BRAIN CO-PROCESSORS: A MOONSHOT PROJECT UNDER THE PRATIKSHA TRUST - IISC BRAIN, COMPUTATION AND DATA SCIENCE (BCD) INITIATIVE

NOVELTY AND IMPACT

March 2026

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Foreword

India is positioning itself as an emerging global hub in neuroscience by bridging the gap between fundamental research and high-impact clinical interventions by fostering multidisciplinary and multi-country partnerships. This holistic approach focuses on unlocking new insights in neuroscience and paving the way for revolutionary treatments.

Central to this vision is Pratiksha Trust's support for the Brain Co-Processors Moonshot Project, a multidisciplinary endeavour that integrates neuroscience, neuroengineering, AI, and clinical science to push the boundaries of medical technology. The project's primary objective is to develop indigenous bidirectional neural interfaces. These advanced systems are designed to both read from and write to the brain with an aim to restore critical functions, such as goal-directed movement and related decision-making, for survivors of middle cerebral artery strokes.

The other programs supported by Pratiksha Trust are (1) IISc's Centre for Brain Research which focuses on long-term aging studies and identifying genetic biomarkers unique to the Indian population to combat dementia and cognitive decline and (2) IIT Madras's Sudha Gopalakrishnan Brain Centre which recently achieved a global milestone by mapping the human brain at cellular resolution and creating a high-definition digital atlas.

By fostering a collaborative global neuroscience research ecosystem, India is moving beyond merely studying and understanding the brain to building the tools required to repair it. These initiatives propel the nation into a higher orbit of innovation, ensuring that indigenous, world-class solutions provide transformative benefits to the global population.

Kris Gopalakrishnan

Trustee, Pratiksha Trust
Founder and Chairperson, itihaasa Research and Digital

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What are Brain Co-processors and why are they important?

The human brain drives a comprehensive range of behaviours, from reflexive actions to sophisticated reasoning. All these behaviours are fundamentally rooted in the dynamic and highly coordinated interactions among large-scale neural networks. These complex functions are not attributable to isolated regions in the brain, but rather emerge from distributed yet integrated activity across multiple regions in the brain, as depicted in Figure 1.
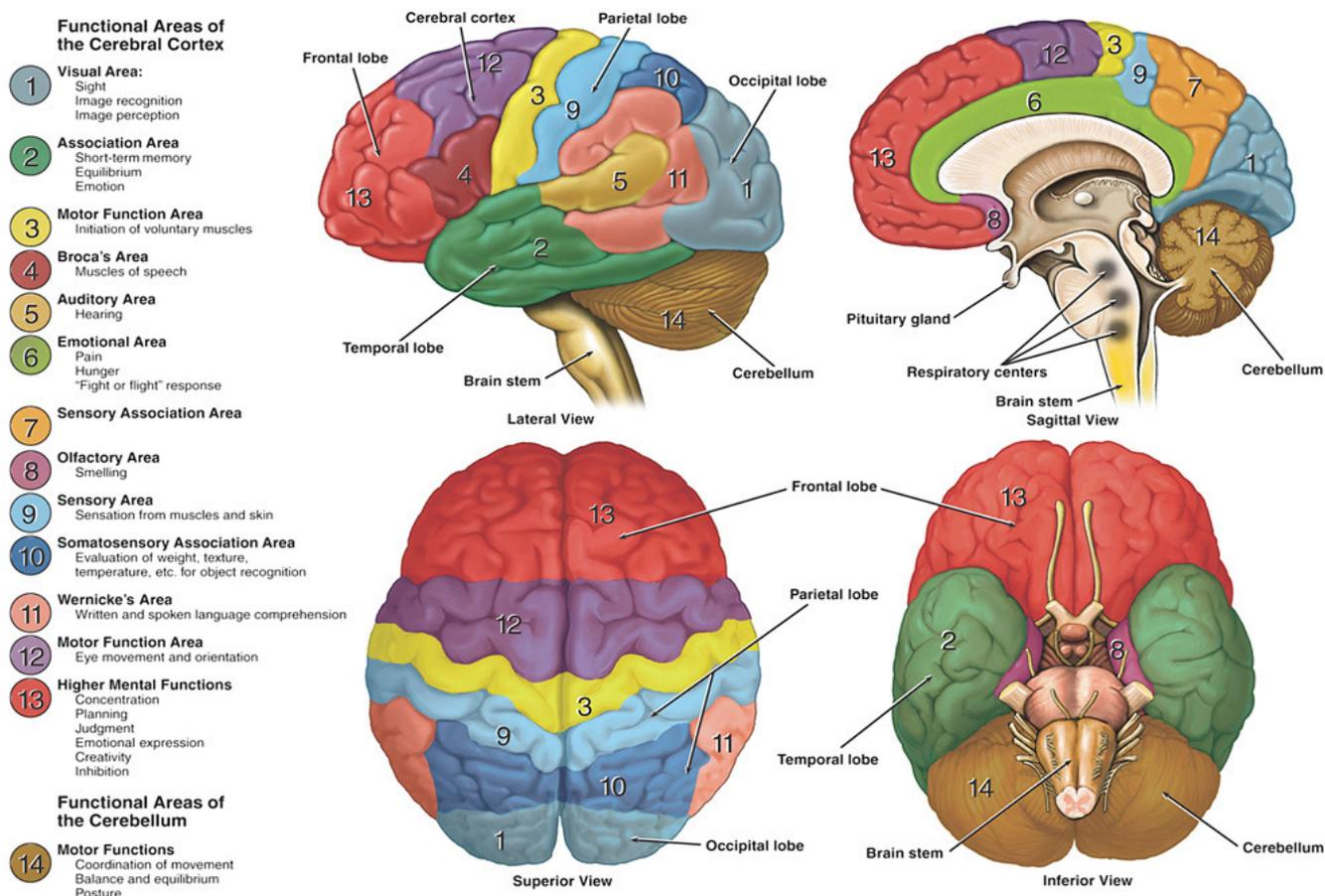

