

Space research inspires innovation in fashion

► Moon Boot advertising campaign clearly displaying the inspiration from Armstrong's first lunar footprint. Innovative shape and material together with lightness and freedom of movement are the keywords of the success of the Italian brand.



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How many times has space inspired us? Our worlds of thought - science, philosophy, religion, technology, literature - have always looked into the universe. As have the many disciplines related to art and its practice - design, cinematography, communications, music and many more. The sky and stars continue to exert a strong influence on our culture - nowhere more so than in the world of fashion.

Innovation, shape, scenario and narration as well as technology can suggest to us new ideas and products destined to revolutionise the world of production and become best sellers on the international market. For example, from Neil Armstrong's lunar boots came a pair of sneakers with a strong power of absorption thanks to technology transfer.

At the same time and looking from another point of view, the Moon landing has also inspired great ideas, like the Venetian entrepreneur Giancarlo Zanatta, who in 1970 decided to clone the 'footprint' of Armstrong's foot to make the mythical Moon Boot snow boots.

"America is thrilled and celebrates its conquest of space," says Zanatta in an interview by Claudio Trabona, 'Dal piede di Armstrong l'idea per i miei Moon Boot' for Corriere del Veneto in July 2009. Standing in front of a giant poster of Buzz Aldrin

walking on the Moon, he says: "It's beautiful, it is strong, the man seems to come out from the image. I cannot take my eyes off those boots so special and from that imprint. Well, it happened to all of us if we think about it: the world's attention was not directed precisely at the foot of the astronauts?"

"If we strive to remember, each of us will think of Armstrong descending the ladder, the gait clumsy and bouncy, the famous phrase 'a giant leap for mankind' witnessed by so many and clear footprints on the dust from between the craters. Everything is focused on those feet. Here the bulb lights up. Why not copy those funny boots and make snow boots that leave a similar imprint on the snow? I came back to Giavera del Montello, in my factory, and decided to try it. Three of us worked on this product along with a designer for the logo. The only complication, if I may say so, was the sole

that would have to reproduce the footprint on the Moon effect, actually later modified to make it more adherent to the slippery surface of the snow.

“Not everyone in the company is confident about this,” he admits. “Some who asked, ‘but where do we go with sta ciabatta? [from the Italian dialect word ‘slipper’] were resoundingly contradicted. A few days after the launch, at a trade show in Germany, orders begin to rain in. Hundreds. Thousands. Today, some 40 years later, we can count 23 million pairs sold. And thanks to the Moon Boots, the Tecnica Group has risen to worldwide fame.”

A pair of snow boots evoking the greatest of conquests has a very strong appeal to consumers: the result of subliminal marketing combined with strong product innovation. The Moon Boot was created using nylon fibre, the maximum in terms of modernity during the Seventies, a time when mountain shoes continued to use traditional raw materials – the skins and furs of animal origin.

Another big innovation was the introduction of a bright colour palette, which was revolutionary in the day. Of course, these were the times of Pop Art and Andy Warhol, who spread a new vision through presenting and valuing consumer goods as powerful visual communication signs, which were considered important enough to become privileged subjects of the art in themselves. In this international context, a company which proposes a new shoe that rejects the eternal brown leather is a striking thing! But that’s not all: with ambidextrous footwear, and without size constraints, customers feel more free and light.



The Moon Boot can also be considered as one of the first examples of ‘democratic’ design: it is on the feet of movie stars and queens, but also of all of us, thanks to a simple construction and relatively low price.

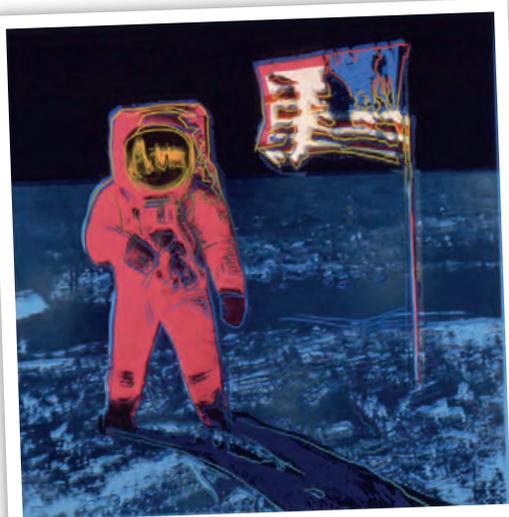
This is an example of a brilliant idea that turns into a commercial success, an adventure that becomes almost poetic and ultimately a museum piece too. In the year 2000, the Louvre in Paris chose Tecnica’s Moon Boot as one of the hundred objects of the 20th Century most representative of the history of world costume.

And today Moon Boot is one of the few trademarks allowed in the Italian dictionary: a product so successful as to become a common name, a word in current use. It is a very interesting case-study of a technological spin-off related to the innovation of meaning, innovation of emotional language and innovation of usability of the product.

