

# ... Effective technological means

The LAAS-CNRS has always taken care to acquire advanced technological means. Just as it was the first French academic laboratory to invest in 1976 in a clean room for the manufacture of micro-systems, it also acquired a new experimental building, instrumented and energy self-sufficient, totally dedicated to several themes particularly cyber physical systems and energy.



## THE MICRO AND NANOTECHNOLOGIES PLATFORM

The **Renatech** platform is a clean room whose €35 million equipment allow developing, shaping and processing materials for prototyping micro-electronical, opto-electronical and micro-opto-mechanical components, as well as micro and nanosystems. These means are used by LAAS-CNRS researchers but are also open to academic and industrial external requests. This structure is in continuous evolution for more than 40 years.

## THE BIOLOGY/BIOCHEMISTRY PLATFORM

It gathers on 400 sqm the experimental means for studying and characterising micro and nano-systems dedicated to biology, health and environment. These means are essential for the works on biosensors, nano biosystems, lab-on-a-chip (LOC), bio-inspired nano-technologies.



## GEORGES GIRALT BUILDING

By the scale and the sophistication of its instrumentation, this building foreshadows what our living places will be in the coming years and offers, above all, to the laboratory research a setting close to the real conditions. Indeed, it deals with rapidly evolving fields like embedded systems, networks of sensors, Internet of things, communication from machine to machine, interconnections of services, companion robots, privacy and energy optimised management. The platform will gradually be enriched with new robots, sensors and networks and new energy-related equipments.

**THE LAAS-CNRS PLATFORMS AT THE SERVICE OF THE RESEARCH**

- > Micro/nanotechnologies  
Renatech Platform of over 1,500 sqm
- > Characterization suite: over 1,000 sqm of which 400 sqm dedicated to biological and chemical analysis
- > Fleet of a dozen robots
- > Georges Giralt instrumented building
  - Cyber physical systems
  - Photovoltaic energy
- > Design of micro and nanosystems



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# Laboratory for Analysis and Architecture of Systems



## THE INTELLIGENCE OF SYSTEMS

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Laboratory under contract with the Federal University of Toulouse Midi-Pyrénées





## TO ANTICIPATE...

the major interdisciplinary challenges related to our rapidly changing society, the LAAS-CNRS identified strategic focuses based on the four major disciplinary fields which are the trade mark of the laboratory since its inception: **automation, robotics, IT and micro and nanotechnologies.**

Within these disciplines, eight scientific departments define the future guidelines and coordinate the activities of the 26 research teams.



## ... A philosophy of openness

### EXCHANGE OF KNOWLEDGE

The LAAS-CNRS has been involved in European programs from their creation. Within the framework of the H2020 program, the laboratory has already participated in more than 8 projects. It is also highly involved in the national scientific life, through future investments, projects of the French National Agency of research or in the animation of scientific foundations, like the RTRA Aeronautics and Space Sciences and technologies.

### TRAINING BY THE RESEARCH

Over thirteen nationalities come and go among doctoral students, allowing acquiring an international culture of exchanges from the thesis. The LAAS-CNRS is deeply involved in the training to the research and by the research. It is a host laboratory for several doctoral schools of Toulouse. The LAAS-CNRS is finally associated to founding members of the Federal University of Toulouse Midi-Pyrénées.



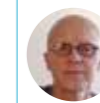
### THE MANAGEMENT TEAM



**Liviu Nicu**  
director of the LAAS-CNRS



**Florent Lamiroux**  
deputy director for industrial affairs



**Pierre Lopez**  
deputy director for relationship with university partners



**Pierre Temple-Boyer**  
deputy director for relationship with EPIC and EPST (except CNRS)

## ... Engineering science and IT researches

### OUR RESEARCHES

The researches carried out at the LAAS-CNRS, laboratory of the CNRS, aim to gain a fundamental comprehension of complex systems while considering the usage which can be made as a result. In contrast, a lot of industrial or societal issues for instance in aeronautics, space, health, energy or communication network, raise fundamental questions which motivate the laboratory research projects. The major part of the projects is federated by strategic focuses of the laboratory, tools of prospective projection which set out the objectives of our research works.

The **Alive** strategic focus aims to structure and facilitate, within the laboratory, a highly interdisciplinary approach, consisting in coupling the different internally developed engineering sciences with the live and environment sciences.