Figure 1: Complex functions emerge from distributed yet integrated activity across multiple regions in the human brain (Source: Dana Foundation[1])

Disruption to any component of this system – induced by stroke, neurodegenerative disorders, traumatic brain injury, or developmental conditions – can result in significant and debilitating deficits in essential daily capabilities. These include motor control, memory encoding, attentional focus, and sensory perception.

In recent years, there has been rapid progress in the development of Brain-Computer Interfaces (BCIs), which seek to restore or augment brain function by directly interfacing with neural activity. Landmark demonstrations include the decoding of motor intent to enable cursor control or robotic arm movement in

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paralysed individuals[2], as well as retinal prostheses for restoring basic vision in the blind[3]. However, most current approaches follow a one-region-one-function model. They target specific circuits in motor or sensory cortices for narrow, task-specific gains.

This one-region-one-function model paradigm, while technically elegant, fundamentally overlooks the brain's distributed and integrative architecture. Even simple goal-directed behaviours – such as reaching out to grasp a cup – require coordinated processing of visual inputs, motor planning, attention, decision-making, and proprioception, involving regions such as the parietal cortex, motor cortex, basal ganglia, cerebellum, and prefrontal areas[4,5]. Disruption to any one of these components often leads to behaviourally significant deficits, and restoration thus requires more than isolated decoding or stimulation.

Brain co-processors represent a transformative leap in this landscape, stemming from our understanding that complex functions emerge from distributed yet integrated activity across multiple regions in the human brain. Rather than acting as mere decoders or actuators, co-processors are envisioned as intelligent, adaptive systems that work in tandem with the brain – augmenting or restoring functions by decoding neural signals, analysing them via artificial intelligence (AI), and re-encoding information back into the brain using targeted stimulation or neurofeedback loops. This bidirectional loop mirrors the principles of closed-loop neuromodulation but expands them by integrating real-time AI-driven inference and multiregional coordination.

Conventional BCIs are like simple machines that enhance engineering performance – for example, their efficiency depends on how accurately they can read a signal or how fast they can transfer data. Brain co-processors have a different goal. They aim to improve the brain's natural abilities in ways that are relevant to real-life situations. Achieving this requires a deep understanding of how the brain computes and solves problems. This, in turn, requires major advancements in technologies like new materials and AI.

Unlike conventional BCIs that are usually optimised for engineering performance metrics such as decoding accuracy or throughput, brain co-processors aim to enhance naturalistic brain functions in contextually meaningful ways. This requires not only advances in materials, microelectronics, and machine learning, but also a deep understanding of the brain's computational strategies. In this respect, existing commercial and transhumanist ventures (e.g. Neuralink and Synchron) have made impressive technical progress but are often constrained by an overly reductive view of brain function. Most do not account for multiple neural routes to achieve the same behaviour or the feedback-driven plasticity inherent in biological learning systems.

2   Hochberg, L. R., et al. (2012). Reach and grasp by people with tetraplegia using a neurally controlled robotic arm. Nature, 485(7398), 372–375.

3   Humayun, M. S., et al. (2012). Interim results from the international trial of Second Sight's visual prosthesis. Ophthalmology, 119(4), 779–788.

4   Andersen, R. A., et al. (1997). Multimodal representation of space in the posterior parietal cortex and its use in planning movements. Annual Review of Neuroscience, 20, 303–330.

5   Shadmehr, R., & Krakauer, J. W. (2008). A computational neuroanatomy for motor control. Experimental Brain Research, 185, 359–381.