The inspiration from Armstrong’s footprint is the transfer of a unique image that reminds us of an extraordinary human challenge – and for that reason, this shape assumes an evocative meaning and exerts a strong power on our emotional choices.

◀ Andy Warhol’s ‘Moonwalk’. The brilliant use of the Pop Art colours spread a new vision to the value of consumer goods and had a major influence on the Moon Boot palette as it moved away for the first time from eternal brown leather.

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Many fashion designers have often turned to science fiction and its associated futurism for inspiration



◀ Pierre Cardin's 'The Sputnik Girls'. Visions of the future from the likes of Pierre Cardin, André Courreges, Paco Rabanne started during the 1960s with experimental fashion based on space styles and innovative materials, with the aim of inspiring dreams and suggesting new ways to live and dress.

VEST project

The author experimented with a similar kind of spin-off project in terms of usability transfer during the feasibility study carried out for the VEST project [Clothing Support System for Intra-Vehicular Activities design by Annalisa Dominoni and tested onboard the International Space Station by astronaut Roberto Vittori during two European astronaut spaceflights in 2002 and 2005].

This involved retrieving and making use of methods and techniques that already exist in familiar clothes on Earth and transferring them to new garments for space, which have different needs and requirements.

Dominoni began identifying new wearability parameters to cater for the astronauts' discomforts, creating garments for microgravity around the Neutral Body Posture (NBP) that astronauts take on in orbit, which is very similar to a person's posture underwater, with their limbs bent, knees and elbows tending to move upwards and head tipped forward.

Surveys carried out during design research showed that the NBP is, in fact, very similar to the posture adopted by snowboarders, and

correspondingly she decided to transfer certain functional adjustments designed to make clothing more comfortable for snowboarders - in terms of the cut, stitching and tailoring of garments - to the clothing system for astronauts. In this case the 'language of usability' allows transferring conventional outfits that are easier to handle, to another field, in this case space.

Fashion designers have been inspired by space, envisaging new scenarios explored by the first human missions and the astronauts' experiences. The microgravity effect, with the possibility to fly and move in weightlessness, and the possibility to look at our planet from an external point of view, are the two most innovative and extraordinary conditions able to generate visual suggestions that can be translated into shapes, colours and materials: rounded volumes, optical white, and silver nuances such as brilliant moon powder, mirroring metals and synthetic fibres.

Visions of the future from Pierre Cardin, André Courreges and Paco Rabanne started during the 1960s with research on experimental fashion based on 'space' styles and innovative materials, with the aim of foreseeing new ways of living and dressing capable of suggesting dreams and inspiring people.

Fashion designer Paco Rabanne was at the helm of the 1960s 'Space Age Fashion' movement thanks to his use of unconventional materials, making clothes from plastics and metals. Indeed, his inaugural 1966 collection was titled 'Twelve Unwearable Dresses in Contemporary Materials'. His signature dresses comprised of plastic discs

▼ André Courreges and the early influence of microgravity in haute couture during the early 1960s.





or aluminium plates strung in a way that was reminiscent of chainmail.

Rabanne extended his research to popular science fiction when he designed the costumes for the classic cult film *Barbarella* in 1968, which is set in the 41st century. As for today, under the direction of Julien Dossena, the fashion house has been returning to its futuristic roots with chainmail skirts, sheer nylon and Perspex wedge boots.

Many fashion designers have often turned to science fiction and its associated futurism for inspiration. The distinctive costumes from cult science fiction films have proved lasting influences, from Jean Paul Gaultier's looks in *The Fifth Element* to the punk-rock garb of Ridley Scott's *Blade Runner* and the robot from the 1927 silent film *Metropolis*, which has been embraced by the likes of Karl Lagerfeld and Thierry Mugler.

And this trend continues. The *Star Wars* saga was an inspiration behind the new fashion show for men of Versace in 2016: tracksuits in optical fibre, shirts with luminescent piping as in astronaut suits, outerwear with embroideries like space debris, leather jackets decorated with crystals, jeans with imprinted entire constellations, sneakers with lunar landing soles. "The Versace man has always been a pioneer connected with the future," suggests Donatella Versace, whose ambition is as big as the universe.

Studies across technology management have shown that innovation often comes from a recombination of existing pieces of knowledge. Henri Poincaré talks about creativity as the ability to create useful new combinations of existing elements and claims that the intuitive way of recognising the usefulness of a new combination is "that it is beautiful".

Of course, he is not talking about beauty in a strictly aesthetic sense, but as something related to elegance as a mathematician might understand it - harmony, simplicity of signs, practical correspondence to purpose. This definition applies to the sciences, arts, technology and also to design.

