

The Leonardo 2016 Innovation Awards

**Students, recent graduates, PhD students and Leonardo employees receive awards for the best *High Tech* projects from Minister Fedeli, Leonardo's Chairman Giovanni De Gennaro and from Chief Executive Officer Mauro Moretti**

Training internships and cash prizes for the winning university students

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- **Among the projects that have won young people's Award:**
  - a PC keyboard that is able to power itself by reusing the energy generated by tapping the keys
  - anthropomorphic robots able to perform the precision finishing in the final production stage of helicopter rotors
  - innovative electrodes that produce a ten-fold increase in battery life for tablets, mobiles and notebooks
- **Minister Fedeli: "Recognise talent in young people: the growth of the entire Country is dependent on them"**
- **Mauro Moretti: "The technological challenges of the third millennium, can only be met through the ability to innovate"**
- **Almost 700 projects have been received from Leonardo's sites in Italy, the UK and the rest of the world**
- **Around 5,000 contacts have been registered on the Young People's Award online platform**
- **Environmental sustainability as the common trait of the projects submitted**

Rome, January 25, 2017 – The Leonardo 2016 Innovation Awards have, once again been flooded with submissions, and remain one of the most awaited events for exploring the new frontiers of high technology. Almost 700 projects were submitted by the Group's employees from Leonardo's sites in Italy, the UK and the rest of the world. The dedicated Young People's Award online platform recorded around 5,000 contacts. The winners (three in the students/new graduates category and three PhD students) will be given the opportunity to attend Group internships, in addition to receiving cash prizes.

Innovation is key to the way Leonardo does business. A leading technology company, Leonardo is committed to fully exploiting a unique and invaluable wealth of knowledge and expertise, cultivating it with passion and determination. This is how the Leonardo Innovation Awards began, and for more than ten years, the initiative has involved the Group's employees worldwide, and for the second year in a row being opened up to university students, ready to tackle the technological challenges of the future. The winners were presented with their awards in Rome today, during a ceremony attended by the Minister for Education, Universities and Research, Valeria Fedeli and by the Company's senior executives.

"Recognise talent in young people and encourage their ambitions: the future growth of the entire Country is dependent on them. This is the main objective of the Ministry that I represent - **said Minister Valeria Fedeli** – and I am delighted that this is also the objective of commendable initiatives such as the Leonardo Innovation Award in which we take part today. Investment in new generations must be shared increasingly by the whole of society, since we are all responsible for laying the foundations today for the world in which we will live tomorrow."

"Anticipating today the technologies of tomorrow in a sector featuring rapidly evolving scenarios, is the key to dealing with the competitive strength of large technology investing countries, as well as emerging countries. The technological challenges of the third millennium can only be met through the ability to innovate" – **said Mauro Moretti, Chief Executive Officer and General Manager of Leonardo**. "The Leonardo 2016 Innovation Awards – **Mr. Moretti added** – has called on young university students once again, as they have the vision and the ability to foresee future developments, either as linear projections of current trends or moving away from them along divergent and unpredictable trajectories. Fostering and emphasising a scientific culture in the school system and strengthening the dialogue between the business world and that of academia – **concluded Leonardo's Chief Executive Officer** – are crucial to consolidating the country's technological leadership."

A PC keyboard able to power itself by reusing the energy generated by tapping the keys; anthropomorphic robots able to perform precision finishing in the last production stage of helicopter rotor. innovative electrodes made in nano-structures that produce a ten-fold increase in lithium battery life for electronic devices such as tablets, mobiles and notebooks. These are some of the projects submitted by recent graduates and Phd students from Italian universities who were awarded the Leonardo 2016 Innovation Award, a significant majority of which dealt with issues of power generation and storage. Employee projects that stand out, include an innovative infra-red system for naval units which guarantee continuous, all-round surveillance around the ship, more efficiently than the systems currently in use, and a patent for integrating and optimising the different telecommunications networks used by the companies providing Air Traffic Control services.

Most of the winning projects share a common feature – a focus on environmental sustainability, one of the crucial issues in developing future technologies, and one that is consistent with the Company's commitment to harmonising environmental management with business objectives.

## **The Winners of the Leonardo 2016 Innovation Awards**

### **Young People's Award**

Launched last year, the Award targets students in the science departments of all Italian universities, with the aim of highlighting their talent and ideas as well as preparing them for the business world. The competition asked candidates, divided into students/recent graduates and PhD students, to develop an innovative project on future technologies, with reference to specific research fields connected to Leonardo's business sectors: protection from threats posed by mini-micro UAVs; reduction of acoustic noise, both internal and external, in aeronautical and land platforms; high efficiency power generation and storage; digital innovation.

PhD Students First Prize: Solar-battery integration with photopolymers (Federico Bella – Politecnico of Turin – Department of Applied Science and Technology). The aim of the project is the use of innovative materials to develop devices that integrate photovoltaic generation with battery storage. These are special polymers (photopolymers) that, unlike those produced with high environmental impact industrial processes – high temperatures, use of solvents or chemical reagents – may be obtained with processes that only require using a light source. The project is therefore very useful for industrial applications and has a special focus on environmental and economic sustainability.

