

## Spinoff technologies

### Why in news?

The space exploration spinoff technologies have significant impact on various industries and sectors.

### What are the NASA's spin off technologies in space exploration?

*Spinoff technologies refer to the unintended or unexpected benefits and applications that arise from the development of a particular technology or innovation.*

- **CMOS image sensor**- Complementary Metal-Oxide-Semiconductor (CMOS) technology enables *digital cameras* to be small, high-quality and low power, which is used in mobile phones and GoPro cameras.
- **Aquaspace filter**- Aerospace compound developed by NASA removes chlorine and other contaminants from drinking water, it is used in industrial, commercial, residential and recreational applications across the globe.
- **Memory foam**- It was created by NASA to *absorb shock* and provide comfort on airplane seats which is now widely used in mattresses, pillows, insoles, and medical applications.
- **Smoke detector**- It uses a sensor developed by NASA to detect combustion particles in the air, it can *reduce false alarms* by distinguishing between smoke and dust.
- **Wireless headset**- It is based on the headset used by astronauts to communicate with mission control, it is lightweight, comfortable and hands-free.
- **Solar cells**- It is used to develop an *unmanned aircraft* capable of flying at high altitudes for extended durations, harnessing solar energy for power. This is widely now used in buildings, calculators etc.,
- **Medical imaging technology**- NASA's *space borne imaging devices* has contributed to the development of medical imaging devices, such as the digital mammography system.
- **Microencapsulation**- It delivers *cancer-fighting drugs* within a patient's body more safely than before, it also provides means to *remove oil pollution* from water.

*Microencapsulation" is the process of enclosing liquids or small particles with a coating to create tiny capsules on a micro metric scale (smaller than millimeters).*

## What are the spinoff technologies made by ISRO?

- **Low-cost artificial heart pump** - A lightweight Left Ventricular Assist Device that can help a weak heart to pump blood it is made from a biocompatible titanium alloy, it is used in rockets.
- **Artificial foot**- It is made of a composite material used in rocket motors, this polyurethane foot is lighter and more durable than traditional prosthetics like the Jaipur Foot.
- **Microprocessor controlled smart knee**- Intelligent artificial limbs with sensor data capabilities which is more affordable and comfortable than passive limbs.
- **Non-invasive ventilator SVASTA**-ISRO has developed a gas powered ventilator Space Ventilator Aided System for Trauma Assistance (SVASTA) designed for emergency and first line treatments, its simple design allows for easy mass production, particularly useful in pandemic-like situations.
- **Artificial denture material (ACRAMID)**- It is a polyamide reinforced plastic used in launch vehicles, also applicable as a cost-effective denture implant material for orthodontic restoration.
- **Fire-extinguishing powder**- OLFEX can extinguish various types of fires, including flammable, liquid, and gas fires, while TEC (Ternary Eutectic Chloride) is designed specifically for metal fires.
- **Endoscopic catheter mounted impedance probe**- It aids in identifying inflammation or malignancy in the gut mucosa, it is more cost effective than traditional biopsies.
- **Flame retardant coating**- A chemical with flame-retardant, waterproofing, and thermal-control properties, based on technology used for spacecraft thermal protection. It can be applied to various surfaces and materials.
- **Hydrophobic silica aerogel**- It is a type of porous material that is water-resistant and has wider applications in construction materials, personal care products, drug delivery etc.,
- **Adhesives**- ISRO has developed various structural (Epoxy resins, phenol based and rubber based adhesives) and non-structural (silicon based, polyurethane elastomers and acrylic based adhesives) adhesives which can be used in automobiles and engineering industries.

To know about the brief history of ISRO click [here](#)

### ISRO's institutional support for spin off technologies

- **SpaceTech Innovation Network (SpIN)**- It is India's first dedicated platform for innovation curation and venture development for the burgeoning space entrepreneurial ecosystem.
- **Antrix Corporation**- It was launched in 1992 to commercialize space products, such as launch services, satellite services, and space-based applications.
- **NewSpace India Limited**- It is a company set up by ISRO in 2019 to market spin-off technologies and products and services both in India and abroad, as well as to facilitate technology transfer and innovation.

## References

1. [Indian Express- NASA's spin off technologies](#)
2. [NASA- Spin off technologies](#)
3. [ISRO- SpaceTech Innovation Network](#)