Indeed, it seems to overlap with the design-specific capacity to create innovation through the transfer of contexts, possible uses, technology and materials into a range of different sectors. This familiar practice among designers is generally referred to by the expression 'spin-off'.

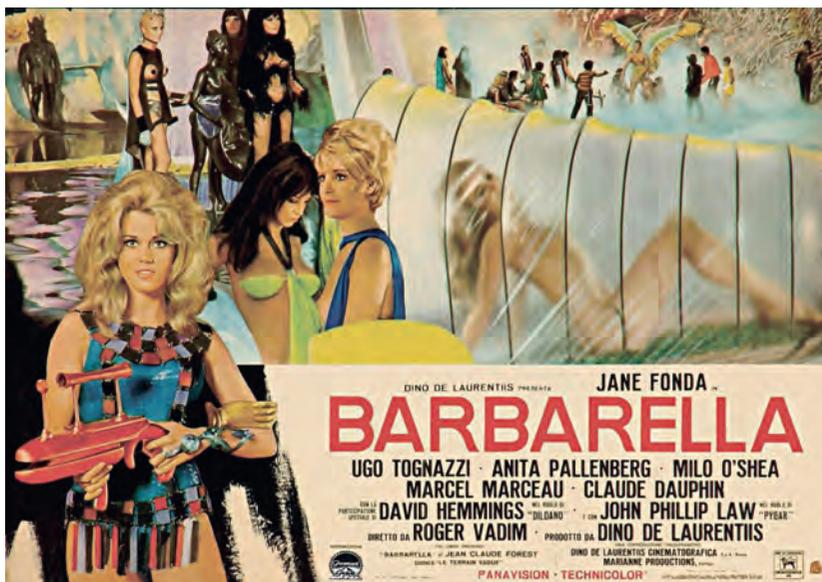
Hussein Chalayan, Alexander McQueen and Iris Van Herpen are among contemporary fashion designers that have better explored the iconic world of Space, looking at technology and smart materials as a plus value to enrich their design proposals and translate them into 'science experiments'.

British-Cypriot fashion designer Hussein Chalayan is the master of metamorphosis. He views technology as "a way of pushing the boundaries of what's possible", and his dedication to sartorial innovation was particularly evident in his fashion show in 2007 when he presented a suite of computer-operated Transformer Dresses which morphed into silhouettes reminiscent of satellite solar panels.

◀ Paco Rabanne was inspired to design space dresses comprising plastic discs or aluminium plates strung in a way that was reminiscent of chain mail.

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▼ Paco Rabanne extended his research to popular science fiction when he designed the costumes for the classic cult film *Barbarella* in 1968, which was set in the 41st century.



► *The Fifth Element* science fiction movie featured costumes inspired by a space future designed by Jean Paul Gaultier.

The traditional distinction between the haute couture and prêt-à-porter was based on the handmade and the machine-made but recently this has become increasingly blurred

► The early 1980s film *Blade Runner* continues to influence fashion design. Karl Lagerfeld and Thierry Mugler were among the first to embrace the punk-rock garb of 'replicants'. The film featured costumes inspired by a space future designed by Jean Paul Gaultier.



The micromotor-powered garments crept across the wearers' bodies as sleeves shortened and hems lifted. In a poetic paradox, the actual aesthetics of these innovative pieces were inspired by mixing old-fashioned and Victorian styles morphing into flapper silhouettes. Chalayan paid homage to the digital era with his 'video' dress, which was made from led lights and played pixel cityscape scenes.

Fashion designer Alexander McQueen also caused a stir when reflecting and prophesying about the future. In 1999, during his time at the helm of Givenchy, he presented during a fashion show a truly artistic performance with robots spraying colours on the white dress of a model who was rotating herself.

The techno revolution of McQueen takes inspiration from space, science fiction and robots: his catwalk models are like cyborgs with their bodysuits covered in neat configurations of multicolour LED lights mounted on artificial skin made of moulded transparent Plexiglas to create a body-hugging bodice - which conjured visions of a human circuit board, with each model also wearing a 12-volt battery pack on her back.

