ISTITUTO
ITALIANO DI
TECNOLOGIA


IMPARARE
TO LEARN
ABBI
Focus

Dear Readers,

2014 was a very dynamic year. Further progress was made in the scientific activity, which led to important new discoveries and originated a number of publications and patents. IIT has now gained recognized standing at international level and strengthened the link with the productive world by launching important projects focused on innovation and technology transfer.

In 2014, the scientific activity resulted in 1.332 scientific articles published on international magazines, thus bringing the number of publications to 5.700 altogether since the beginning of the scientific activity back in 2006. We reached a total number of 15.000 citations, a parameter indicating the impact of publications on the international scientific community. Moreover, we won two European Research Council awards (ERC), the prestigious ad personam grants from the European Union.

As regards the effects of the scientific activity on the productive side, 65 patents were filed and about 30 inventions made in 2014 (over 300 patents and 165 inventions since 2006). The proactive attitude of our research staff led to the establishment of 2 new Start-ups, thus bringing to 10 the total number of businesses launched through IIT since the early stages. Moreover, the contracts acquired in 2014 concern 31 European projects, 34 with national and international entities and about 70 industrial projects.

2014 was also the year in which a new strategic plan was defined for the 2015-2017 period. The new plan will include 11 research programs divided into three areas: Technology (Portable Energy, Robotic Rehab, Graphene), Core (Brain Science, Robotics, New Materials, Materials Chemistry) and Cross Disciplinary Programs (Interactions, Health Technologies, Nanobiophotonics, Computation). The challenge is to be able to accelerate the transfer of the developed technologies from research to industry.

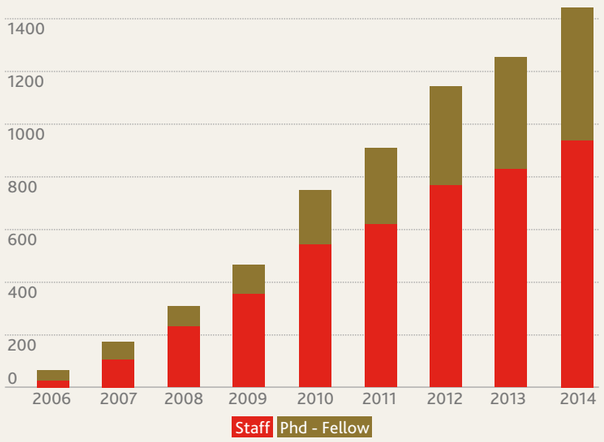
Our goal is to stretch and implement our vision of bio-inspired and "human-centered" technology, so as to concur to enhance the quality of human life in a more sustainable and harmonious relationship with the planet and the other living beings.

To achieve this we have decided to invest in staff, including high-profile human resources. Compared to 2013, the Institute's workforce increased by 15%, thus reaching 1.443 units, 90% of whom are researchers. Moreover, IIT defined a tenure-track process, a recruitment model in line with international standards, which will lead in the next few months to an increase in the number of senior researchers selected among the world's best minds.

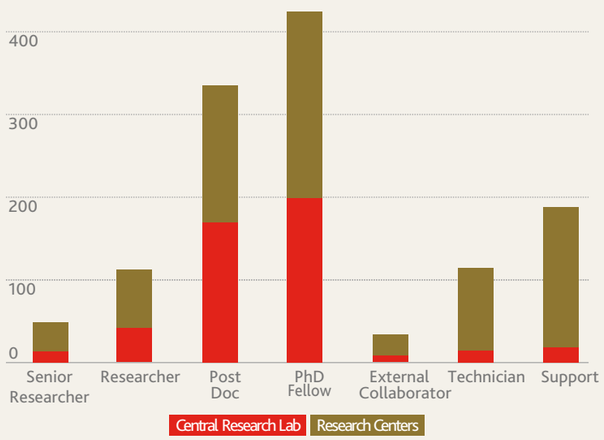
Roberto Cingolani, Scientific Director

REHABILITATION
ROBOTICS
INTERACTIONS
GRAPHENE
BRAIN SCIENCE
MATERIAL
CHEMISTRY
COMPUTATION
NANOBIO PHOTONICS
HEALTH
ROBOTICS
ENERGY
NEW MATERIALS

