gipsa-lab

# Grenoble Images Speech Signal Control laboratory

**UMR 5216 – CNRS, Grenoble INP, Univ. Grenoble Alpes**

## Signal and Systems

Observation to Interpretation
Modeling to Control
From Speech to human communication

GIPSA-lab drives both theoretical and applied signals and systems research. Its approach is multidisciplinary and based on offline data, measurements and observation resulting from physical, biological, cognitive and industrial systems with the remit of designing decision, control and communication devices.
This is based on information processing and control theories for the development of original models and robust algorithms.

**Application fields:**

- Energy, environment, geophysics
- Embedded systems, mechatronics, micro and nanosystems
- Télécommunication, networks
- Transport, management security and safety
- Human-Machine interaction, health, linguistics engineering

### RESOURCES

**STAFF**
350 peoples
105 Permanent Researchers
125 PhD students (30% of them from foreign universities)
36 engineers and administrative peoples
30 post-PhD students and visiting researchers (per year)
50 trainees (per year) (Master level)

**PUBLICATIONS**
500 publications annually
170 papers international journals
230 international conferences
45 books or chapters
40 PhD theses (10% of them in partenership with industry)

**BUDGET**
€4 millions (excluding salaries) including €0.8 million recurrent gouvernment funding, €2.1 millions from national and international funding agencies and €1,1 million from industrial contrats and the rest with the SATT

## 16 research Teams in 4 poles

Gipsa-lab is involved in a joint team-project with the French National Institute in Computer Science and Control (INRIA), has a research team accredited by Grenoble's Science of the Universe Observatory.

### AUTOMATIC CONTROL and DIAGNOSTICS (PAD)

Analysis, modeling, diagnostics/prognostics and control of dynamical systems, in particular for embedded, complex, and network systems. Validating and applying the developed methods on experimental platforms

Models, estimation and control for dynamical systems on networks or with infinite dimension, Control theory for uncertain systems and data-based models, Safe, controlled and monitored cyber-physical systems

### DATA SCIENCES (PSD)

To develop advanced methods in images and signal processing, machine learning and robotics by mastering the complete chain of data science: data acquisition, system modeling, design of high-performance processing methodologies and algorithms, validation and interpretation of results or real-time data processing

Multimodal signal and data analysis, Machine learning, classification, images and video processing, Physical inference and artificial intelligence, Smart sensors, sensor network, Dynamical systems, robotics, drones, Biomechanical analysis of man in motion, vocology, Vision, perception and cognition, Remote sensing and environment,, Brain-computer interface, neurofeedback

### SPEECH and COGNITION (PPC)

To study and model the speech signals, the physical and cognitive systems that produce and perceive them, and the linguistic systems that organize them, by combining observation, data collection by laboratory and in situ experimentation, analysis, modeling and evaluation. Cross-fertilize the development of this knowledge with the development of new voice technologies.

Speech, cognition, language, linguistic systems, face to face interaction, multimodality, development, biomechanics, speech and communication disorders remediation, vocal technologies, sampling, applications in physics (geophysics, astrophysics, biophysics, etc).

### GEOMETRY, LEARNING, INFORMATION and ALGORITHMS (GAIA)

Develop methodological tools for modelling, analysing and understanding structured, numerous and/or large data using information theory, statistical learning and geometry tools. Design powerful algorithms for large dimensional inference, allowing their controlled and efficient use in many applications.

Signal, image, information theory, communications, statistics, large dimensions, learning, geometries, manifolds, graphs, algorithms, optimization, sampling, applications in physics (geophysics, astrophysics, biophysics, etc).



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