

The background features a silhouette of a human head in profile, filled with a complex pattern of binary code (0s and 1s) and circuit-like lines. The overall color scheme is dark purple and blue with red accents.

# LETI INNOVATION DAYS

JUNE 24-28, 2019  
GRENOBLE, FRANCE

*Deep Tech for Edge*

*Artificial Intelligence*

NEW PERSPECTIVES  
FOR ARTIFICIAL INTELLIGENCE:  
TRUSTWORTHY AI AND EDGE AI



#LetiInnovationDays



## Contents

<b>New perspectives on edge artificial intelligence.....</b>	<b>5</b>
Edge intelligence and trustworthy intelligence .....	5
Leti Innovation Days .....	5
<b>2019 highlights.....</b>	<b>6</b>
Edge AI Showroom.....	6
<i>Pitch Startups</i> .....	6
Conference led by Cédric Villani, Member of Parliament and First Vice-President of the French Parliamentary Office for the Evaluation of Scientific and Technological Choices .....	7
Latest advances in quantum computing.....	7
<b>Press visit program.....</b>	<b>8</b>
Maison Minatec .....	8
CEA Grenoble .....	9
<b>Artificial intelligence at CEA.....</b>	<b>10</b>
CEA-Leti.....	10
CEA-List .....	11
<b>A short note on artificial intelligence .....</b>	<b>11</b>
<b>About CEA.....</b>	<b>13</b>
<b>Your contacts .....</b>	<b>13</b>



## New perspectives on edge artificial intelligence

While the development of artificial intelligence depended until recently on software modules installed on centralized IT networks and servers (the Cloud), its future will also be shaped locally. The multiplication of connected objects (Internet of Things or IoT) requires a decentralization of artificial intelligence. A greater reactivity of connected smart devices or components is now required (e.g. to activate the brakes of a driverless car almost instantaneously), as well as enhanced cybersecurity with locally processed data that no longer need to be exported via a central network to feed into AI. The new revolution in artificial intelligence therefore involves developing dedicated electronic components, such as specifically designed sensors or chips.

Ultra-low-power computing solutions incorporating rapid artificial intelligence computing modules are going to become increasingly common in our everyday objects. Research institutes and designers of advanced electronic components are now setting to work on this subject with new perspectives in terms of technological breakthroughs and market shares. The entire value chain of the micro- and nano-electronics sector is affected (system components), since it is now a strategic area for several fields of activity that are experiencing a digital revolution: automotive, aeronautics, defense and security, health and medicine, etc.

### Edge intelligence and trustworthy intelligence

Can we trust artificial intelligence to control a driverless vehicle if the calculations are made in the Cloud? Doubtful. The slightest bug in the transmission and the decision would be made too late. This is why CEA now focuses its work on edge artificial intelligence, that is, AI that is installed on integrated circuits and no longer remotely. Researchers already have numerous technological building blocks available: algorithms, low-power, photonics, imagers, memories, architectures, etc. They will start to assemble them as part of the programs that will be presented to industry during the Leti Innovation Days 2019.

### Leti Innovation Days

This year, the annual event for innovators at CEA-Leti is dedicated to new perspectives on edge and trustworthy artificial intelligence.

As in previous years, around 700 decision-makers, researchers and engineers from the IT world in Europe, Asia and America will meet at CEA-Leti, from 24 to 28 June 2019, to assess together the perspectives for R&D over the next 10 years.

 **Find the full program at:** <http://www.leti-innovation-days.com>

## 2019 highlights

26 & 27  
JUNE

### Edge AI Showroom

Of the 45 technological demonstrations presented in the exhibition intended for the health sector, the industry of the future, or even smart cities, several feature edge artificial intelligence. The guided tour of the exhibition on Wednesday 26 June at 3 pm will present solutions for the electric car of the future; for diagnosing sleep apnea at home, with the same degree of medical accuracy as in a hospital; solutions for lens-free, portable or even microfluidic microscopes, to save time on prescribed analyses; as well as technological demonstrations, such as the first neural network circuit in the world to be fully integrated in a chip for edge AI applications.