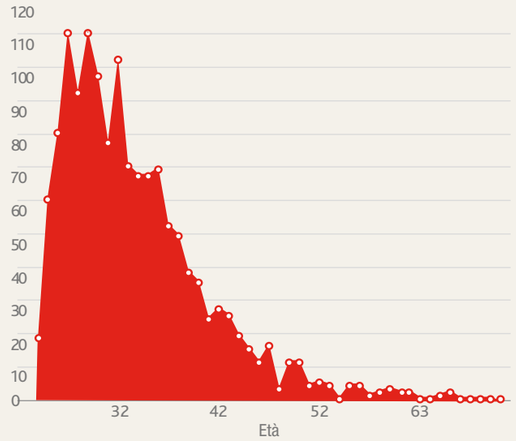
1. Staff evolution over the years



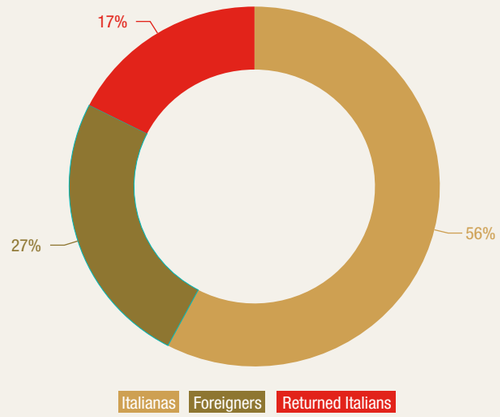
2. Staff role distribution



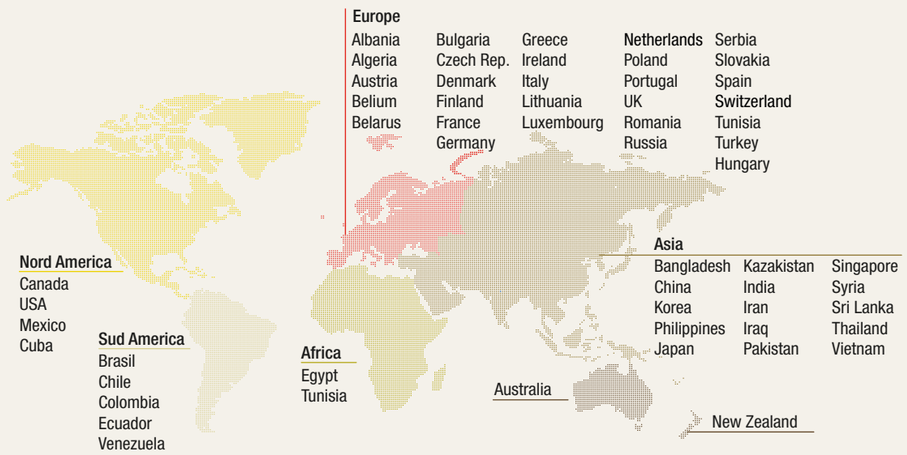
3. Staff age distribution



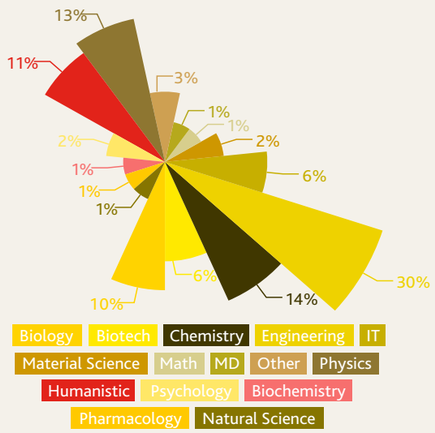
4. Scientists' origin



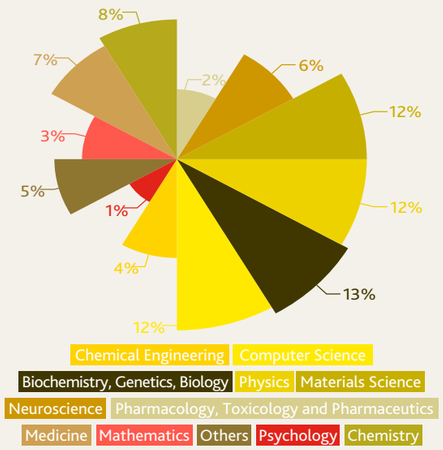
5. Countries of origin of IIT staff



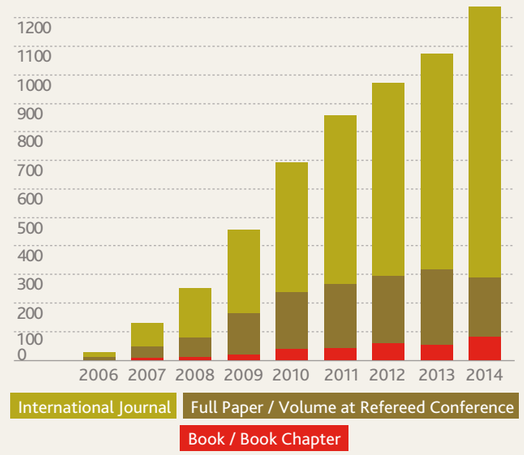
6. IIT scientific staff role distribution



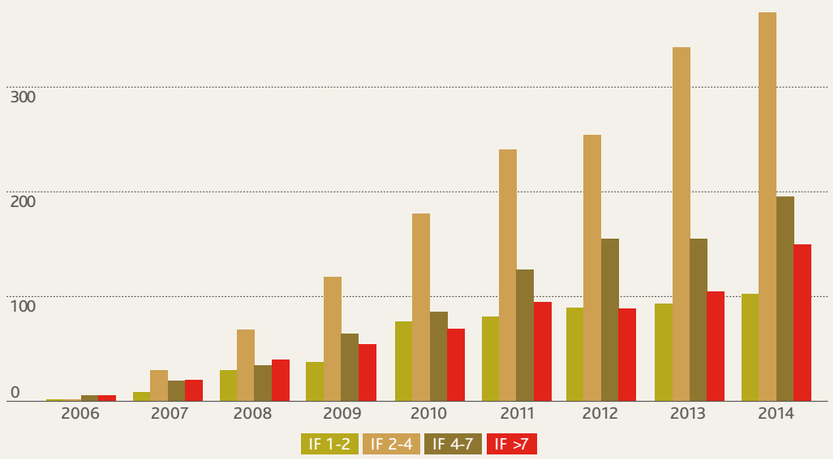
7. Number of publication by thematic area
(based on scopus classification from 2006 to 2013)



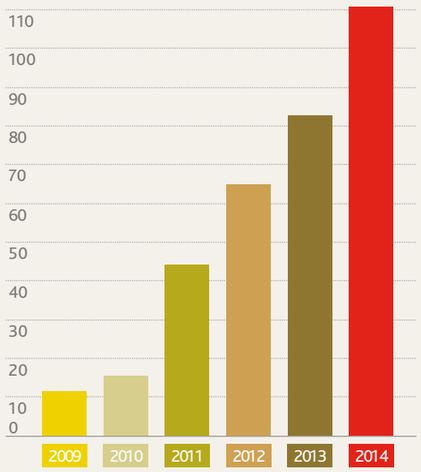
8. Number of publications over the years



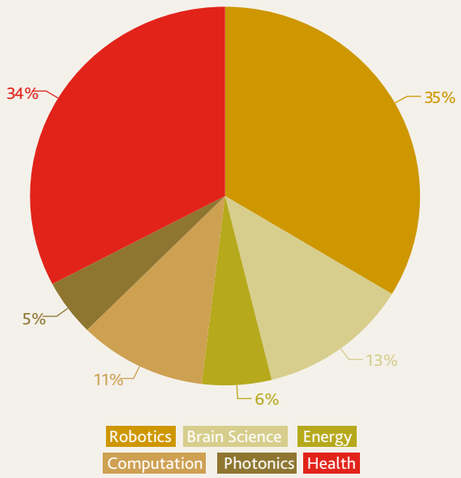
9. Temporal evolution of publications suddivision by impact factor (IF) range



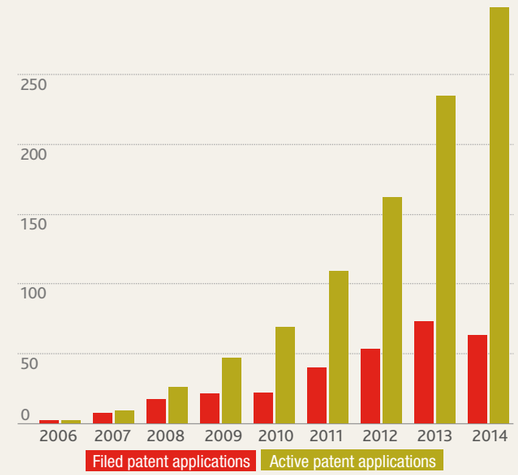
10. Fund raising from competitive projects and technology transfer



11. Distribution of patent portfolio per area



12. Patent applications



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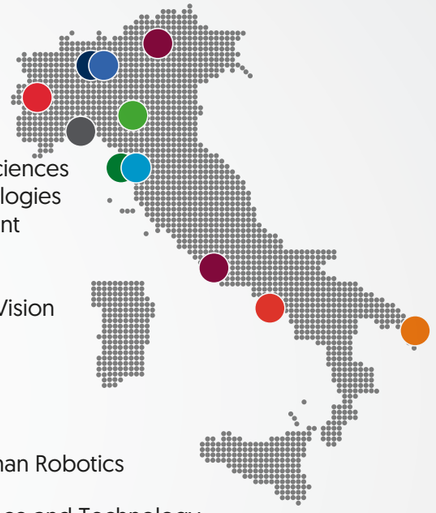
CAMBRIDGE, USA

IIT@HARVARD
Nanotech for Brain

IIT@MIT
Laboratory for Computational and Statistical Learning

ITALY



GENOVA
- Advanced Robotics
- Robotics, Brain and Cognitive Sciences
- Neuroscience and Brain Technologies
- Drug Discovery and Development
- Nanochemistry
- Nanophysics
- Pattern Analysis and Computer Vision
- iCub Facility
- Graphene Labs
- Rehab Technologies

TORINO IIT@PoliTo Center for Space Human Robotics

MILANO IIT@PoliMi Center for Nano Science and Technology

MILANO IIT@SEMM Center for Genomic Science

TRENTO IIT@unitn Center for Neuroscience and Cognitive Systems

PARMA IIT@UniPr Brain Center for Motor and Social Cognition

PISA IIT@NEST Center for Nanotechnology Innovation

PISA IIT@SSSA Center for Micro-Biorobotics

ROMA IIT@SAPIENZA Center for Life Nano Science

NAPOLI IIT@CRIB Center for Advanced Biomaterials for Health Care

LECCE IIT@UniLe Center for Biomolecular Nanotechnologies

2014: 9° year report

DIn 2014 IIT researchers brought to conclusion the activities scheduled in the last part of the 2012-2014 scientific plan, essentially based on biomimesis and development of technologies to improve human life.