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Feature	Conventional BCIs	Brain co-processors
Primary Goal	Optimised for engineering performance metrics (e.g. decoding accuracy, data throughput).	Aim to enhance naturalistic brain functions in contextually meaningful ways.
Focus	Often based on a narrow view of brain function, focusing on specific inputs and outputs.	Requires a deep understanding of the brain's computational strategies and interactions among brain areas.
Limitations	Typically constrained by reductive mechanisms and often fail to account for complex biological features (e.g. neural plasticity, co-adaptation, redundancy).	Necessitates advances across multiple domains like materials, microelectronics, and AI to succeed.

Table 1: Comparing BCIs and Brain co-processors

The Pratiksha Trust - IISc Brain Co-Processors Moonshot Project plans to develop a new class of implantable and non-invasive brain co-processors that draw in equal parts from fundamental neuroscience, novel hardware development, and cutting-edge AI. This project brings together interdisciplinary expertise from cognitive neuroscience, electrical engineering, neuromorphic devices, systems biology, and bioelectronics. By working across domains and scales – from cellular activity to behaviour – the project aims to build co-processors that not only restore lost functions but also expand our understanding of how the brain solves complex problems.

This comprehensive approach has wide-ranging implications for:

» Basic science in uncovering principles of brain computation
» Clinical interventions in the context of stroke, epilepsy, Parkinson's disease, cognitive decline, etc.
» Long-term brain-machine symbiosis

A novel approach distinguishes the Brain Co-Processors Moonshot Project

The Brain Co-Processors Moonshot Project intends to develop, within a decade, a neural co-processor to restore goal-directed reach and grasp abilities in survivors of middle cerebral artery (MCA) stroke. This is arguably the most common type of stroke and occurs when blood flow is blocked or, less commonly, when the middle cerebral artery or one of its branches ruptures. MCA often leads to hemiparesis (partial paralysis), sensory deficits, and disruptions in visuomotor integration.

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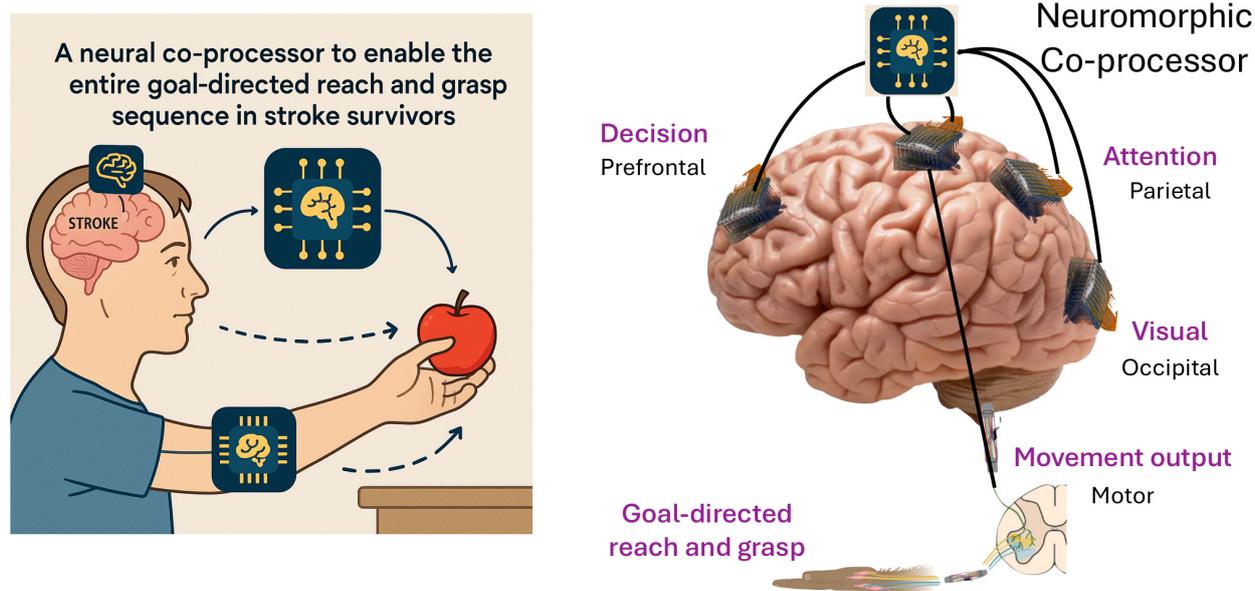
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Figure 2: The objective of the Brain Co-Processors Moonshot Project is to develop a neural co-processor to restore goal-directed reach and grasp abilities of MCA stroke patients (Source: Generated with ChatGPT).