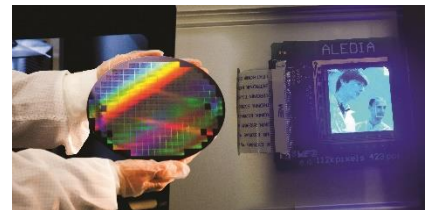
27  
JUNE

### Pitch Startups

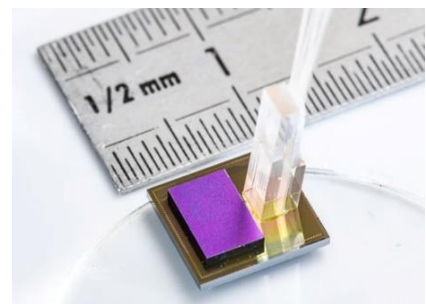
CEA provides overall support for business creation (from conceptualization to the launch of the business) and lends its expertise in technological assessments, developing intellectual property portfolios and/or preparing business models. In particular, the start-up support program at CEA-Leti is open to creators of technological startups in all fields, from virtual reality to the medical sector, from industrial applications to mass-market products, and from IoT to the factory of the future. In addition to the start-up presentations scheduled for 27 June, the exhibition has dedicated a space to several of the CEA-Leti start-ups, including *Aledia* and *Scintil Photonics*, launched barely 6 months ago with the aim of accelerating and enabling more widespread access to optical interconnects for data centers. There is also a space dedicated to projects in the incubation phase, notably *Mag4health*, a solution that will drastically reduce the size of magnetoencephalography (MEG) devices and the weight of their magnetic shielding from 5,000 kg to 150 kg.

 Pitch startups program at:

<https://bit.ly/2L0PQ1j>



Aledia is a CEA startup. Aledia is developing a doubly innovative 3D LED technology. Made using a 200-mm silicon wafer with an ultra-thin nucleation layer, manufacturing costs are reduced and the light-emission structure, consisting of a forest of gallium-nitride nanowires, is highly efficient and ultra-bright. © Aledia.



Scintil Photonics is a CEA startup. Silicon Photonic Integrated Circuit (circuit on the bottom) with silicon integrated electronics circuit (chip on top). A fiber network glued to the photonics circuit enables optical data input/output. © DR.

27  
JUNE

## Conference led by Cédric Villani, Member of Parliament and First Vice-President of the French Parliamentary Office for the Evaluation of Scientific and Technological Choices

Cédric Villani will discuss the challenges of artificial intelligence in France and in Europe (presented in English). The public is invited to send him questions by SMS. These questions will be answered at the end of the session.

28  
JUNE

## Latest advances in quantum computing

The Leti Innovation Days will also be an opportunity to review the latest advances in R&D and to map the initiatives in quantum information science that are in progress worldwide. Experts will discuss all aspects of the value chain when developing a quantum computing sector: IT needs and associated opportunities for quantum systems, links between algorithms and architectures, building a large-scale quantum computer platform, covering everything from quantum physics to quantum devices, requirements relating to interfaces, to the environment and to system architectures.

 **Program for the quantum computing seminar at:** <https://bit.ly/2WPAfnD>

## Press visit program

Please bring a valid ID card or passport with you

Wed 26  
JUNE

Maison Minattec

### 1.30-2.30 pm | INTERNATIONAL PRESS CONFERENCE (in English)

- **Jean-Noël Patillon, Director of CEA-List:**  
The Challenges of AI for Industry: Towards Safe and Certifiable AI.
- **Patrick Gros, Director of Inria Grenoble - Rhône-Alpes Research Centre:**  
Artificial Intelligence, from Software to Hardware.
- **Yassine Lakhnech, Executive Director of the IDEX Université Grenoble Alpes Project:** New 3IA Institute in Grenoble
- **Erik Huneker, CEO of Diabeloop:**  
Health, the DBLG1™ System is an automated medical device that puts machine learning at the service of the patient.