During 2014 a matrix model was implemented further to the reorganization that followed the introduction of the Tenure Track process: the creation of independent research lines within Departments and Research Centers has ensured greater management flexibility and enhanced interdisciplinary work among research groups.

In the second semester, the scientific plan for the following three years (2015-2017) began to be prepared. This is a complex process that takes its lead from the integration into one unified vision of the work projects headed by the single Principal Investigators (PI) selected through the Tenure Track procedure, which has now become fully operative. The document thus drafted was then submitted to the strategic and feasibility assessment of the Technical Scientific Committee (CTS); this version, possibly supplemented and amended in accordance with the indications received, was then approved by the Executive Committee and by the Foundation's Board, which ratifies the relevant expenditure.

The strong points of IIT - attractiveness for scientists and companies and project competitiveness - were further consolidated compared to the previous years, which has made it fundamental to find new premises for labs and offices. The Institute has therefore

identified a few suitable facilities and started negotiations to verify the possibility to expand beyond the facilities of the Central Laboratory in Genoa.

The new scientific initiatives undertaken during the year were preparatory for the launch of the 2015-2017 scientific plan: in most cases, they concerned new laboratories set up to start explorative, interdisciplinary or technological programs in highly strategic sectors or to launch the cross-border projects assigned to the institute by the European Research Council (ERC) during the previous year.

Nanofisica

- ☐ Graphene Lab: facility for the synthesis of graphene-based materials and bi-dimensional materials in connection with the Graphene EU-FET Flagship
- ☐ Nano Carbon Materials Lab: chemical facility for the synthesis of carbon nanocompounds for various applications, including biomedicine.
- ☐ Plasmonic Lab: laboratory for the activity related to the ERC Consolidator grant "Neuro Plasmonic".

Nanochemistry

- ☐ Li-Batteries Lab: laboratory for the manufacture of new electrodes for lithium batteries.
- ☐ Nanoparticles Transformation Lab: laboratory for the activity related to the ERC Consolidator grant "Advancing the Study of Chemical, Structural and Surface Transformations in Colloidal Nanocrystals".

Discovery and Development of Pharmaceutical Drugs

- ☐ Nanotechnology for Precision Medicine: laboratory for the activity related to the ERC Consolidator grant "Engineering Discoidal Polymeric Nanoconstructs for the Multi-Physics Treatment of Brain Tumors".

Multiscale computation

- ☐ Compunet Network: enhancement of the Compunet national computational network.

Neurosciences

- ☐ Molecular Biology Lab: facility for the experimental study of micro-RNA and molecular biology.

In addition to these new laboratories, which have an explorative and fundamental nature, there are a few initiatives of technological and/or industrial nature to be considered:

Nanophysics

- ☐ Nikon Imaging Center (NIC@IIT): joint lab with Nikon for the development of super-resolution microscopes (BOX 1).

Discovery and Development of Pharmaceutical Drugs

- ☐ Pharma-Chemistry Facility: facility that deals with pharmaceutical chemistry, pharmacokinetics and in vivo experiments. It supports the nanotechnological activities for "intelligent drug delivery" and for biocompatible materials and materials that enhance tissue regeneration (wound-healing). This facility has readdressed some of the main duties of the D3 Department. During the year, the facility obtained important financing (1.2 Meu for two years) from Fondazione Nazionale Fibrosi Cistica [Italian National Cystic Fibrosis Foundation] aimed at experimenting a new treatment (BOX 2).

Neurosciences

- ☐ Synaptic Neuroscience Lab: located within IRCCS Ospedale San Martino of Genoa and in collaboration with Università degli Studi di Genova. This new laboratory transfers the research developed by IIT in the neurophysiological sector to a clinical ambit.

Robotics

- ☐ IINAIL-IIT joint Robotic Rehabilitation Lab; joint lab with INAIL [the Italian Workers' Compensation Authority] involves all robotic departments in the development of 3 platforms: hand prostheses, leg exoskeleton and rehabilitation systems for various districts of the human body.

BOX 1

The Nikon Imaging Center in Genoa - NIC@IIT

A new center of excellence for optical microscopy

On 6 June 2014 the Nikon Imaging Center (NIC) was inaugurated at IIT, Genoa. This is the new microscopy center that will be entrusted with the task of enhancing, over the next three years, the new generation of optical instruments with biomedical applications. NIC@IIT originates from the collaboration between IIT and Nikon Instruments, the world leader in the distribution of scientific equipment for diagnostics, research and measurement. The new center is one of the nine Nikon excellence centers in the world together with Harvard, Singapore, London, San Francisco, Paris, Chicago, Hokkaido and Heidelberg. A team of 22 scientists, led by Alberto Diaspro, works exclusively in this laboratory, with the aim of innovating optical microscopy through the development of a new generation of instruments capable of ensuring applications in the field of biomedicine and innovative materials. The investment by the multinational was about 2.8 Meu.

In particular, NIC@IIT will focus on applications within the study of neurodegenerative and oncological diseases, diagnosis through molecular screening and structural analysis of new materials. The research will be accompanied by training for the new generation of doctors, biologists and engineers who will use the new instruments in the future.

NIC@IIT's objective is to develop innovative technologies at modest costs: the performance of the new optical microscope will be comparable to the performance of an electronic microscope, but the cost of implementation, maintenance and preparation of materials will be 20 times lower. Moreover, the new optical microscope will be capable of competing with the present ones also with respect to a few fundamental aspects: it can carry out non-invasive in vivo analyses on human beings (partly replacing biopsy), it operates in the absence of molecules or artificial tracers in the body to identify the tissue or organ to be studied and allows access to the measurement of the biological sample in 4 dimensions (the three dimensions of space and evolution in time).

BOX 2

A Task Force against Cystic Fibrosis

IIT has been chosen by Fondazione per la Ricerca sulla Fibrosi Cistica Onlus [Non-profit Foundation for Research on Cystic Fibrosis] together with Istituto Giannina Gaslini [Genoa-based children's hospital] to collaborate in the "Task Force for Cystic Fibrosis" (TFCF) project.

The objective is quite ambitious: identifying the molecule that can correct the defect of the CFTR protein caused by the ΔF508 mutation - the most frequent mutation in people suffering from cystic fibrosis, which involves over 80% of patients worldwide and 70% in Italy - to eradicate the disease and find a treatment for most cystic fibrosis patients around the world. In Italy alone, there are over 2.5 million cystic fibrosis immune carriers, and these people are often unaware of being such, although they may transmit the disease to their children.

In pursuing this goal, Fondazione per la Ricerca sulla Fibrosi Cistica (FFC) Onlus has chosen to invest in the "made in Italy" excellence and has involved IIT Drug Discovery and Development Department led by Tiziano Bandiera and Daniele Piomelli, as a protagonist of the task force. Another main actor of the project, with which the Foundation has created a synergy, is the Molecular Genetics Laboratory of Istituto Giannina Gaslini, which has a long-established experience in CFTR pharmacology and high throughput screening.

Within this initiative of strategic importance, IIT shall provide the necessary collection of chemical compounds for the initial screening and deal with the synthesis of new molecules capable of improving the functionality of the defective CFTR protein.

FFC Onlus, which has already given a significant contribution to the field of treatment of the base defect, has undertaken to finance the first three steps of the period of study (2014-2017), participating with 1.2 Meu altogether out of the total project value, which is 1.6 Meu.