Unlike traditional neuroprosthetic solutions that address isolated components of motor impairment, the Brain Co-Processors Moonshot Project's approach targets the entire functional loop of perception, attention, decision-making, motor planning, execution, and feedback. The project proposes to create an **AI-powered, closed-loop brain co-processor** that can interface with multiple cortical regions and peripheral effectors, facilitating a distributed and adaptive restoration of coordinated movement. This will be achieved by developing both **implanted, invasive and non-invasive interfaces**, supported by a multi-disciplinary integration of neuroscience, machine learning, systems engineering, and clinical rehabilitation.

By combining advanced neural recording, AI-driven inference, closed-loop stimulation, and personalised rehabilitation protocols, this project will lay the foundation for a first-of-its-kind brain co-processor that restores complex sensorimotor function after stroke. The integrated approach will not only address multi-region interfacing using **novel, indigenous, low-cost and scalable brain recording and stimulation hardware** but will also leverage the brain's own distributed computational logic – by developing **brain-inspired AI-based neuromorphic co-processors** that facilitate decoding, analysing, and reencoding signals back into the brain.

The Brain Co-Processors Moonshot Project team is led by a world-class multi-disciplinary Indian team:

» *Neuroscience:* **Sridharan Devarajan (IISc), Supratim Ray (IISc), SP Arun (IISc), Aditya Murthy (IISc), Arjun Ramakrishnan (IITK)**

» *Bioelectronics and Implants:* **Arjun Ramakrishnan (IITK), Hardik Pandya (IISc), Chandra Murthy (IISc), Kaustubh Deshpande (Eywa Neuro)**

» *Neuromorphic:* **Chetan Singh Thakur (IISc), Sreetosh Goswami (IISc), Navakanta Bhat (IISc)**

» *Clinical partners:* **Shabari Girishan (MS Ramaiah Hospitals), George Vilanilam (Sree Chitra Tirunal Institute), Siby Gopinath and Harilal Parasuram (Amrita Hospitals), Nilesh Kurwale (Deenanath Mangeshkar Hospitals) and Paresh Doshi (Jaslok Hospitals)**

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The project team aims at a five-pronged impact on India and the word:

1. **Made in India**: Indigenous implant, hardware, and AI stack tailored to clinical infrastructure in low and middle-income countries
2. **Bidirectional**: A brain co-processor platform prioritises both rehabilitation and restoration, thereby enabling interactive, personalised treatment
3. **Distributed and modular**: Decodes attention, vision, decision-making and not just motor signals, reflecting true cognitive architecture
4. **Digital public good**: Open-source AI, datasets, and visualisation tools democratise access and research
5. **Ethical and scalable**: Leverages non-invasive technologies first, transitions to implants only when necessary

The targeted project outcomes include:

» Restoration of **goal-directed reaching** in stroke survivors via co-adaptive training
» First **India-wide sEEG (Stereoelectroencephalography) and/or ECoG (Electrocorticography) database** linked to cognitive-behavioural states
» Validated **indigenous cortical implants** and system-on-chip platforms for neural interfacing
» Public release of **datasets, algorithms and software** for international collaboration
» Scalable pathway toward **cognitive augmentation** and rehabilitation technologies

A break-up of the key focus areas and milestones over 10 years of the Brain Co-Processors Moonshot Project outline the novelty in both the approach and the end goals.

Phase I: Technology Development and Non-Invasive Co-Processor (Years 1–5)

The focus is to develop, validate, and refine a non-invasive neural co-processor platform capable of decoding intention and providing sensory-motor feedback for goal-directed reaching in stroke survivors with residual neural connectivity.

- Year 1 – Foundation and System Design
    » Design and fabricate an early-stage neurofeedback system tailored to process real-time EEG (electroencephalography) signals with low latency
    » Initiate development of a multi-component sensory neurofeedback protocol for virtual goal-directed reaching tasks
- Year 2 – Non-Invasive System Integration
    » Integrate EEG decoding with real-time feedback loops (visual, tactile, and auditory)
    » Implement non-invasive brain stimulation methods e.g. tDCS/tACS (transcranial direct current stimulation/transcranial alternating current stimulation) to modulate attention and motor intention networks
- Year 3 – Data Collection and Cross-Population Validation
    » Leverage collaboration with clinical centres to gather stereo-EEG (sEEG) data from epilepsy patients performing comparable tasks, allowing access to deeper and region-specific signal dynamics

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» Train and refine deep learning models to decode multi-modal intent signals from both non-invasive and invasive sources

- Year 4 – In Vivo Electrode Development and Animal Testing
    » Design indigenous implantable probes – MER (Microelectrode Recording), sEEG, and multi-contact arrays – tailored for high-resolution, low-power cortical interfacing
    » Begin testing the neuromorphic co-processor with implantable electrodes in rodent and non-human primate models, validating real-time bidirectional function
- Year 5 – Prototype Readiness
    » Achieve full integration of non-invasive hardware (EEG, stimulation) with the neuromorphic processor for human-in-the-loop tests
    » Conduct feasibility studies in stroke patients for functional improvement, measured via kinematics, behavioural success, and neurophysiological markers

Phase II: Embedded Co-Processor for Restorative Intervention (Years 6–10)

Develop and validate an **embedded, minimally invasive co-processor** capable of restoring sensorimotor coordination and goal-directed reaching in individuals with chronic, multi-domain deficits due to MCA stroke.

