| DAY #1 - *morning* |
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| **09:45 - Plenary session** |
| Motion generation for nonholonomic systems: from robots to humans <br> Jean- Paul LAUMOND, Research Director, LAAS-CNRS |
| **11:00 - ALIVE Axis / parallel session 1** |

**ALIVE AXIS**

Coupling engineering sciences and life sciences at LAAS-CNRS: motivation and responsibility, *Christophe VIEU*
> A strategic collective action, called ALIVE, organizes researches and projects on Engineering Sciences for the investigation of Living and Environmental systems and for Medicine. This introductive talk focuses on the big ideas and big concerns behind this interdisciplinary field.

Microfluidic systems: tools for life science and environment, *Pierre JOSEPH*
> LAAS-CNRS is conducting research relying on microfluidic tools, mainly for biology, sensing and environment, at different levels: technological developments, fluidic functions and their integration, biomimetic model systems.

Sensing and interactions developments for life sciences and environmental applications, *Adam QUOTB, Katia GRENIER*
> Sensing and interacting with bio-materials constitute important ongoing developments at LAAS-CNRS. This activity gathers multiple and interdisciplinary competences for a variety of life sciences and environmental applications.

3D Bio-Imprint for medical microdevices, *Laurent MALAQUIN*
> LAAS-CNRS is developing novel 3D printing and bioprinting technologies for the manufacturing of integrated microdevices devoted to biological analysis and to the study of living systems in 3D microenvironments.

Molecular modeling methods for novel health and environmental applications, *Marie BRUT, Juan CORTES*
> Model-based computational methods are essential to understand atomic and molecular systems with the aim of developing and optimizing new technologies. LAAS-CNRS develops novel modeling approaches to address various applications from pharmacology to biotechnologies.

Artificial Intelligence, Automatic Control, Operational Research for medicine, life science and environment, *Louise TRAVE-MASSUYES*
> LAAS-CNRS develops researches in Decision and Optimization area with impactful applications in quality control of radiotherapy treatment, biomedical data analysis, anesthesia delivery control...

| **11:00 ENERGY Axis / parallel session 2** |
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**ENERGY AXIS**

Tackling energy transition challenges from microsystems to microgrids, *Marise BAFLEUR*
> The ENERGY axis aims at leveraging LAAS multidisciplinary research skills to tackle the challenges of energy transition, from component to complex systems such as smart grids.

Integrated energy micro-storage, *David PECH*
> This presentation will focus on the emergence of micro-supercapacitors for modern electronics. The need to move from 2D to 3D configurations and the development of new processing techniques and materials are discussed.

III-V nanowires for energy: low power nanoelectronics and other opportunities, *Guilhem LARRIEU*
> We will review activities performed at LAAS around III-V nanowires with specific emphasis on energy-related applications from nanowires patterning to device integration.

Gallium Nitride power devices, *Frédéric MORANCHO*
> This talk will present a review of Gallium Nitride (GaN) power electronics devices and then will focus on recent research activities in this field at LAAS-CNRS

Hybrid control for power converters, *Carolina ALBEA-SANCHEZ*
> This presentation addresses a new paradigm of control for power converters via a new hybrid formalism, which takes into account the continuous dynamics of electrical signals and the discrete dynamics of switching between different modes of system configuration.

Hybrid electrical network for building integrated photovoltaic, *Corinne ALONSO*
> A positive energy building has a complex network of energy constituting a micro-grid powered by renewable energy sources and requiring additional storage elements and an appropriate management unit

Combinatorial optimization methods for energy management, *Sandra Ulrich NGUEVEU*
> This talk illustrates the research developments at LAAS in combinatorial and energy optimization, for solving industrial and academic problems arising in smart grids, hybrid electric vehicles, or production planning.

| DAY #1 - *afternoon* |
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**02:00 - Plenary session**

Presentation of the scientific means and technological platforms of LAAS-CNRS

Liviu NICU, LAAS-CNRS Director

**02:15 - Plenary session**

Lessons from Mars and Beyond: The Projects, People, and Culture of the Jet Propulsion Laboratory

**Jordan P. EVANS**, *NASA, Jet Propulsion Laboratory*

**03:00 - SPACE Axis** / parallel session 1

**Innovative devices and system approaches for space applications,** *Olivier LLOPIS*
> Improving space systems is an always evolving challenge for researchers and engineers. In this field, reliability is combined with high performance and small volume. A summary of the on-going studies at LAAS will be provided.