In detail, the steps of the Task Force against Cystic Fibrosis project are:

2014: Step 1 (12 months)

- ☐ Screening of a collection of over 11,000 compounds and identification of the active molecules (hit identification);];
- ☐ Selection of the compounds being most active on the mutated protein;
- ☐ Validation of the compounds being active on bronchial cells from primary cultures (lungs of CF patients subjected to a transplant), the biological conditions being most similar to those of a person affected by the disease.

2015: Step 2 (12 months)

- ☐ Selection of the most promising chemical compounds and their chemical modification to look for the most effective leads (hit to lead).

2016-2017: Step 3 (18 months)

- ☐ Optimization of the lead molecules and identification of a final compound;;
- ☐ Studies of pharmacokinetics and safety for the implementation of a drug potentially capable of treating cystic fibrosis to be then used for in vivo experiments.

2014 saw an increase in the total number of ERC grants awarded to the Institute (8 since 2006), thanks to Mario Caironi (Center for Nano Science and Technology@PoliMi), who won a starting grant for the project called "High-frequency printed and direct-written Organic-hybrid Integrated Circuits" **(BOX 3)** and Tommaso Fellin (Optical approaches to brain function Lab@Genova), who won a consolidator grant called "How neuronal activity patterns drive behavior: novel all-optical control and monitoring of brain neuronal networks with high spatiotemporal resolution" **(BOX 4)**.

At the beginning of 2014, kickoff meetings were held at IIT about two European projects financed by the European Commission and coordinated by scientists of the RBCS Department:

- ABBI "Audio Bracelet for Blind Interaction", coordinated by Monica Gori and financed with 1.8 Meu for three years, aims at improving the spatial abilities of blind children and adults by using sound associated with body movement, in collaboration with 5 European centers and Istituto Davide Chiossone (a Genoa-based institute for the care of blind people) **(BOX 5)**.
- BLINDPAD "Personal Assistive Device for BLIND and visually impaired people", coordinated by Luca Brayda and financed with 2 Meu for three years, aims at developing a new class of digital devices to stimulate the sense of touch in visually impaired people **(BOX 6)**.

BOX 3

Low-power electronics awarded with the ERC Starting grant of the European Research Council

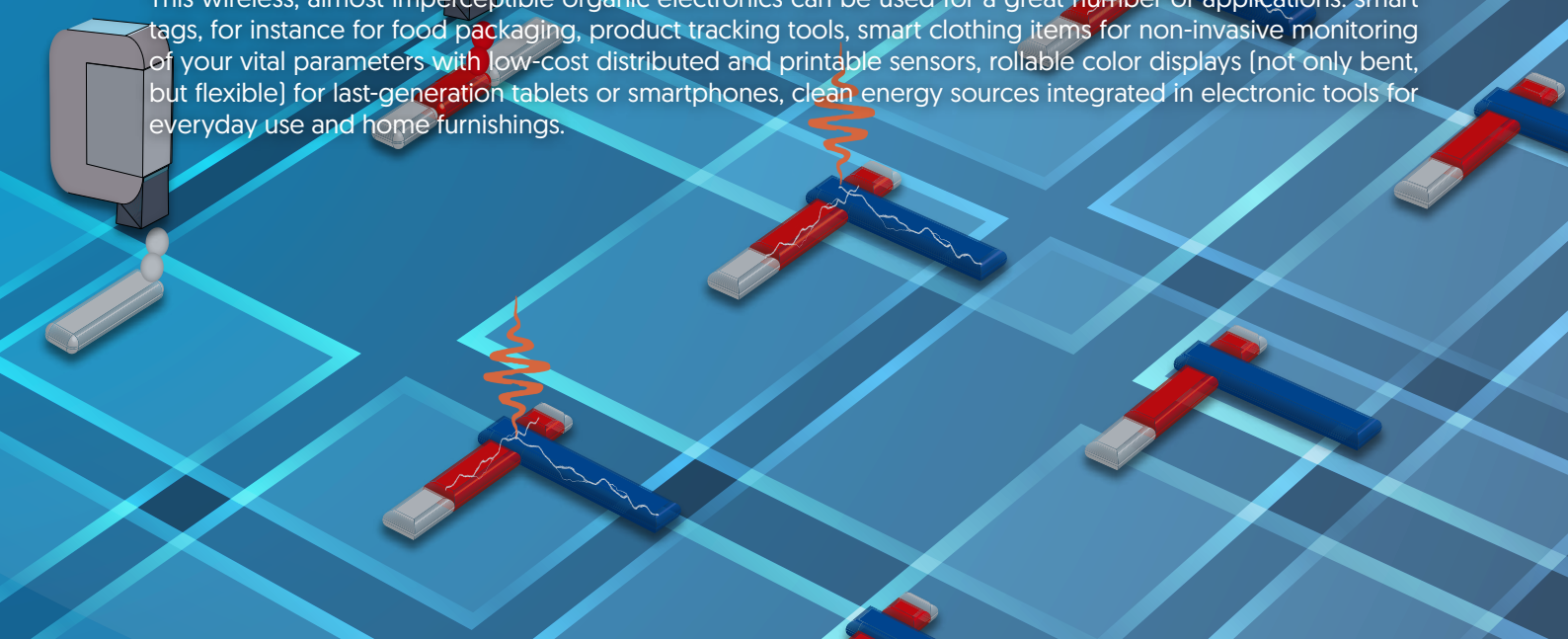
The project for the development of a low-power-consumption transistor not based on silicon, devised by Mario Caironi from IIT Center for Nano Science and Technology, Milan, was awarded with the most prestigious competitive research Grant in Europe (ERC) intended for specific, individual research projects.

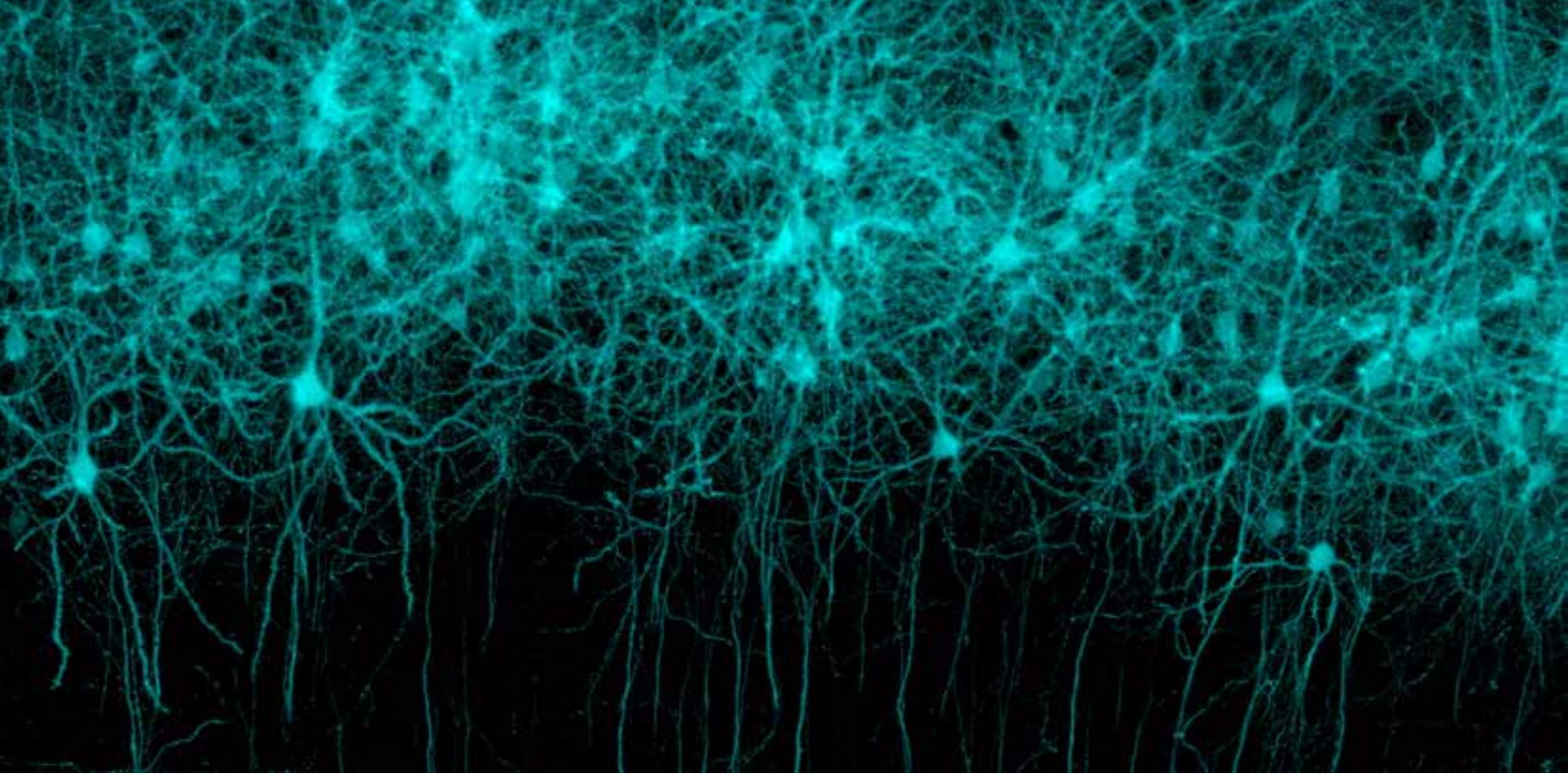
The "High-frequency printed and direct-written Organic-hybrid Integrated Circuits" project, financed with 1.5 Meu, was selected among about 3,000 submitted projects.