- Year 6 – Electrode Testing with Existing Systems
- Year 7 – Human Testing of Limited Implants/Electrodes
- Year 8 – Integration with Indigenous Electrode Systems
- Year 9 – Longitudinal Recovery Studies
- Year 10 – Translation, Scale-Up, and Regulatory Readiness

The Brain Co-Processors Moonshot Project will also incorporate feedback from neurologists, therapists, patients, and caregivers throughout the development process. Informed consent, data privacy, and long-term monitoring will follow national and international standards such as the ICMR (Indian Council of Medical Research), CDSCO (Central Drugs Standard Control Organization) and NIH (National Institutes of Health) guidelines, which will be an integral part of the ethical and clinical considerations.

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Six Phase I sub-projects with a focus on technology development and developing a non-invasive co-processor

1. Cognitive mapping of the human brain with intracranial EEG

Key deliverables:

Release of de-identified sEEG and suitably anonymised video EEG database with about 100 patients' data, as well as visualisation and analysis algorithms as Digital Public Good. This database will enable important basic science discoveries of brain-behaviour relationships for the development of efficient neuro coprocessors, as well as provide valuable insights into neural origins of seizures. Piloting the use of electrical stimulation for improved treatment outcomes for epilepsy. Intracranial recordings and stimulation in epilepsy patients are a critical first step toward developing implantable brain co-processors for stroke patients.

Key objectives:

» Human cognitive mapping with intracranial recordings: Data will be analysed with state-of-the-art AI algorithms to understand how cognitive processes like attention, memory, and decision-making shape these networks. Design a novel battery of tasks that can be used for restoration of goal-directed reaching abilities in MCA stroke patients.

» Stimulation to understand the causal role of brain regions in cognition.

» Creating a first-of-its-kind India-centric stereo-EEG recordings and stimulation database of human intracranial EEG recordings, including sEEG and ECoG, along with video recordings and related anonymised patient information from clinical centres.

» Pilot goal: Localising epileptic foci and arresting seizure propagation. Develop a real-time tool for recording sEEG data with deep learning models to identify specific patterns that index the focus or "origin" of EEG seizures. Study the use of focal electrical stimulation to specific electrodes to arrest the ongoing seizure.

Principal Investigators:

Sridharan Devarajan (IISc), SP Arun (IISc), Aditya Murthy (IISc), Arjun Ramakrishnan (IITK), and clinician collaborators (Amrita Hospital, MS Ramaiah Hospital, Sree Chitra Tirunal Hospital, Deenanath Mangeshkar Hospital).

2. Validation of stimulation and recording co-processor technologies in the non-human primate

Key deliverables:

A harmonised data repository with non-invasive and invasive recordings and stimulation from humans and monkeys as well a suite of algorithms for feature extraction and decoding. Identifying a stimulation paradigm, both non-invasive and invasive, that maximises intra- and inter-regional functional connectivity.

Key objectives:

» Compare the performance of invasive versus non-invasive decoders/stimulators

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» Analyse various stimulation paradigms affect neural circuitry. Find the optimal stimulation paradigm for improving functional connectivity.

Principal Investigators:

Supratim Ray (IISc), SP Arun (IISc), and Chandra Murthy (IISc)

3. Development of indigenous deep brain recording and stimulation electrodes for cognitive rehabilitation

Key deliverables:

Naturalistic cognitive tasks, neural datasets, and computational models to understand how prefrontal brain circuits support adaptive decision-making and learning. In parallel, it will create indigenous deep-brain recording and stimulation electrodes, along with targeted neuromodulation strategies and a prototype closed-loop brain-stimulation system.

Key objectives:

» Design, develop, and validate indigenous deep brain recording and stimulation electrodes (MER and sEEG). Build state-of-the-art, cost-effective microelectrode systems tailored for the Indian clinical landscape.

» Establish and validate behavioural assays and neural decoding algorithms for cognitive rehabilitation in nonhuman primates. Leverage an ecologically valid behavioural paradigm (dynamic foraging) to characterise cognitive deficits and recovery in models of brain dysfunction.

Principal Investigators:

Arjun Ramakrishnan (IITK), Kaustubh Deshpande (Eywa Neuro), and clinician collaborators (Jaslok Hospital, DM Hospital)

4. Indigenous implantable technologies for brain signal acquisition and stimulation

Key deliverables:

Intracortical depth electrode for animal models. A single-disc (multi-pillar) micro cortical device for studying stroke and a multisite micro cortical array. Wireless acquisition and stimulation unit for rodent and pig models.

