Full life cycle of video content: capture, processing, coding, transmission and adaptation to heterogeneous displays

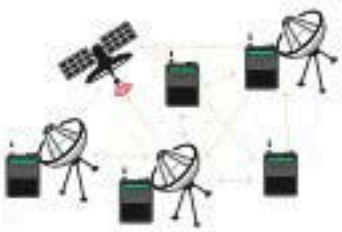
MAIN PARTNERS

- Vitec, SurCog, STMicroelectronics, Telecom ParisTech, Univ. Paris 6

CONTACT:
maria.trocan@isep.fr • http://perso.isep.fr/mtrocan

DIGITAL COMMUNICATION FOR WIRELESS NETWORKS

HYBRID SATELLITE AND AD-HOC NETWORKS



- Design of communication strategies to interconnect ad-hoc and satellite networks
- Optimization of radio resource dimensioning in centralized and distributed ad-hoc networks

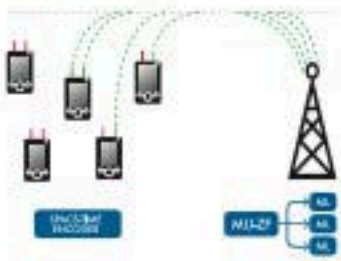
MAIN PARTNERS

- Telecom ParisTech, le CNAM,
- Thales Communications & Security

CONTACT: lina.mroueh@isep.fr

CELLULAR NETWORKS 4G AND BEYOND

- Error minimization of high data rate transmission in multi-carrier and multi-antenna systems,
- Design of radio resource allocation algorithms for cellular networks 4G and beyond.



For more information: http://lisite.isep.fr/site or contact florence.rossant@isep.fr

RDI

Professors, associate professors :
Raja Chiky, Yousra Chabchoub, Zakia Kazi-Aoul, Sylvain Lefebvre, Matthieu Manceny, Mohamed Sellami, Jérémie Sublime, Patricia Conde-Cespedes

Research and Development in Information technology

RESEARCH AXES

1. LARGE-SCALE DATA MANAGEMENT AND CLOUD COMPUTING
2. RECOMMENDATION SYSTEMS

KEYWORDS: data streaming, semantic data, data analysis, resource optimisation, sharing systems, collaborative filtering, Case based reasoning, massive data, load balancing, data consistency, cloud simulation

MASSIVE DATA STREAM ANALYSIS

REAL-TIME MANAGEMENT AND SUPERVISION OF THE WATER DISTRIBUTION NETWORK

GOAL
- Design and develop a platform for distributed management of massive structured and unstructured data streams

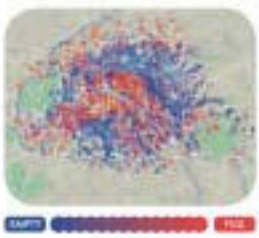
CHALLENGES
- Interconnection of several streams, summarizing and visualizing significant statistics, efficient distributed data storage and analysis

PARTNERS
- ATOS (leader), Oncleo Systems, LIGM, Data Publica

FINANCIAL SUPPORT: FUI 2014-2017

CONTACT: zakia.kazi@isep.fr

IMPROVING THE PERFORMANCE OF THE BIKE SHARING SYSTEMS (BSS)



GOAL
- Design new methods to improve resources availability (bikes and empty docks) in the BSS

STEPS
- Analyze Velib' trips to identify and qualify weaknesses of the system
- Classify Vélib' stations into clusters
- Evaluate the scalability of the BSS and plan its future expansion

MAIN PARTNERS
- INRIA (leader), IFSTTAR, Paris X University

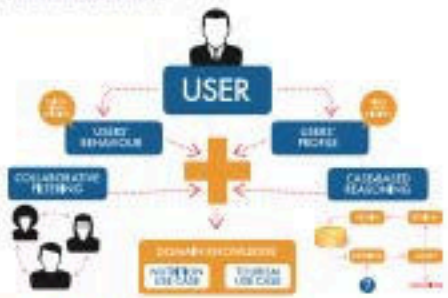
FINANCIAL SUPPORT: PGMO 2014-2016

CONTACT: yousra.chabchoub@isep.fr

RECOMMENDER SYSTEMS

HYBRID AND DOMAIN-INDEPENDENT RECOMMENDER SYSTEM FOR PERSONALIZED RECOMMENDATIONS:

- Hybrid strategy combining Collaborative Filtering and Case-Based Reasoning (CBR)
- Formalization of the required reasoning knowledge using a generic ontology
- Parallelized processing for performance gain
- Experimentations with two application domains:
  - Nutrition: Suggestion of relevant recipes and healthy/personalized meals
  - Tourism: Recommendation of travel itineraries based on the user's constraints



MAIN PARTNERS
- Kiolis (Leader), SOLAR, MONDECA
- University Paris XIII, INRIA

FINANCIAL SUPPORT
- Direction Générale des Entreprises (DGE)
- Conseil Général d'Ile de France
- Conseil Général de Seine Saint Denis
- BPI France
- Cap Digital

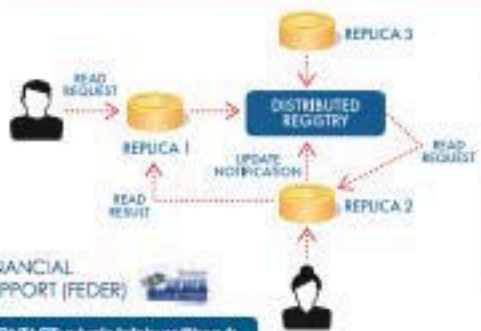
CONTACT: raja.chiky@isep.fr

CLOUD COMPUTING RESOURCE MANAGEMENT

REDUCING LATENCY IN DISTRIBUTED DATA BASES

GOALS
- Keep data up to date in a fast and reliable way
- Dynamic consistency adaptation

CHALLENGES
- Small overhead
- Fault tolerance
- Very large scale
- Analyzing user behavior
  - Cases Study: Dealing with data consistency in Bike Sharing Systems



FINANCIAL SUPPORT (FEDER)

CONTACT: sylvain.lefebvre@isep.fr

LOAD BALANCING : CLOUDIZER AND SIMIZER

GOALS
- Simulation and evaluation of load balancing algorithms
- Scalable application deployment platforms

CHALLENGES
- Going from simulation to real deployment
- Common API between Simizer Cloudizer for load balancing policies
- Large-scale simulation
- Cases Study: Agriculture and Photovoltaïc supervision

For more information: http://lisite.isep.fr/rdi or contact raja.chiky@isep.fr

ISEP
the digital engineering school

What is ISEP ?

ISEP is a graduate engineering school in Electronics, Software & Computer Engineering, Signal & Image Processing, Telecommunications and Networks, founded in 1955.

Why choose ISEP ?

ISEP trains engineers and researchers that meet the needs of industry. Its close relationship with the corporate world contributes largely to the school's life. ISEP has a strong international dimension with more than 110 partnerships worldwide leading to joint research projects, student and professor exchanges, integrated & Engineering Master programs which receive many international students. ISEP has also developed an innovative teaching methods to foster the development of competences since 2008.

ISEP FACTS

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44000€ average gross salary in 2015 (worldwide)
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