The project intends to develop a new technological concept of transistor, printable on any surface for a new generation of low-power-consumption electronics fed by renewable organic sources and with the use of environmentally-friendly materials. This approach has several technological applications: light, flexible and transparent printable electronic devices, with production methods which reduce environmental impact and costs, which could thus bring manufacture back into towns, as they do not need the large plants and heavy infrastructure typical of traditional manufacturing activities.

"Organic" electronics finds its natural application in domotics and in the Internet of things. Printed electronic circuits can turn everyday objects and sensors into highly technological instruments, capable of performing complex operations and interacting with one another, as they can integrate flexible and transparent photovoltaic cells capable of producing electricity even from weak and/or artificial light sources. Moreover, these are creasable and rollable materials, with a very low percentage of performance loss even after 10,000 bending cycles.

This wireless, almost imperceptible organic electronics can be used for a great number of applications: smart tags, for instance for food packaging, product tracking tools, smart clothing items for non-invasive monitoring of your vital parameters with low-cost distributed and printable sensors, rollable color displays (not only bent, but flexible) for last-generation tablets or smartphones, clean energy sources integrated in electronic tools for everyday use and home furnishings.





BOX 4

Let's read the alphabet of the brain, and more

IIT won the grant from the European Research Council, thanks to the activity of a young neuroscientist.

"How neuronal activity patterns drive behavior: novel all-optical control and monitoring of brain neuronal networks with high spatiotemporal resolution". This ERC Consolidator Grant of about 2 Meu will allow Tommaso Fellin and his team of researchers of the Genoa IIT to develop a technique to interpret the alphabet of the brain by reading and modifying the electric activity of neurons with a space and time resolution so far unreached. Being able to decode the electrical impulses at the basis of the representation and storage of information in our brain would open new frontiers for the comprehension of the way in which the brain works.

The research activity will mainly focus on the implementation of a new technology that will permit to understand the electrical signals in groups of neurons and reproduce their complexity. By using the recent optogenetics technique (which combines optical and genetic approaches) and a multidisciplinary team of physicists and biologists, the new project aims not only at developing this new technique, but also at standardizing it, so that it may be made available to researchers in various scientific sectors, thus facilitating the transfer between basic research and industry. The results of the research will shed light on one of the main unresolved issues of modern neurosciences: what is the code used by the brain to interpret and transfer the information coming from the outside world. Revealing these fundamental properties will be the first step to better understand the onset mechanisms of several, still mysterious neurological pathologies, such as Alzheimer's disease, Autism and Schizophrenia. Moreover, the technologies developed in this project may be of great importance in the field of brain-machine interfaces (control of the operation of a machine through electrical signals generated by the brain), used, for instance, in the field of prosthetics. Understanding the details of the code used by the brain to interpret the signals coming from our senses might lead to a new generation of interfaces, which will make it possible to recover the perception of the senses when the functionality of the sensory organ is impaired, by "writing" suitable neuronal codes directly in the cerebral tissue.

BOX 5

Do the blind have a "sixth sense"? Probably not...

It has been often heard that in the absence of vision, hearing becomes so surprisingly acute as to allow blind people to find their way in space.

However, this sort of "sixth sense" seems to be a false myth, according to what has been reported by IIT in a study presented for the first time at the ninth edition of the Forum of Neuroscience of the Federation of European Neuroscience Societies (FENS), which was held in Milan from 5 to 9 July 2014.

The research, conducted by Monica Gori, Tiziana Vercillo, Giulio Sandini, Elena Cocchi and David Burr of IIT RBCS Department in collaboration with Istituto David Chiossone, Genova, involved children who were visually impaired since birth. During the experiment, scientists presented the children with a series of complex hearing stimuli, asking them to find out where a certain sound came from. For the first time, the situation recreated in the laboratory was more similar to the situation in which a blind child is normally immersed every day, unlike the measurements made so far in other experiments, which considered single hearing stimuli, therefore simpler than those we are used to hear in our surrounding environment.

The same exercise had been conducted during another experiment carried out by Gori and her colleagues on a group of adults with congenital blindness. The results, published on Brain magazine in February 2014, showed great difficulty in interpreting complex hearing stimuli.

Now, the results obtained from the experiments on children confirm the data emerged from the study on adults: blind people do not hear better. Indeed, in normal everyday conditions they even seem to hear less.

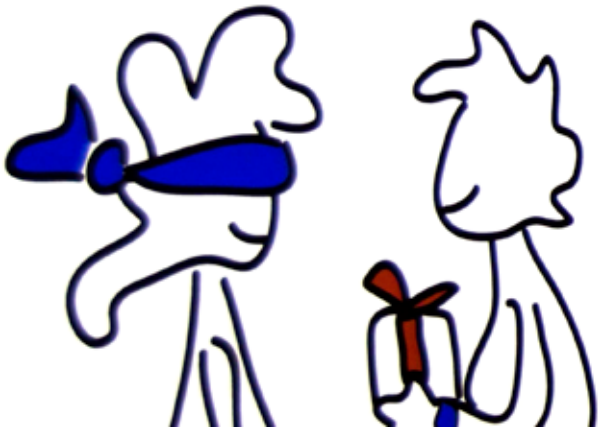
This result would completely reverse a scientific debate that has gone on for years. According to Monica Gori, though, this discovery is not so counterintuitive. Vision is an essential means to understand how the space around us is structured. Until now, blind people seemed to have greater abilities than able-bodied people, although experiments on animals suggested that loss of vision may impair the development of space maps in the upper culliculus.