Key objectives:

» Develop a multi-contact miniaturised intracortical depth electrode. *In vivo* testing of the intracortical depth electrode in a rodent model and translation toward human trials.

» Design and develop a micro-pillar-based multi-contact cortical array implant. Electrical, mechanical, and material characterisation of the cortical implant. Design and development of the electronic acquisition and stimulation interfaces and peripherals for the cortical implant.

Principal Investigators:

Hardik Pandya (IISc), and Dr. Shabari Girishan (MS Ramiah Hospital)

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5. High-Precision molecular neuromorphic accelerator for real-time neuro-feedback and signal conditioning

Key deliverables:

A compact, high-precision System-on-Chip (SoC) integrating the neuromorphic crossbars for deployment in cognitive neurofeedback platforms. Benchmark results comparing signal-to-noise ratio, energy efficiency, and processing speed against current platforms.

Key objectives:

» To design and implement a high-precision analog computation platform using molecular memristor crossbars.

» To demonstrate the utility of this platform in AI/ML operations such as deep learning, predictive analytics, and signal denoising.

» Fabricate a compact, high-precision System-on-Chip integrating the neuromorphic crossbars for deployment in cognitive neurofeedback platforms.

» Validate the system through advanced signal processing techniques and neural network applications.

Principal Investigators:

Sreetosh Goswami (IISc), and Navakanta Bhat (IISc)

6. Neuromorphic AI co-processor for cognitive rehabilitation

Key deliverables:

High-density neuromorphic frontend chip. AI co-processor System-on-Chip (SoC). Integrated neuromorphic frontend and AI co-processor SoC and chiplet architecture. Low-density ML-enabled BCI based on commercial off-the-shelf components with indigenous IPs.

Key objectives:

» Develop a non-invasive approach for training cognitive functions like attention and working memory using real-time neurofeedback.

» Implement a Commercial Off-The-Shelf (COTS) hardware-based BCI system with indigenous IPs capable of real-time signal processing and ML-based decoding on acquired EEG, ECoG, intracranial EEG, etc., for both invasive and non-invasive cognitive neurorehabilitation.

» Design and fabricate a real-time neuromorphic AI co-processor as a SoC for accessible invasive and non-invasive cognitive rehabilitation leveraging the inherent sparsity of neural signals.

» Design a modular chiplet ecosystem in which multiple neuromorphic front-end die, each capable of streaming 256 neural recording channels and interface seamlessly with a dedicated AI co-processor.

Principal Investigators:

Chetan Singh Thakur (IISc), and Sridharan Devarajan (IISc)

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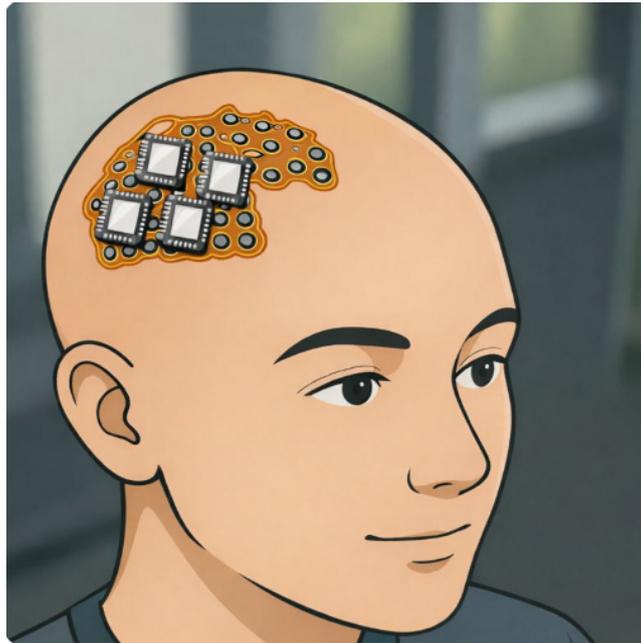
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Figure 3: Illustration of the integrated chiplet architecture with multiple 256-channel neuromorphic front-end chiplets are tiled on the cortical surface and connected via a high-bandwidth common bus to an on-package machine-learning co-processor. This configuration supports ultra-high-density (>1,024 channels) neural recording with on-chip ML decoding for complex brain-computer interface tasks (Source: Generated with ChatGPT).

Impact on India and the world

1. **Made in India indigenous hardware and AI stack**

    1.1. Create an indigenous pipeline for sEEG recording setup, hardware and software and data – providing custom solutions for hospitals.

    1.2. Strengthen India's capacity to drive next-generation neurotechnologies rather than relying solely on imported datasets or frameworks.

