

What we made from Space

HANDOUT english

8 Objects from Space Science



Smartphone

We use our phones everyday – but did you know that many features on your phone were developed from space science?

Camera

How we use it on Earth: Photographs and videos have become a vital way to share stories and remember the past.

How it is used in space: It is important for astronauts to take photos when they go on missions, for scientists to study and learn more about space. The pictures also act as proof of what humans can achieve. This meant that researchers needed to create smaller, lighter cameras – these developments have now made their way onto every smartphone.

GPS Apps

How we use it on Earth: How long would it take to find your way without using GPS navigation? Google Maps and other services help us to find the shortest way from one place to another. GPS is also used in games like **Pokémon GO** for example. It also helps **planes navigating in the air, assists search and rescue missions, locates lost pets, tags endangered animals** and lots more!

How it is used in space: There is a system of over 30 satellites orbiting in space that send signals to your GPS receiver on Earth to calculate precise locations.



There are many more apps that access space technology everyday. These include weather apps and video-on-demand services like YouTube, Netflix and TikTok.





Crisps Packaging

How do manufacturers ensure our bag of crisps does not end up as a bag of crumbs? We have space technology to thank for that!

How it is used on Earth: Crunchy crisps are a popular snack. But crisps are easy to break. Crisps are packaged by automated machines working at incredibly high speeds. We have space technology to thank for that!

How space technology is used: Crisp manufacturers realised that, dropping a potato crisp into a bag is as delicate as landing a spacecraft on another planet. The speed of descent, atmospheric conditions and airflow determines whether it arrives safely. A German food packaging company approached ESA for help. By studying the way crisps behave as they fall, they were able to design a new food packaging system. The soft landings meant crisp breakages are cut to a bare minimum despite the high-speed operation. Now, this space-age 'soft landing' machine is being made available for crisp packaging around the world.



Crayons Using Aerogels

Aerogels are materials that have a similar chemical structure to glass, but instead of liquid contain gas or air in their pores. This makes them great insulators of extreme cold or hot environments.

How it is used on Earth: Aerogels are one of the lightest solids to be found on Earth. A cubic inch of aerogel could be spread out to cover an entire football field. It's breathable and fireproof, and it absorbs both oil and water. Aerogels are also amazingly strong, considering its light-weight. Aerogels are one of the best insulators ever known, and different versions can also act as electrical conductors. These properties are being adapted to a wide range of products on Earth. They



can be found in firefighter suits, wetsuits and windows as well as in cosmetics and paints like crayons.

How it's used in space: Aerogels are great insulators of extreme cold or hot environments. In space exploration they are used to protect batteries, electronics or computers from the extreme cold of space. They can also be used to trap dust particles that would damage the spacecraft.



Scratch-Resistant and UV-Blocking Glasses

Sunglasses are popular fashion accessory, at the same time they protect your eyes from the sun's harmful ultraviolet rays.

How we use it on Earth: We use it in shoes and clothing, or whenever we need something to be secure. Often referred to as Velcro and originally invented by a Swiss engineer George de Mestral, Velcro consists of two opposing pieces of fabric. One piece has a dense arrangement of tiny nylon hooks and the other with a dense nylon pile, that interlock when pressed together.

How it is used in space: Velcro has become an essential component of space travel, to overcome the challenges of living in microgravity. Astronauts on board the International Space Station secure food pouches, equipment and tools to the walls of the spacecraft with Velcro. Otherwise, these items would float away. Astronauts sometimes even attach patches of Velcro to the inside of their helmets so they can scratch an itch!





Hook-And-loop Fastener

George de Mestral invented the hook-and-loop fastener. It consists of two opposing pieces of fabric. One piece has a dense arrangement of tiny nylon hooks and the other with a dense nylon pile, that interlock when pressed together.

How we use it on Earth: We use it in shoes and clothing, or whenever we need something to be secure. The hook-and-loop fastener is often referred to as Velcro.

How it is used in space: Velcro has become an essential component of space travel, to overcome the challenges of living in microgravity. Astronauts on board the International Space Station secure food pouches, equipment and tools to the walls of the spacecraft with Velcro. Otherwise, these items would float away. Astronauts sometimes even attach patches of Velcro to the inside of their helmets so they can scratch an itch!





Tennis Racket Using Liquid Metals

Liquid Metals are new materials that are light, resilient, rust - resistant, and easy to cast and mould.

How we use it on Earth: The just mentioned properties are useful in the sports industry, where they have started to use this material for sports equipment like skis and tennis rackets.

How it is used in space: Strong, durable materials are needed to withstand the extreme environment of space. Researchers were able to create a new form of metal that goes from a liquid to a solid state at room temperature. The liquid included a mix of elements: zirconium, titanium, nickel, copper, and beryllium. This new alloy is more than twice as strong and has the moulding ability of plastic.



Cochlear Implants

Cochlear Implants are hearing aids. On earth sound usually travels in waves, through the vibration of atoms and molecules in a medium (such as air or water). In space, in the absence of air, sound has no way to travel.

How we use it on Earth: Sound travels in waves on Earth through the vibration of atoms and molecules in air or water. Normal hearing aids amplify sounds so they can be detected by ears. Cochlear implants directly stimulate the auditory nerve with electrical impulses that sends signals to the brain and allow people who are hearing impaired to hear.



How space technology is used: In space there is no air, and sound has no way to travel. This challenging situation inspired the creation of cochlear implants, where the signal is sent directly to the nerve by electronic stimulation.





Shapeshifting Metals

Space research led to the development of shape memory alloys (SMAs). These 'smart' metals can be reshaped when cool, but when heated, return to their 'remembered' shape.

How we use it on Earth: Shape memory alloys (SMAs) are used in our daily life in the medical industry. These 'smart' metals can be reshaped when cool, but when heated, return to their 'remembered' shape. This is used to repair bones and straighten teeth. See how it works here with the paper clips.

How it is used in space: Space research led to the development of shape memory alloys (SMAs). These 'smart' metals' ability means that they can recover or repair from strains. This is useful to minimise damage from the extreme environment of space.