Gori's results bring clarity to this debate: in the absence of vision, it is possible to develop a few simple space hearing abilities allowing, for instance, to localize the origin of a sound in space, such as guessing where a person speaking is, but not complex ones, such as: understanding the position and distance of three people speaking with each other. And as we live in a rather complex world, this knowledge is of essential importance for us to be included in the world around us

ABBI Project

The data gathered by the team would thus seem to resolve this long-lasting controversy, proving that even in human beings, the absence of vision impairs space hearing perception. This assumption could open the door to new and more effective rehabilitation instruments. The study is at the basis of the "Audio Bracelet for Blind Interaction" European project (www. abbiproject.eu), which aims at improving the spatial abilities of blind children and adults by making use of sound associated with body movements. Realizing the real importance of the visual means in structuring the hearing space would permit to create targeted rehabilitation programs. ABBI project originates from a collaboration that involves 5 European Centers, including IIT with Monica Gori as project coordinator, and Istituto Davide Chiossone. Within this project, the system of rehabilitation with hearing stimuli will be tested on more than 50 visually impaired children from the Liguria Region over the next three years. It is the first project that suggests using rehabilitation systems in children even from one year of age.

In short, seeing well is necessary to hear well: this new idea could in actual facts change the current treatment course. According to the World Health Organization, 285 million people in the world suffer from visual impairment: 39 million of them are totally blind, including 1.4 million children.



The aim of **ABBI** is the development of a new technology
sensory-motor rehabilitation for visual impaired
The ABBI project is a three-years long project and starts in

BOX 6

IIT leads the European "Blindpad" project for the implementation of tactile devices for the blind and the visually impaired

The kick-off meeting of 17 January 2014 at IIT officially started off the three-year "Blindpad" European project, aimed at implementing devices for the visually impaired and the blind, which stimulate the sense of touch.

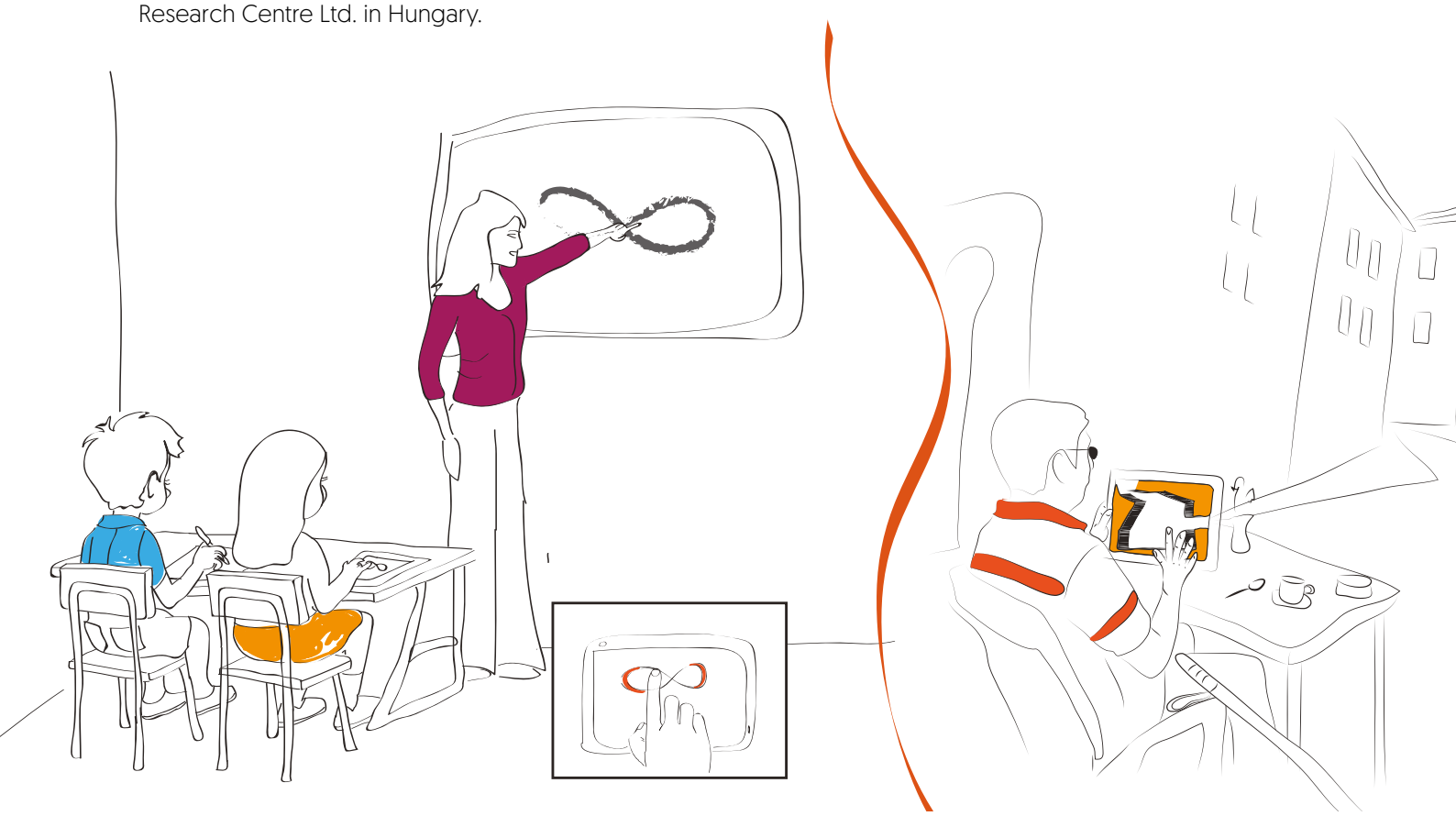
The objective is to improve the fruition of graphic information and, as a consequence, the quality of life of the people affected by serious sight loss through a unique technology solution. The project is being developed within the European Commission "ICT Work programme 2013" of the Seventh Framework Programme and involves an international consortium comprised of research and rehabilitation institutes and companies. The project coordinator is Luca Brayda, a researcher from IIT, Genova.

"Blindpad" (www.blindpad.eu) is the acronym for "Personal Assistive Device for BLIND and visually impaired people". Its objective is to introduce new touchable surfaces in mobile digital devices, capable of transmitting graphic contents through tactile sensations. The new instrument will be conceived to become a handy object, which can be integrated into the life of the disabled: new materials, a design that meets the needs of users, energy efficiency and low costs.

In the age of the Web and modern electronic devices, it has become difficult for people with serious visual impairment to approach and use the graphic contents conveyed by instruments that using sight as their favoured sense. "Blindpad" intends to create an alternative that will exploit the sense of touch to transmit the graphic information required to understand abstract concepts (such as geometric shape) or acquire information about the surrounding environment (such as the presence and position of a door). The surface of the device will consist of a grid of independent elements allowing to program and vary the represented form, stimulating tactile sensitivity and allowing the user to perceive the figure. It will be possible to connect "Blindpad" to mobile devices that are already present on the market.

The project involves different scientific areas of expertise and institutes having the improvement of the quality of life of disabled people as their mission. IIT scientists (from RBCS and Nanophysics Departments in Genova and IIT CBN centre in Lecce) will deal with the interaction between the final user and the Blindpad device as well as the implementation of part of the matrix of tactile stimulators.

The Italian partner is Istituto David Chiossone, which will have a central role in the interaction between the researcher and the disabled people, in order to verify the efficacy of the device directly with the potential users. The other partners of the project are: Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland, GeoMobile GmbH in Germany, Fundacja Instytut Rozwoju Regionalnego (FIRR) in Poland, ATEKNEA Invention and Research Centre Ltd. in Hungary.