As the material, the software, the networks and the robotics continue their high evolution, the **Ambient Intelligence** strategic focus, at the same time, aims to develop these fields, anticipating the future synergies between them, preparing the tools needed to this design and proposing the first experiments related to them.

The **Energy** strategic focus aims to use the multidisciplinary competences of the LAAS to become a key player of the energetic transition and to meet the challenges, from the component to the complex systems like the smart power grids.

The **Space** strategic focus aims to federate the multidisciplinary activities of the LAAS-CNRS in the field of space systems, to foster the emergence of ambitious projects and help integrate them within the regional and international space community.

### SCIENTIFIC COMMUNITY

The LAAS-CNRS has an active role in the main institutions of its community: consultative and decision-making bodies (National Scientific Research Committee, scientific councils of its institutes attached to the CNRS); animation institutions (European networks, learned societies); expert body (editorial boards of journals, program committees for international conferences). The most tangible involvement is the visibility of its publications by this community. Moreover, more than half of the publications are co-signed with researchers from other organisations.

### INTERNATIONAL COOPERATIONS

The international visibility of the LAAS-CNRS is achieved through a continued willingness. The cooperations are constant with EU countries under framework programs but also exist with Latin America, USA and Asia particularly.

The LAAS regularly send its members to international joint research units of the CNRS but also hosts foreign researchers, within the framework of bilateral cooperations, excellence research chairs or sabbaticals. In addition to doctoral and post-doctoral students, the LAAS-CNRS hosts each year around ten foreign researchers for stays over three months.

## ... A long tradition of partnership and innovation

### FIELDS OF APPLICATION

The researches carried out at the LAAS-CNRS are valued in many fields: aeronautics, space, embedded systems, communication, networks, chemistry, health, environment, energy, defence, services. The laboratory forged strong links with the industry and is involved in a large number of collaborative projects with regional, national and international companies of all sizes. The partnership-based research has always taken the form of research/industry common laboratories, for instance with Actia, Airbus, Astrium, Essilor, Innopsys, Lacroix, Orange or Thalès. This concept has taken shape in 1991 at the LAAS-CNRS.

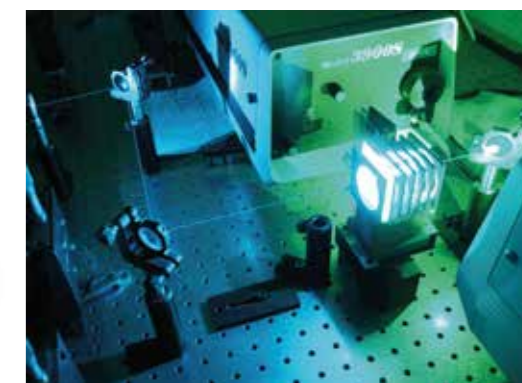


Start-ups created by the LAAS-CNRS offer an industrial future to some of its works. Among them:

- > Kineo Cam, motion planning
- > QoS Design, network optimization
- > Tag Technologies, microsystems for motion detection in home automation
- > Noomeo, 3D sensors
- > Epsiline, wind measurement solutions based on laser systems
- > SmartCatch, capture in vivo of circulating tumor cells

### The LAAS-CNRS is leading partner of:

- > EquipEx:
  - RobotEx, national network of robotics platforms
  - LEAF, Laser processing platform for multi functional electronics on flex
- > LabEx: GAnEx, national Network for GaN
- > IRT ST-EXUPÉRY Aeronautics, Space, Embedded Systems
- > SATT Midi-Pyrénées Toulouse Tech Transfer



### LAAS WITH FIGURES

#### 1968 > inception of the laboratory

Jean Lagasse founded the laboratory of automatics and its spatial applications

#### 577 > people on 01/01/2019

36% researchers, teachers-researchers, 39% doctoral students, 25% ITA

#### +2000 > thesis

more than 2 000 thesis since the inception of the laboratory

#### 14 > talents distinguished by the CNRS

4 silver medals, 7 bronze medals, 3 Cristal

#### 4 > strategic focuses

**Ambient Intelligence:** Dynamic reconfigurable architectures for embedded mobile autonomous systems

**Alive:** Analysis of interactions with the living world and the environment

**Energy:** Systems for energy intelligent management

**Space:** Space systems

#### 5 > technologic platforms

clean room, robot platform (humanoid, assistance, exploration, drones), characterisation platform, design platform, network platform