PhD Students Second Prize: TIGRE: Tastiera GeneRa Energia – Energy Generating Keyboard (Arnaud Gigot – Politecnico of Turin – Science and Technology of Materials). The project is aimed at recovering energy by converting the mechanical energy expended by tapping the keys of a PC keyboard into electricity, for extensive applications in a widely distributed commercial sector. To this end, piezoelectric transducers are used, that is, materials that are able to generate a potential difference when subject to

mechanical deformation. The keyboard is therefore able to reuse the energy generated by the fingertips tapping it to contribute to powering itself.

PhD Students Third Prize: Synthesis of nano-structured C/Si materials for optimised electrodes for Lithium batteries (Marco Natali, La Sapienza University, Rome – Nanoscience and Electromagnetism). The limits of all common electronic devices that use lithium batteries, including tablets and mobile phones, is the duration of the battery charge. The aim of the project is to develop innovative electrodes in carbon and silicon nano-structures –extremely small structures on the nanometric scale. The use of such electrodes offers huge advantages in terms of electrical conductivity and allows batteries to have higher efficiency/longer life. The project has a high industrial impact due to the breadth of application sectors of lithium batteries.

Recent Graduates First Prize: Converter with low switching losses to power high-speed, three-phase electric motors for aeronautics applications (Pierluigi Sidella – Politecnico of Bari – Master Degree in Electrical Engineering) “High efficiency power generation and storage”: This is an electric power converter with low switching losses, an alternative to inverters with MOSFET in SiC (silicon carbide) with multidisciplinary applications, potentially of great interest in the "more/all electric aircraft" sector.

Recent Graduates Second Prize: Optimisation of the post machining process of rotor parts in titanium alloy (Marco Verrecchia – University of Cassino and Southern Lazio – Master Degree in Mechanical Engineering). A project in the sector of industrial robotics with an innovative methodological aspect and interesting validation in the field. The research is based on the technical feasibility of a process concerning the end machining stage, wholly automated by using anthropomorphic robots. This innovation would bring about a host of benefits in terms of reduction in machining times, reduction in inventories, improvement of the product's surface quality and reduction/elimination of machining defects.

Recent Graduates Third Prize: Energy Harvesting through magnetostrictive materials (Stefano Fabrizio – University of Sannio – Master Degree in Energy Engineering). The project focuses on recovering as electricity the mechanical energy that would otherwise be wasted in the environment, by using magnetostrictive materials (materials the magnetisation of which is changed as a result of mechanical action, pressure or dilation). The project is especially significant for applications focusing on environmental sustainability and energy savings.

### **The Employees Award**

Leonardo has been awarding the innovative projects its employees worldwide for over ten years.

For the second year in a row, the projects are divided into categories: Incremental innovation, which has the purpose of improving existing products; Radical innovation, i.e. able to generate new products or create opportunities in new markets for existing products and finally, the Idea category, for projects that have no implications on the business in the short term, but may assure competitive advantages in the future. A best patent prize is also awarded.

In the Incremental Innovation category: A. Pozzi (SAS) and G. Barani (EDTN) DSS-IRST: a new Infrared Search & Track system based on multiple distributed sensors, passive ranging capability and new detection and track processing. The project covers an innovative IRST system (Infra-Red Search and Track, i.e. a passive infrared system, therefore non interceptable, for identification and tracking of missiles/naval/airborne targets) for ships that integrates several sensors, each of which is able to cover a certain visual angle. The sensors, distributed along the perimeter of a platform, assure comprehensive and continuous surveillance of the airspace around it. Therefore the system, called DSS-IRST (Distributed Sensor System - IRST), assures constant surveillance, 360° around the ship, and immediate detection of the distance of any threats, thus overcoming the limits of scanning performed by a single, rotating sensor, such as the updating time of the detected images.

In the Radical Innovation category: A. Genovese (EDTN) “Bi-Band X and Ka Antenna for Radar Applications”. The prize was awarded to an antenna that works simultaneously on two frequency intervals, X and Ka, developed for Radar sensors employed for controlling naval pointing systems, which otherwise use two separate antennas, one for each of the two frequencies. The innovation mainly consists in a configuration whereby the two frequencies on which the radar works are pointing in the same direction through a dichroic mirror able to reflect one frequency (X) and transmit the other (Ka) – thus achieving very high performance and reducing costs.

In the Idea category: M. Iannone and E. Vitiello (Aircraft) *“Protective film in nano-composite material with surface extension graphene particles”*. The innovative project concerns inserting Graphene particles (atom-thick Carbon sheets) within the layers of composite parts, to counter the spread through composite material structures of substances such as water or organic solvents that decrease their properties or prevent structural applications.

Best Patent: P. Fantappie (SIS) *“Ground station, network and method for a unified ground-to-air and air-to-ground communication system operating in VHF data link mode 2”*.

The solution protected by patent makes it possible to integrate and optimise the various telecommunications networks used by companies providing Air Traffic Control services. This means overcoming the limits that have characterised telecommunications between control tower and aircraft until now, if they are managed by different operators. The patent, called “Double Squitter” (i.e. double language), will also allow national Authorities (e.g. ENAV, etc.) to implement a single integrated network for providing said services to Airlines. Since the old ACARS system for messages exchanged between aircraft and control towers is going to be phased out and superseded by the new air traffic control standard – which came into force in 2014, based on the radio protocol called VDL2 which also entails data exchange in addition to voice communications – Leonardo’s solution stands to become a “key” feature for industrial implementation of these services and networks.