The startup Diabeloop is developing a portable artificial pancreas that combines a continuous glucose monitor, an insulin pump and a smartphone that hosts a personalized algorithm. © Pierre JACQUET/CEA

### 3 pm | GUIDED TOUR OF THE EXHIBITION (in French)

“Leti Innovation Days: Industry 4.0, smart cities, health, technological blocks”.

### 4.45 pm | MEETING WITH EMMANUEL SABONNADIÈRE

CEO of CEA-Leti

### 5.15 pm | ARTISTIC PERFORMANCE / ROCIO BERENGUER

The Catalan choreographer Rocio Berenguer will give an exclusive artistic performance as part of a European research program on artificial intelligence. Her show presents five species and their kingdoms: humans, plants, minerals,



animals and machines. A dialog between a human and a machine will be performed to raise the ethical challenges of artificial intelligence.

📺 Program at: <https://bit.ly/2KtUzZK>

**7.30 pm | DINNER AT THE RESTAURANT “L’Epicurien”**

1, Place aux Herbes, 38000 Grenoble.

*TRAM B, direction GIERES Plaine des Sports, stop Notre Dame-Musée.*

*Option to meet at 7pm in front of High Park Hotel to travel in a group to the restaurant.*

Thurs  
27  
JUNE

CEA Grenoble

**9 -11.30 am | VISIT TO A CLEAN ROOM WITH FOCUS ON AI AND MEMORIES**



Clean room © ©P.JAYET/CEA

- Brief presentation of the clean room and its activities
- The challenges of edge AI: Presentation of new techniques to lower power consumption, reduce latencies and the number of data transfers, notably by integrating all the blocks in one chip, since the inputs/outputs to and from memory blocks and computing are too costly in both time and energy.
- ERC My Cube: integration for in-memory computing.
- Presentation of the 193-mm immersion lithography cell, made possible thanks to the support of the Auvergne-Rhône-Alpes (AURA) Region. Lithography is one of the key stages in the manufacture of electronic components, as this is the stage where the electronic circuit is drawn layer upon layer. This critical stage will define the size of the pattern and the alignment, level by level – a crucial technological factor these days in the race to miniaturize components.
- The challenges around new phase-change materials and memories for edge artificial intelligence

**11.45 am -12.30 pm | BUFFET WITH CONFERENCE PARTICIPANTS**

## Artificial intelligence at CEA

Using their skills in the fields of electronics (1) and software security (2), CEA researchers are developing new approaches to respond to the specific challenges around trust and the distribution of artificial intelligence functions.

Whilst many research teams use AI at CEA, it is CEA-Leti, through its sound knowledge and expertise in digital sciences, that is positioned as a key player in developing reliable edge artificial intelligence: deep learning, expert systems, AI reliability, cybersecurity, robotics, etc.

CEA-Leti develops essential technologies for AI and especially for edge AI, offering more efficient and more compact electronic components and architectures that are less energy-intensive. To support the software complexity in an edge environment, AI is now conceived from software to chip.

CEA's fundamental research teams use AI as a tool in particle physics or astrophysics as well as in biology (brain imaging): analysis of physical or biological models and the introduction of decision-making tools, especially in diagnostics.

### CEA-Leti



CEA-Leti clean room: 300-mm high-magnification inspection station.  
© Pierre JAYET/CEA.

Based in Grenoble for over 50 years, CEA-Leti is one of Europe's top three public institutes for R&D in micro- and nano-electronics. The Institute is structured around the cross-disciplinary program "Edge AI/edge AI", funded by IPCEI/Nano2022 and European projects. The aim of this program is to use semi-conductor technologies in order to provide a technological answer to the challenges of edge AI: extensive use of FD-SOI technology increase energy

### INTERDISCIPLINARY AI INSTITUTE

*Run by Université Grenoble Alpes (UGA), CEA-Leti, Inria and CNRS, Inserm, Grenoble École de Management and Grenoble INP, the MIAI@Grenoble Alpes project (Multi-disciplinary Institute in Artificial Intelligence) is one of four institutes that have been awarded the "3IA" label by the Government.*

*The 54-million-euro budget over 4 years will allow all the participants to run collaborative public-private projects focusing on application subjects and will finance 28 chairs of excellence on seven topics, namely edge AI, health, Industry 4.0, the environment, energy and societal issues.*