    1.3. CDSCO-ready MER and sEEG devices, enabling rapid translation from preclinical validation to pilot human studies and commercialisation. Establish India's first end-to-end pipeline for indigenous deep-brain recording and stimulation electrodes by delivering both MER and sEEG devices.

    1.4. Provide a scalable framework for indigenous, affordable neurotechnology and a protocol for closed loop neuromodulation for treating feedback-based learning deficits.

    1.5. Create a clinically viable, accessible neuroprosthetic platform that can restore motor function and improve quality of life for stroke patients.

    1.6. Develop board-level and silicon-integrated prototypes for real-time EEG and brain-signal classification. Create Indian leadership in deep-tech AI hardware spanning molecular science, neuromorphic computing, and semiconductor integration, critical for technological sovereignty. Open pathways to personalised and wearable medical technologies.

    1.7. Deliver an advanced neuromorphic BCI technology within India which includes an indigenous ecosystem covering neural sensing, decoding, and feedback, without reliance on outsourcing or

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technology transfer from other countries. Given India's large population of stroke survivors, this work has strong potential to deliver affordable and effective neurorehabilitation solutions with significant clinical and societal impact.

2. **Bidirectional focusing on both rehabilitation and restoration**

   2.1. Enable causal mapping of function and laying the groundwork for closed-loop, bidirectional BCIs that can both record from and stimulate the brain for rehabilitation.

   2.2. Create a harmonised data repository with non-invasive and invasive recordings and stimulation from humans and monkeys as well a suite of algorithms for feature extraction and decoding.

   2.3. Develop neural-behavioural decoders of adaptive learning and targeted intracortical stimulation protocols that includes a prototype closed-loop neuromodulation controller validated in non-human primates.

   2.4. Deliver a low-density BCI platform with edge ML for early clinical and field trials, hardware-optimised AI and sparse signal-processing algorithms, and neuromorphic ML co-processor SoC scalable from hundreds to >1024 channels, enabling an end-to-end closed-loop BCI system. Together, these create a clear pathway from prototype to clinically translatable, low-power neuromorphic BCI systems for rehabilitation and broader neurotechnology applications.

   2.5. Transform today's power-hungry lab prototypes into practical, deployable neurorehabilitation technologies in India and around the world.

3. **Distributed and modular reflecting true cognitive architecture**

   3.1. Compare the performance of invasive versus non-invasive decoders/stimulators, and find out various stimulation paradigms that affect neural circuitry.

   3.2. Identify a stimulation paradigm, both non-invasive and invasive, that maximises intra- and inter-regional functional connectivity.

4. **Digital public good to democratize access**

   4.1. Leverage India's unique clinical scale and expertise by partnering with leading hospitals across multiple states. By building the first large-scale Indian intracranial EEG database and developing indigenous experimental paradigms, data pipelines, and analytical tools, it can help establish Indian leadership in human cognitive neuroscience.

5. **Ethical and scalable leveraging non-invasive technologies first**

   5.1. Build a privacy-aware, remotely accessible database of stereo-EEG, ECoG and video-EEG and behavioural recordings. This will be first of its kind from India, and can potentially grow to become the largest in the world, dovetailing with international standards to ensure ethical and scalable data use and reuse.

Global collaborations with the world's best researchers

The Brain Co-Processors Moonshot Project leverages a novel global partnership model to achieve its goals. The Pratiksha Trust Chair Professors at IISc are the mentors for this project.

» **Rajesh Rao**, CJ and Elizabeth Hwang Professor in the Paul G. Allen School of Computer Science and Engineering and Department of Electrical and Computer Engineering Co-Director of the Center for Neurotechnology (CNT), University of Washington. His work involves developing AI-driven brain

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co-processors that learn and adapt with the brain to restore function or augment capabilities after injuries like stroke.

» **Maneesh Sahani**, Professor of Theoretical Neuroscience and Machine Learning Gatsby Computational Neuroscience Unit, University College London. His work focuses on how neural systems represent and process information, combining theory, data-driven analysis, and machine learning. Collaborating with physiologists, his lab develops methods to study neural dynamics, contributing to analysing how neural populations process information aiding for building effective BCIs.

» **Barbara Shinn-Cunningham**, Glen de Vries Dean, Mellon College of Science, Professor, Biomedical Engineering, Carnegie Mellon University. Her work focuses on understanding and aiding auditory processing by monitoring attentional selection through EEG. She is a recipient of the Misha Mahowald Prize for Neuromorphic Engineering and President of the Acoustical Society of America (ASA).

The Brain Co-Processors Moonshot Project plans to collaborate with some of the world's top researchers in this domain.