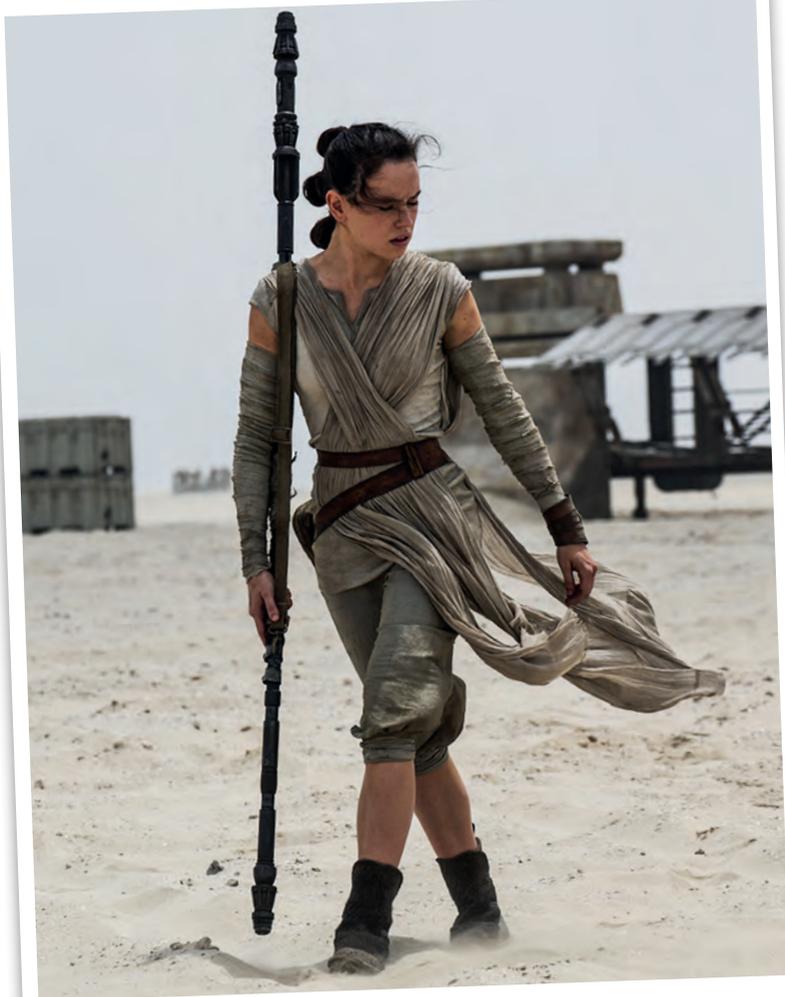
Iris Van Herpen, the celebrated 'fashion alchemist' who was the first designer to create a 3D printed dress, has long explored the dynamic relationship with science and the digital world. Her visionary brand of sartorial creativity reached a climax with her human installation 'Biopiracy' in 2014.

In an uncomfortable voyeuristic display, models were vacuum-packed in plastic, similar to a piece of sous-vide supermarket meat, and suspended several feet above the ground. It wasn't the first time the Dutch designer had turned a fashion show into a science experiment: her haute couture show 'Voltage' in 2013 began with lightning-like electrical flashes emanating from a model standing on a pedestal.

If, traditionally, the distinction between the haute couture and prêt-à-porter was based on the handmade and the machine-made, recently this distinction has become increasingly blurred as both disciplines have embraced the practices and techniques of the other.

Today we can choose several handmade couture items, featuring techniques such as embroidery, pleating and lacework, but also machine-made dresses but tailored as handmade, thanks to new





technologies like laser cutting, thermo-shaping and circular knitting, or items digitally produced by 3D printing.

The Chanel couture collection of 2015 showcased prime examples with rich tweed suits woven through 3D printed lattices, and the Metropolitan Museum of Art in New York chose the theme for 2016 of 'Manus x Machina: Fashion in an Age of Technology' focussing on the dichotomy between handmade haute couture and machine-made fashion.

More often than not our fashion system looks at innovation as a big challenge and a great opportunity to experiment in new ways to create garments and new design languages inspired by space technology. Fashion designers try to interpret the new dimension we are all living by integrating the exciting new notions of digital, virtual and cyber with real life. ■

▲ The *Star Wars* saga continues to be a great inspiration for contemporary fashion designers, like the new fashion show for men in Versace during 2016.

▲ The collection of *Transformer Dresses* from Hussein Chalayan open their shapes as solar panels during the show.



About the authors

Prof Annalisa Dominoni is director of the ESA Fashion in Orbit course at Politecnico di Milano, Italy. Her activities are focussed on teaching, design and research on space and extreme environments to facilitate human missions in microgravity and create new opportunities and spin-offs for space technology in the private sector. She is the Principal Investigator of two experiments on the International Space Station – VEST (Marco Polo mission) and GOAL (Eneide mission).

Prof Benedetto Quaquaro is a director of the ESA Fashion in Orbit course at Politecnico di Milano, Italy. He is designer and curator of exhibitions in the fields of art and technology specialising in Yacht Design and innovative materials. He works closely with Annalisa Dominoni on projects for ESA to spread the potentialities of space research to the business world in the fields of fashion, products, services and communication.



▲ Alexander McQueen's techno revolution with Givenchy in 1999 takes inspiration from space, science fiction and robots. His models are like cyborgs with their bodysuits covered in neat configurations of multicolour LED lights mounted on artificial skin made of moulded transparent Plexiglas to create a body-hugging bodice.