*CEA-Leti is actively involved in four chairs, comprising the following areas in particular: pushing the limits of neuromorphic AI architectures, providing better support to patients for managing their treatment, and optimizing telecommunication networks.*

## DIGIHALL, DIGITAL INNOVATION HUB

*CEA is a member of DigiHall1, a digital technology hub in Paris-Saclay, which aims to guide industry and society in the use of artificial intelligence and its applications. DigiHall brings together all those involved in artificial intelligence as well as the technology transfer and business-creation offices on the Paris-Saclay campus. Supported by Île-de-France, the top region in Europe for innovation in the fields of artificial intelligence and the Internet of Things (IoT), DigiHall is labeled as a Digital Innovation Hub (DIH) in artificial intelligence and is a member of the European AI-DIH-EU network.*

*Digital Innovation Hub is a European initiative that aims to identify two or three digital ecosystems of world-class excellence in each Member State. These will be endowed with dedicated resources under the next Horizon Europe program: FP9 (2021-2027).*

efficiency, artificial neural networks to speed up computing, volatile memories and cyber-physical systems. to increase energy efficiency, artificial neural networks to speed up computing, volatile memories and cyber-physical systems.



## CEA-List


N2D2, open-source platform for the design, optimization and export of neural networks on multiple hardware platforms, for demanding and constrained applications. © Cyrille Dupont/CEA.

Based within Université Paris-Saclay, CEA-List has more than 800 researchers working on digital technologies – and particularly AI for the factory of the future – security and defense, transport, energy and health. CEA-List is also a member of the DATAIA Institute dedicated to data sciences, alongside Inria and the two universities, Paris-Saclay and the Institut polytechnique de Paris.

<sup>1</sup> The DigiHall hub brings together 5 partners (CEA, Inria, IRT System X, Mines Telecom/Telecom ParisTech Institute and the Systematic Paris-Region hub), including 3 Carnot institutes, within Université Paris-Saclay, with the support of the Île-de-France Region.

## A short note on artificial intelligence

Artificial intelligence or AI applies to all business sectors: transport, health, energy, industry, logistics, finance, as well as trade and commerce. The Cloud, driverless vehicles and smart meters all use efficient algorithms to provide effective, reliable and personalized responses to users. Combining hardware and software, artificial intelligence mobilizes not only multi-disciplinary knowledge – electronics (data collection, neural networks), IT (data processing, deep learning), mathematics (data analysis models) – but also human and social sciences (analysis of the societal impact induced by these new uses).

 For more information, go to: <https://bit.ly/2ltdJwM>



## About CEA

CEA was named one of the Top 100 Global Innovators in 2018-19 by Derwent-Clarivate. A public research organization, its work covers four main areas: defense and security, low-carbon energy (nuclear and renewable energy), technological research for industry, and fundamental research in physical sciences and life sciences. Devoted to innovation, especially Deep Tech, CEA has been supporting the creation of start-ups for more than 20 years. It is the leading French research organization for the filing of patents (annual INPI award).



ENERGY  
TRANSFORMATION



DIGITAL  
TRANSFORMATION



MEDICINE OF  
THE FUTURE



DEFENSE AND  
SECURITY

## Your contacts

### Organization

**Carolyn ANDERSON**

✉ [carolyn.anderson@cea.fr](mailto:carolyn.anderson@cea.fr)

☎ +33 1.64.50.20.11

### Press contacts

**François LEGRAND**

✉ [francois.legrand@cea.fr](mailto:francois.legrand@cea.fr)

☎ +33 6.77.38.57.97

**Vincent CORONINI**

✉ [vincent.coronini@cea.fr](mailto:vincent.coronini@cea.fr)

☎ +33 6.33.74.16.45

**FOLLOW US:** [www.cea.fr](http://www.cea.fr)



@CEA



@CEA\_Officiel



@cea.pageofficielle



@CEAsciences



[www.cea.fr](http://www.cea.fr)



@CEA



@CEA\_Officiel



@cea.pageofficielle



@CEAsciences