**A nanosatellite optoelectronic payload dedicated to radiation induced degradation measurement in erbium doped fiber,** *Arnaud FERNANDEZ*
> NIMPH nanosatellite mission and more precisely its embedded metrology setup designed by LAAS-CNRS and Paul Sabatier University researchers will be presented.

**Spacecraft rendezvous control: a predictive strategy and Hardware-in-the-loop demonstrator,** *Paulo Ricardo ARANTES-GILZ*
> A model predictive controller for the impulsive spacecraft rendezvous is presented. Its efficiency and robustness is assessed by means of HIL simulations involving a synthesized LEON3 microprocessor.

**Des plans sur la comète": the Contribution of Combinatorial Optimization to Rosetta/Philae,** *Christian ARTIGUES*
> LAAS-CNRS is developing novel 3D printing and bioprinting technologies for the manufacturing of integrated microdevices devoted to biological analysis and to the study of living systems in 3D microenvironments.

**An adaptive hyperspectral imager: design, control, processing and applications,** *Simon LACROIX*
> We present a new hyperspectral imager concept, which yields the possibility to exploit hyperspectral data in a variety of applications that require either real time data acquisition or interpretation.

**RF and microwave energy harvesting for space applications,** *Alexandru TAKACS*
> This presentation highlights the recent advances in the field of the RF and microwave energy harvesting onboard of broadcasting satellites in order to power autonomous wireless sensors.

**03:00 AMBIENT INTELLIGENCE Axis** / parallel session 2

**Ambient.Intelligence@laas.fr,** *Rachid ALAMI*
> The Ambient Intelligence (AI) strategic axis of LAAS deals with an integrative context bearing significant scientific and technical challenges based on the excellence of LAAS teams in a number of key domains.

**Adaptive communication for collaborative interaction in smart environments,** *Khalil DRIRA*
> We present recent achievements in advanced interoperability and automated adaptation for collaborative interaction in smart environments and IoT Service platforms. The application domains include remote health monitoring, and advanced manufacturing.

**Trust me I am autonomous,** *Jérémie GUIOCHET*
> Robotics and autonomous applications are now facing the confidence issue for their deployment. This presentation will focus on collaborations between *Robotics* and *Crucial Computing* departments carried out in the context of dependable autonomous robots.

**Cross-layering opportunity for designing cyber-physical systems,** *Daniela DRAGOMIRESCU*
> Numerous applications for Wireless Sensor Network as part of Cyber Physical Systems have been developed in the fifteen years. This talk will present the cross-layering opportunities for designing real-world Cyber-Physical systems.

**An embedded instrumentation approach for detecting the fragility of complex systems,** *J-Yves FOURNIOLS*
> Is there anything in common between detecting the fragility of a person or the appearance of a defect in a composite airplane structure? Distributed instrumentation is an approach to construct observables linked to complex systems fragility

SPACE AXIS

AMBIENT INTELLIGENCE AXIS

| DAY #2 - *morning* |
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| **09:00 - Overview of the LAAS-CNRS Equipment** - part1 |
| **Micro and nanotechnology platform - clean room**, *Hugues Granier* <br><br> The micro and nanotechnologies platform, part of ReNaTech national network, operated by a 36 members technical staff offers more than 200 equipment to support internal and external projects. |
| **Characterization platform,** *Laurent Bary* <br> This presentation will focus on the emergence of micro-supercapacitors for modern electronics. The need to move from 2D to 3D configurations and the development of new processing techniques and materials are discussed. |
| **10:00 - Coffee break & Exhibition** |
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| **10:30 - Overview of the LAAS-CNRS Equipment** - part2 |
| **Biological characterization platform**, *Aurélien Bancaud* <br><br> To perform research at the frontier between technology and biology, LAAS-CNRS has designed a unique facility to exploit our micro/nanosystems for the analysis and manipulation of biological samples |
| **Robots platform**, *Matthieu Herrb* <br><br> The robotics platform is composed of spaces equipped to perform robotics experimentations with a fleet of various robots, their software and the technical staff supporting the research projects. |
| **Energy Building**, *Marise Bafleur* <br><br> The Energy Platform is an instrumented experimental building for the implementation and testing of energy management technologies (hardware and software) within a context of renewable energies and storage technologies deployment. |
| **11 :30 - Introduction to administrative tools for industrial & academic collaboration,** Laurent Perez <br><br> Through its history and culture, LAAS-CNRS is today one of the most dynamic laboratories of CNRS in terms of partnership with private companies. |
| **12:00 - Lunch and Exhibition** |
| <br> The afternoon is dedicated to **Facilities tours** and **Speed dating sessions** (registration required) <br> -see next page- <br><br> |