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Researcher	Affiliation	Expertise
Jeffrey Ojemann	Vice-Chair for Discovery and Professor in the UW Department of Neurological Surgery, University of Washington	Chief neurosurgeon and co-PI in the UW/Cortec stroke brain implant trial. Clinical trials in motor recovery from stroke and brain-computer interface. Cortical signals in epilepsy, motor and language function, and in developmental (paediatric) signals with a focus on mental and behavioural health.
Jeffrey Herron	Associate Professor of Neurological Surgery Adjunct Associate Professor of Electrical & Computer Engineering, University of Washington	Key member of invasive stroke rehabilitation trial using Cortec implants. Enabling bi-directional neural prosthetics that make use of sensed signals to dynamically modulate stimulation. Application of induced plasticity to further enhance the treatment of neurological disease and injury. Working with regulatory bodies to receive approval for human subjects-based research through protocol review and investigational device exemption applications.
Ben Grannan	Assistant Professor of Neurological Surgery, University of Washington	A neurosurgeon who specialises in epilepsy, movement disorders and neuromodulation. He is on the neurosurgery team for the UW stroke trial. He is also involved in a study on an implanted brain device for stroke recovery and has performed Deep Brain Simulation (DBS) surgery for Parkinson's disease tremors.
Nishant Sinha	Assistant Professor, Department of Neurology, Perelman School of Medicine, University of Pennsylvania	Curator of Pennsieve and epilepsy science. Developed complementary platforms designed to build an international neural data ecosystem for translational epilepsy research, with a focus on scalable, secure, sustainable, and reproducible data sharing and analysis across institutions.
John Seymour	Associate Professor of Neurosurgery, McGovern School of Medicine, UT Health Adjunct Associate Professor of Electrical & Computer Engineering, Rice University	Director of the Translational Bioelectronics Lab at Rice University (TBBL) that is laser-focused on the translation of implantable sensing and stimulating technology in humans, including brain-computer interfaces.
Shantanu Chakrabartty	Clifford W. Murphy Professor Translational Neuroscience and Neurotechnology Training Program, Washington University in St. Louis	Researching new frontiers in non-conventional analog computing and sensing techniques using silicon, quantum and biological circuits for applications in Machine Learning, Neuromorphic Engineering, Structural Health Monitoring and Biomedical Instrumentation.

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Barani Raman	Professor, Department of Biomedical Engineering, Washington University in St. Louis	Research focuses on the design and computing principles of biological sensory systems and translating this knowledge into bio-inspired intelligent systems and machine learning algorithms.
Sahil Shah	Assistant Professor, Department of Electrical and Computer Engineering, University of Maryland	Investigate circuits, systems and architectures to compute efficiently in a resource-constrained environment (wearable, implantable, and edge devices).
Douglas Weber	Akhtar and Bhutta Professor, Mechanical Engineering, Neuroscience Institute and Biomedical Engineering, Carnegie Mellon University	Developing neuro-technologies for restoring sensorimotor functions after stroke or spinal cord injury, and a founding member of DARPA's Biological Technologies Office. Key contribution in co-developing the Stentrode, a minimally invasive endovascular brain-computer interface to restore function in patients with paralysis.
Pulkit Grover	Associate Professor Electrical & Computer Engineering; Neuroscience Institute; Biomedical Engineering, Carnegie Mellon University	Stimulating deep brain structures through transnasal stimulation. He also has expertise in designing, implementing and testing in simulations and cadavers non-invasive and minimally invasive neurostimulation approaches, laying the groundwork for closed loop neurofeedback.
Byron Yu	Gerard G. Elia Career Development Professor Electrical & Computer Engineering and Biomedical Engineering, Carnegie Mellon University	Developing novel statistical algorithms to analyse large populations of neurons and using BCIs to study brain function.
Matthew Smith	Professor, Biomedical Engineering and Carnegie Mellon Neuroscience Institute Co-Director, Center for the Neural Basis of Cognition, Carnegie Mellon University	Research brain mechanisms for interpreting visual inputs, processing, and generating motor outputs to better understand how groups of neurons give rise to visual perception, cognition, and action.

Table 2: Global collaborators for the Brain Co-processors Moonshot Project

More international researchers are expected to join the collaboration.

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itihaasa Research and Digital (www.itihaasa.com) is a non-profit Section 8 company that analyses the evolution of technologies, R&D, and innovation in India. We have published reports on the R&D landscape of brain science, quantum technologies, and AI/ML in India. We were the knowledge partner for the US - India Artificial Intelligence (USIAI) initiative of the Indo-U.S. Science and Technology Forum (IUSSTF).

Kris Gopalakrishnan, co-founder of Infosys, is the founder and Chairperson of itihaasa Research and Digital. Our flagship project is itihaasa history of Indian IT, a first-of-its-kind free digital museum that recounts the history of Indian IT since the 1950s. We have also authored the award-winning book *Against All Odds: The IT Story of India*.

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