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

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