## DAY #2 – *Facilities Tours & Exhibitions*

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| **PLATFORMS** | **Micro and nanotechnology platform - clean room**, *Hugues Granier* (1 hour)<br><br>The micro and nanotechnologies platform, part of ReNaTech national network, operated by a 36 members technical staff offers more than 200 equipment to support internal and external projects.<br><br>**Biological characterization platforms**, *Sandrine Souleille* (1 hour)<br><br>To perform research at the frontier between technology and biology, LAAS-CNRS has designed a unique facility to exploit our micro/nanosystems for the analysis and manipulation of biological samples<br><br>**Humanoid Robotic,** *Olivier Stasse, Philippe Souères (30 min)*<br><br>The humanoid robotics platform has two robots of human size: the HRP-2 humanoid robot, and the first robot of the TALOS series: Pyrene. They are very challenging experimental platforms use to test algorithms for motion generation. |
| **ENERGY AXIS** | **Energy Building**, *Marise Bafleur, Ilias Papas* (45 min)<br><br>The Energy Platform is an instrumented experimental building for the implementation and testing of energy management technologies (hardware and software) within a context of renewable energies and storage technologies deployment.<br><br>**Photovoltaic low voltage dc microgrid for building with energy storage systems**, *Lionel Séguier* (20 min)<br><br>In order to develop and improve strategies for sustainable energy management, a low voltage direct current (LVDC) micro-grid (MG) including task scheduling algorithms and dedicated power electronic converters has been deployed in the ADREAM Building-Integrated Photovoltaic (BIPV) of LAAS-CNRS.<br><br>**Pioneering GaN technology - Start-up EXAGAN**, *David Tremouilles & Éric Moreau* (30 min)<br><br>Discover EXAGAN / LAAS research and development partnership on new Gallium Nitride (GaN) power components for energy management. |
| **AMBIENT INTELLIEGENCE AXIS** | **Robotics research in Aerial Physical Interaction,** *Antonio Franchi, Davide Bicego, Marco Tognon* (30 min)<br><br>Illustration of the flight of a tilted-propeller aerial robot touching the environment to perform physical interaction tasks.<br><br>**Illustration of examples of cooperation between man, robot and the environment**, *Christelle Ecrepont, Aurélie Clodic, Eric Campo, Thierry Monteil & Rachid Alami* (30 min)<br><br>Connected apartment, optimized building, intelligent sole...<br><br>**Active binaural localization of a sound source**, *Patrick Danès* (30 min)<br><br>This demo shows how a mobile robotics head endowed with two ears can analyze its sensorimotor flow and control its motion so as to localize a sound source in the "most informative" way. |
| **SPACE AXIS** | **A nanosatellite optoelectronic payload dedicated to radiation induced degradation measurement in erbium doped fiber**, *Arnaud Fernandez* (30 min)<br><br>NIMPH nanosatellite mission and more precisely its embedded metrology setup designed by LAAS-CNRS and Paul Sabatier University researchers will be presented.<br><br>**Embedding an optimization-based control strategy for spacecraft rendezvous on a LEON 3 processor: about the software development platform and the Hardware-in-the-loop demonstrator**, *Frédéric Camps, Christophe Louembet* (30 min)<br><br>An optimization-based controller has been embedded on a synthesized LEON3 microprocessor. We focus here on the software development, compilations chains and HIL demonstrator construction<br><br>**RF and microwave energy harvesting for space applications**, *Alexandru Takacs* (30 min)<br><br>This presentation highlights the recent advances in the field of the RF and microwave energy harvesting onboard of broadcasting satellites in order to power autonomous wireless sensors. |
| **ALIVE AXIS** | **High resolution 3D printing and bioprinting: application to microfluidics and cell culture**, *Julie Foncy, Rémi Courson, Fabien Mesnilgrente & Nicolas Bernardin* (1h30)<br><br>Multifab is an open platform devoted to the development of innovative multi-scale and multimaterial 3D printing technologies with applications in microelectronics, integrated optics, microfluidics and biology<br><br>**BIOSOFT Labcom**, *Jean-Christophe Cau, Emmanuelle Trévisiol, Christophe Vieu* (30 min)<br><br>In the framework of an original Public/Private partnership, BIOSOFT Labcom develops new methods of soft lithography (mainly Micro-Contact Printing and Capillary Assembly) for the biomedical field. |