Moonshot project on brain co-processors

Prelims: *Current events of national and international importance | Science and technology*

Why in News?

Recently, the Indian Institute of Science (IISc) launched a moonshot project on brain co-processors.

- **Brain Co-processors –** These are an emerging neurotechnology designed to ***enhance or restore the brain's natural functions.***
- They combine ***neuromorphic hardware and Artificial Intelligence (AI)*** to interpret and influence brain activity.
- These devices interact directly with neural signals to assist in real-life cognitive and motor functions.
- **Objectives of the Moonshot Project -** To develop advanced brain co-processors that can decode, process, and re-encode brain signals.
- The project aims to create both:
    - **Implantable devices** (placed inside the body)
    - **Non-invasive devices** (external systems)
- **Working -** The system follows a closed-loop process:
    - Decode brain activity from neural recordings.
    - Process the signals using AI algorithms.
    - Re-encode signals back into the brain through neural stimulation or neurofeedback.

- **Stroke Rehabilitation -** The technology is aimed at cognitive and motor rehabilitation of stroke survivors.
- It helps restore critical motor functions, such as:
    - Goal-directed **reach**
    - **Grasp movements**
    - Smooth and coordinated limb control.
- **AI-Powered Closed-Loop Device -** The project plans to develop an AI-powered closed-loop brain interface.
- This device will connect with different regions of the brain to restore

coordinated movement and neural control.

- **Indigenous Technology Development in India -** The initiative aims to indigenise key technologies, including
    - Brain implants
    - Neuromorphic hardware
    - AI software stacks
- Designed to function within India's clinical infrastructure, especially in low-resource healthcare settings.
- **Creation of National Brain Data Infrastructure -** Development of India-specific neural databases, including:
    - Stereo EEG (sEEG) recordings
    - Electrocorticography (ECoG) data
    - These datasets will support AI training and neurological research.
- **Digital Public Goods -** The project will create open-source digital resources, such as AI models, Neural datasets and Visualization tools.
- These will be shared as digital public goods to support global neuroscience research.
- **Significance -** Addresses a major medical challenge—stroke rehabilitation
- Strengthens India's capacity in brain-computer interface technologies and neuro-AI research.
- Supports the development of affordable medical technologies for large populations.

Reference

[The Hindu | Moonshot project on brain co-processors](#)