In 2014 an important activity was carried out for the consolidation of scientific dissemination:

- La scienza a km zero [Zero-mile science], Massa Carrara;
- Researchers' Night, Genoa;
- Researchers' Night, Turin;
- Scientific Café Cycle, Genoa;
- Communication Festival, Camogli (GE);
- Wired Next Fest, Milan;
- Maker Fair and "Make in Italy" Exhibition, Rome;
- Botanical Garden, Padua;
- SMAU, Milan;
- World Science Festival, New York (Usa;
- The "Italia del futuro" [Italy of future] exhibition, consisting of specimens of the advanced technology of IIT (iCub, HyQ, rehabilitation robotics) reached European town in its travelling tour, such as Madrid, Podgorica and Stockholm, after visiting the United States in the second semester of 2013 (San Francisco and Los Angeles).

"Beyond Science. La scienza in uno scatto [Science in a snapshot]" The photographic exhibition organized in Genoa in 2013 further to a photographic contest which was held inside IIT, was brought to Lecce and hosted at the Castello Carlo V **(BOX 8)**, and exhibited at Genoa-based Festival della Scienza, which saw for the first time an important participation by IIT laboratories, also because IIT has become part of the Festival's organization team **(BOX 9)**.

Having opened its laboratories to students, IIT welcomed a few high school students for training guidance internships. The Foundation, moreover, promoted a contest among schools called"Mettici la faccia" [Put a face on it], where students were asked to draw the face of COMAN robots. The winner had the opportunity to visit IIT robotics laboratories and spend a day with the researchers

In order to consolidate its presence at international level, IIT participated in the organization of important scientific events, including:

- Living Machines (Milan);
- Joint IEEE International Conference on Development and Learning and on Epigenetic Robot - ICDL-EPIROB (Genoa);
- European Robotics Forum (Rovereto-TN).

Awards

- "Emily M. Gray Award" to A. Diaspro (Nanophysics); the prestigious international award granted every year by the Biophysical Society (www.biophysics.org) to scientists who stand out among others for the contribution given to teaching in the field of biophysics;
- "Brain Prize" to G. Rizzolatti (IIT@Unipr): the award is granted by the Danish Foundation Grete Lundbeck to scientists who have significantly contributed to the development of neurosciences in Europe;
- "Salvatore Venuta" fellowship in Nanomedicine to A. Marino and S. Gualtieri (IIT@SSSA);
- "UK-Italy Innovation Awards" to D. Ghezzi (NBT) for the On-Iris project; the award is granted by the UKTI British Government Department to young entrepreneurs and new companies that represent at best the brilliant results of Italian tradition in research and the development of cutting-edge technologies;
- Microturbina and Arbot were presented respectively by E. Guglielmino (ADVR) and J. Saglia (Robotic Rehab) to the Italian Prime Minister's Office as innovative ideas for the Country;
- The research group, coordinated by Gianni Ciofani at IIT CMBR centre in Pontedera (Pisa), has been selected by the European Space Agency (ESA), within the fifth edition of the "Spin your thesis!" campaign, which will allow scientists to make experiments in altered gravity;
- "Gentile da Fabriano" Award to Roberto Cingolani for the Science, Research and Innovation section; the award, now at its 18th edition, aims at representing the attractive aspects of the Marche Region and Italy as a whole, through the recognition of experiences, professional skills and commitments of great value in the cultural sector (economics, science, non-profit, sports).

BOX 7

BOX 7

IIT welcomes Prime Minister Matteo Renzi to Genoa

Our Prime Minister, Matteo Renzi, accompanied by the Minister of Defense Roberta Pinotti and the President of the Liguria Region Claudio Burlando, visited the IIT Central Lab on May 8 and met with IIT President, G. Galateri, the Scientific Director R. Cingolani, local authorities and representatives of the business world. During the visit to the laboratories, Renzi was shown some of the most advanced research activities in the field of rehabilitation, humanoid and animaloid robots and new "smart" materials.

In the Nanophysics Department, the innovative properties of eco-compatible nano-technological materials were presented: the hydrophobic sponge that absorbs oils, the "smart" card, which can be magnetic, fluorescent, antibacterial and water-resistant, and bioplastics, obtained from the processing of vegetable extracts and wastes.

Inside the robotics departments, the researchers showed the humanoid robot iCub, which, thanks to its cognitive abilities, can recognize and grab objects, learning from its mistakes, and with a new artificial skin that gives it the sense of touch on the chest, arms and hands. Another demo regarded the robots for wrist and ankle rehabilitation, for which clinical experiments are already under way at INAIL Motor Rehabilitation Center, Volterra and Istituto Giannina Gaslini, Genova.

Technology Transfero

The Technology transfer activity showed a significant increase, alongside with the patent portfolio.

Likewise, there was an increase in the relationships with international investors potentially interested in certain initiatives considered to be mature for the market:

- ☐ Graphene-based inks and composites;
- ☐ Plastics obtained from vegetal materials;
- ☐ Smart materials for food packaging;
- ☐ Wound healing materials ;
- ☐ Water purification sponges;
- ☐ Robotic rehabilitation;

Two new companies were set up with the participation of IIT researchers (Biki Technologies and Optogenix) and a few business projects were developed, relevant to start-ups that may be presently established, still with the participation of IIT.

Moreover, the fund set up for Technology Transfer was used to support the de-risking and prototyping stage of 5 projects:

- ☐ **3Brain** for SW integration on the device;
- ☐ **Artificial Retina** for in vivo tests;
- ☐ **Robotics rehab** for construction of 9 Arbot for clinical experiments;
- ☐ **Graphene** for development of printable coatings;
- ☐ **Plastic Robot** for development of iCub in plastic.

IIT participated in the circuits of start-up competitions, in particular by winning SMART Cup Liguria in life science with its SmartTissue initiative, thus gaining IIT access to the Premio Nazionale per l'Innovazione (PNI [National Innovation Award).

Initiatives of IIT were brought to the finals of Premio Marzotto and to several other circuits.

BOX 8

Curtain up on "Beyond Science" in Lecce

After the success of the first step in Genoa at the end of 2013, the photographic exhibition of the Italian Institute of Technology "Beyond Science. Science in a snapshot" was shown again at Castello Carlo V in Lecce.

The event, conceived by IIT as part of the outreach activities coordinated by Alberto Diaspro, portrays the meeting of science with images through a selection of 60 shots of technological objects, people and realities not visible to the naked eye, such as biological systems, research instruments and robots.

All shots were collected during a photographic contest organized by IIT in 2013 among its researchers to increase awareness in the importance of communicating science to the public.

INGRESSO: LUNEDÌ A VENERDÌ 9-13; 16,30-20,30 | SABATO E DOMENICA 9,30-13; 16,30-20,30.

