Press release
November 24th 2020

2020 IMT- Académie des Sciences Awards for Gaël Richard and Étienne Perret

The award was created in 2017 in partnership between the Académie des Sciences and Institut Mines-Télécom (IMT) to reward outstanding scientific contributions in the fields of digital transformation; engineering for energy and the environment; and materials and manufacturing. The 2020 ceremony will be entirely virtual and will be held on 1 December. It will reward two researchers, who specialize respectively in audio signal processing and identification and in low-cost RFID sensors for identification applications.

Two prizes awarded

The IMT-Académie des Sciences Awards reward scientific research carried out by French researchers or by European researchers in collaboration with French teams. Three fields of research are eligible:

- Digital transformation in industry
- Engineering for energy and the environment
- Materials and manufacturing

The IMT-Académie des Sciences Grand Prize for an amount of €30,000, is awarded to a scientist who has made an outstanding contribution to the advancement of issues arising from the industrial or business world.

The IMT-Académie des Sciences Young Scientist Prize, for an amount of €15,000, recognizes a scientist who is under 40 years old on January 1 of the year the prize is awarded and who has contributed to advancing issues arising from the industrial or business world through a major innovation.

The prizes are rewarded jointly by the Académie des Sciences and IMT with support from the Fondation Mines-Télécom. They are awarded, irrespective of nationality, to a scientist working in France, or in Europe in close collaboration with French teams.

To attend the awards ceremony on 1 December at 6 pm: https://bit.ly/ceremonie-prix-IMT-AcadSciences

IMT-Académie des Sciences Grand Prize: Gaël Richard

Research professor and Head of the "Image, Data, Signal" Department at the Information Processing and Communication Laboratory (LTCI), Télécom Paris

"I'm particularly pleased with this award, which, in addition to recent advances, highlights the challenges and issues of audio signal processing in artificial intelligence science and technology."

Gaël Richard is a specialist in audio signal processing. After earning his PhD at University Paris-Sud in 1994, he began his research career by studying singing voice synthesis, followed by speech synthesis. His work in the field of signal processing led him to find new methods for breaking down the voice into the constituent elements of audio signal, in order to better recreate a synthetic voice. He thus developed the principle of decomposing signal as a product of two positive matrices: one representing the basic components of sound, and the other indicating the activation of these components over time. This sophisticated method represented a significant advance in the field. It allowed for a highly detailed description of the composition of the audio signal, and paved the way for Gaël Richard's subsequent work on separating sound sources, followed by classification. The strength this description in the form of a product of non-negative matrices is that a priori knowledge can be easily injected into certain elements that make up sound. By indicating, for example, whether or not the components have a harmonic character, or by identifying one of the sources of a complex signal (such as the type of musical instrument), the description of the overall signal is therefore greatly improved. This characteristic makes it easier to work on the automatic detection of audio signals, such as an instrument in the middle of a concert, or emotional signs that come through in a voice. Gaël Richard's work has given rise to numerous collaborations with the industrial world, in particular within the music industry, and notable partnerships with Deezer and Technicolor. Gaël Richard has also developed a number of open-source software programs for the academic world, thereby contributing to the huge growth of his discipline in recent years.

IMT-Académie des Sciences Young Scientist Award:
Étienne Perret
Research professor, System Design and Integration Laboratory, Grenoble INP

"I'm delighted to show, year after year, that an identification technology very different from those used at present could be developed. I've always been fundamentally interested in the practical implementation of academic research – my goal is for it to find a place in society."

After earning a PhD in electrical engineering at INP Toulouse in 2005, Étienne Perret began his academic career at Grenoble INP. His research led him to the topic of identification technologies, and in particular simple approaches to minimize the cost and materials necessary to manufacture them. Étienne Perret is recognized for his work on chipless RFID sensors, an especially attractive alternative to the other technologies already available on the market. These sensors in the form of tags combine the economic benefits of bar codes with RFID sensors' ability to identify an object through a material based on a wave signature. For this, Étienne Perret relies on the geometry of the sensors, printed with a conductive ink.

Depending on the shape of the tag, the wave signature reflected by an emitter will be unique, making it possible to detect. This technological brick paves the way for a wide range of applications. In addition to tracking and tracing objects, it will also make it possible to develop temperature and humidity sensors at a lower cost. This especially promising research could give rise to new identification practices in industry. A start-up based on Étienne Perret's work has been created in order to bring this technology to companies. Starting in 2021, it will work to promote the opportunities offered by chipless RFID sensors.

About IMT www.imt.fr
Institut Mines-Télécom is a public higher education and research institution under the aegis of the French Ministry for the Economy, Industry and Digital Affairs, which groups together 8 graduate schools, 2 subsidiaries and a network of strategic and affiliated partners. Its activities in the fields of engineering sciences and digital technology support the education of engineers and managers, partnership-based research, innovation and economic development. Always attentive to the economic world, IMT combines strong academic and scientific legitimacy, close corporate relations and strategic positioning in the key transformations of the 21st century: digital technology, industry, energy and ecology, and education. IMT is a founding member of the Alliance for the Industry of the Future and co-founder of the Franco-German Academy for the Industry of the Future with Technische Universität München (TUM). It is recognized by 2 Carnot Institute accreditations for the quality of its partner-based research. Each year, IMT trains over 1,200 students, enters into nearly 70 million research contracts, and hosts some 100 start-ups in its incubators.

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