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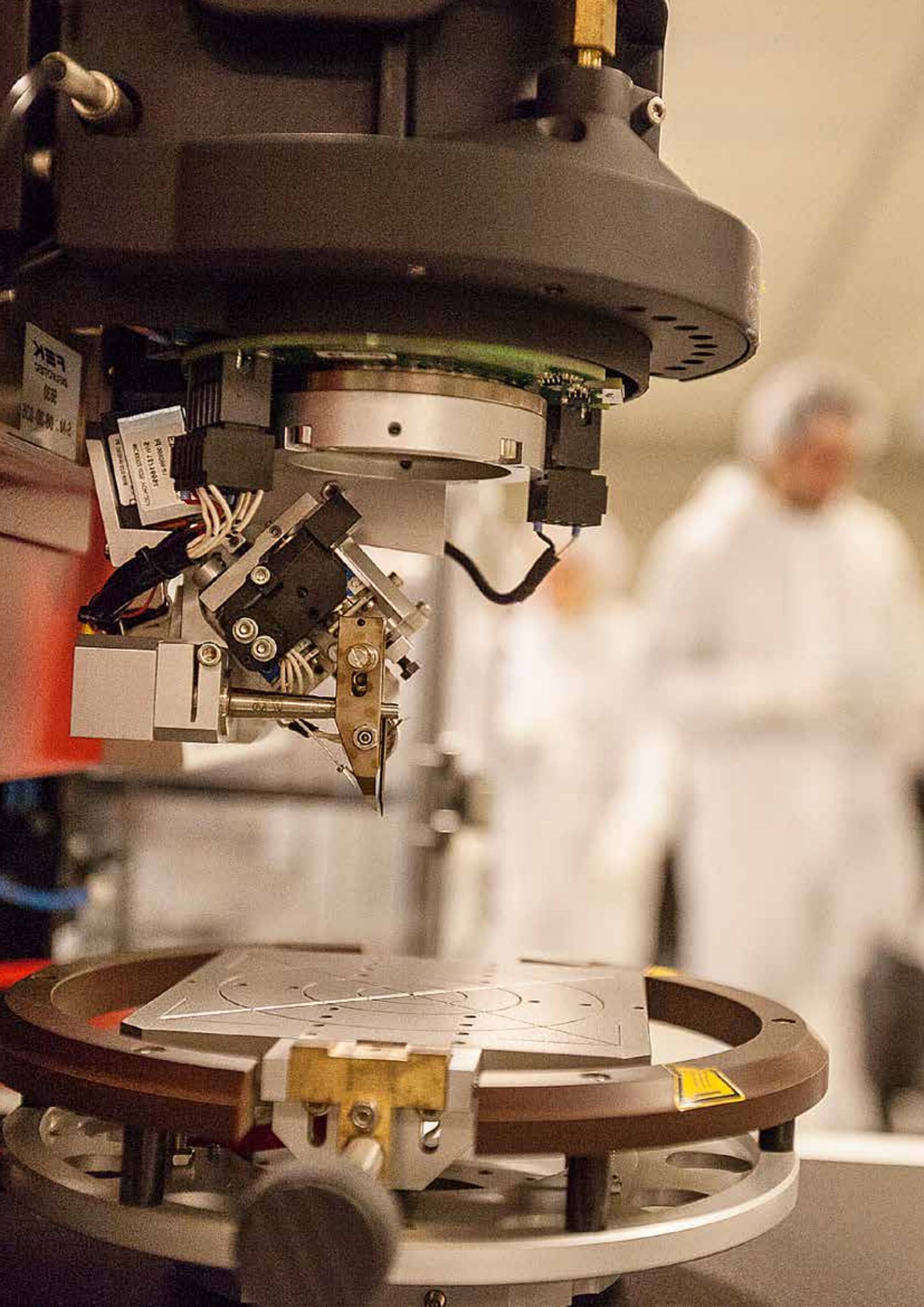
Festival della Scienza

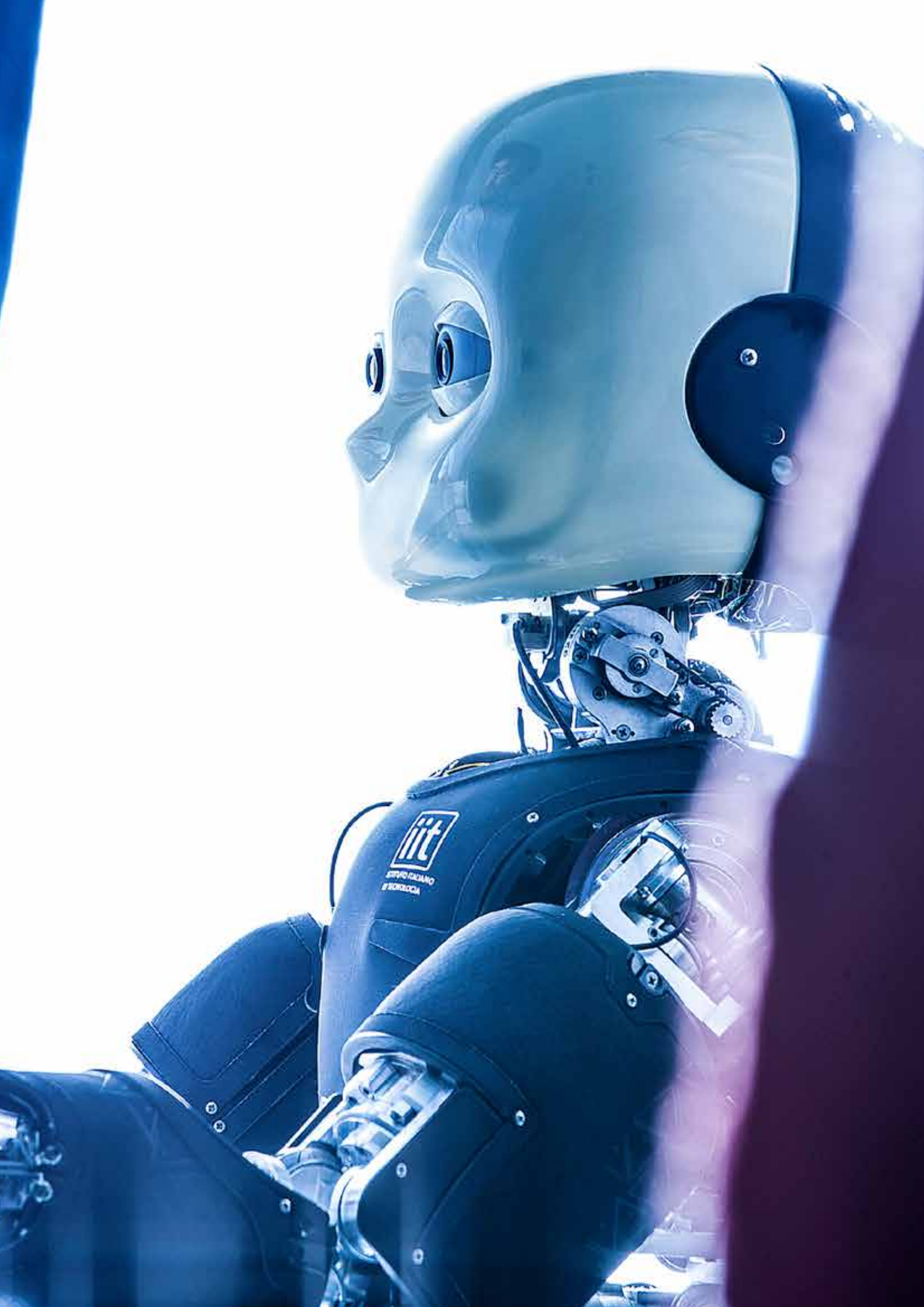
BOX 9

Festival della Scienza: Time

This year, IIT participated in Genoa-based Festival della Scienza (24 October - 2 November 2014) with a number of events.

Three photographic exhibitions on scientific research, including a part of "Beyond Science. La scienza in uno scatto"; two laboratories to explore the perception of time and the biological clock that regulates the life of our body and one for an in-depth examination of the properties of graphene and other nanomaterials with carbon. Several lectures were held by IIT scientists where time, the festival's main theme, is linked to physical and biological phenomena such as light, memory and nanotechnologies. Moreover, during an additional scientific café, ten IIT scientists presented the 2014-2015 program of the meetings called "IIT si racconta ...".

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