Call for Pre-Proposals

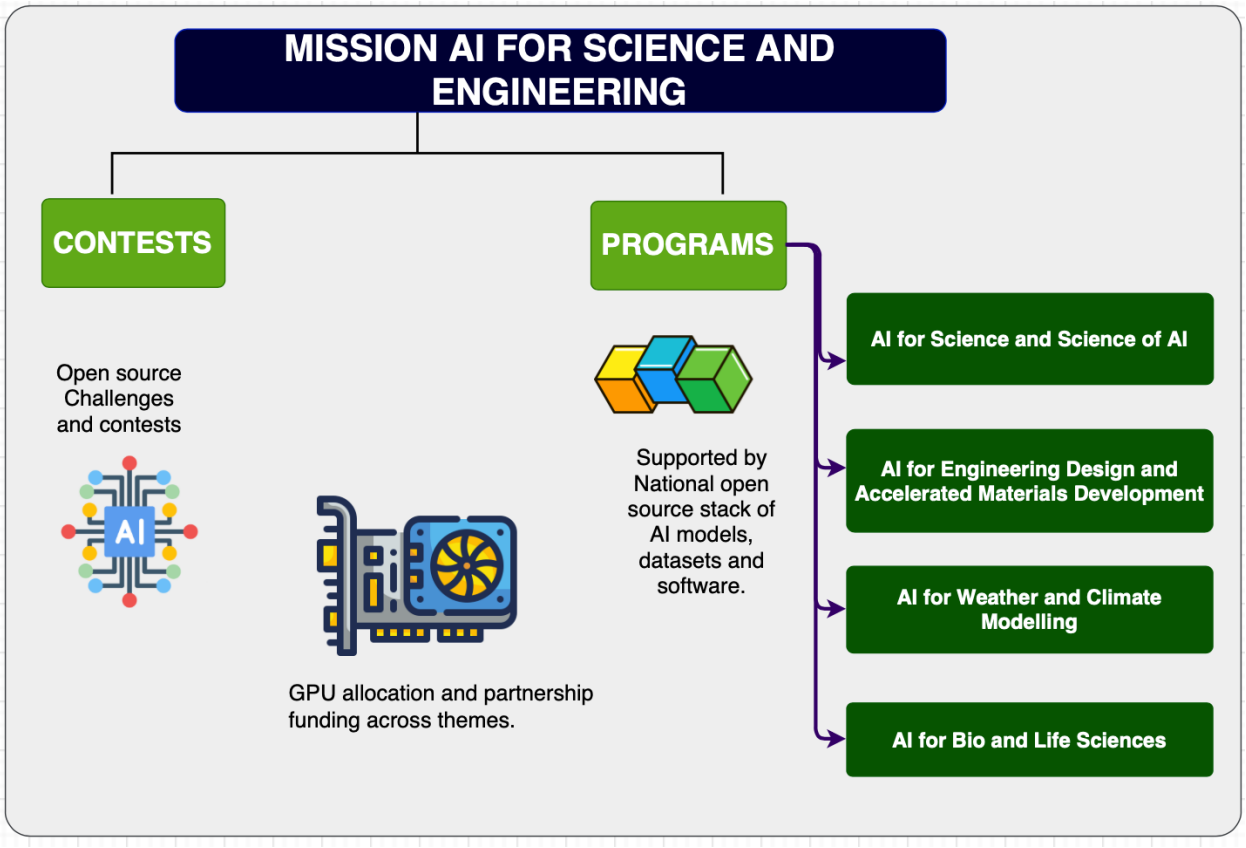
ANRF MISSION AI for Science and Engineering (AI-SE)

Introduction:

Anusandhan National Research Foundation (ANRF) is mandated to spearhead a new era of directed Research & Innovation in the country, translating ideas into tangible national and societal outcomes. Under its **Mission for Advancement in High-Impact Areas (MAHA)** program, ANRF promotes mission-mode, solution-oriented research. The newest flagship initiative under ANRF MAHA is **Artificial Intelligence for Science & Engineering (AI-SE)**, launched in collaboration with the **Ministry of Electronics and Information Technology** (MeitY), and Scientific Departments.

Vision:

To embed AI as a core enabler of India's scientific and engineering ecosystem by advancing foundational AI methods, domain-specific models, and national-scale infrastructure for accelerated discovery and innovation.



Objectives:

- Advance next-generation AI methods that **directly** model science and engineering, including neural operators, physics-informed learning, molecular and biological foundation models, and domain-specific models.
- Accelerate AI-driven discovery in strategic areas such as Climate Science, Advanced Materials, Biomanufacturing, and data-rich fields like microscopy, spectroscopy, medical imaging, astrophysics, and high-energy physics.
- Build an open, interoperable AI ecosystem of scientific models, datasets, tools, and infrastructure to embed and share scientific insights across domains.
- Catalyse cross-disciplinary collaboration to integrate AI research with domain expertise, advance the science of AI (including generative AI and domain adaptation), and strengthen India's scientific and technological self-reliance.
- Creation of a coherent set of opensource fundamental models and datasets for science and engineering.

Significance of the Mission:

This Mission positions AI as an integral component of the scientific and engineering enterprise — where scientific principles, engineering designs, data, and models are directly embedded in AI systems—thereby advancing both the frontiers of science/engineering and the science of AI to accelerate discovery, innovation, and national technological self-reliance.

Scope of the Mission:

The Mission adopts an interlinked support architecture through various domain specific programs.

The Mission will drive cutting-edge AI research, backing academia and research institutions to develop fundamental building blocks in science and engineering. This includes exploring novel architectures like domain-centric neural operators, sophisticated large-scale models tailored for specific knowledge domains in science and engineering, and AI-powered experimental platforms and digital twins.

The projects identified under the programs will be open for funding support by ANRF and/or partner scientific departments such as Ministry of Earth Sciences (**MoES**), Department of Biotechnology (**DBT**) and Defence Research & Development Organization (**DRDO**), based on the areas of interest. More entities including non-governmental organizations will be added to the mission as program partners, in future.

Projections for the programs include scalable GPU clusters supported by **MeitY**, a federated data backbone built on FAIR (Findable, Accessible, Interoperable, and Reusable) principles, and an open-source ecosystem of models, tools, and autonomous laboratories for machine-speed validation. These elements converge in the Open IndiaAI Stack, a composable catalogue of models, datasets,

and workflows that function like snap-together "LEGO blocks. These lego blocks can be composed into domain specific AI agents via automated AI techniques.

Proposals are invited under the following tracks:

Track I: Programs (in Partnership with **MeitY** for GPUs)

Program I: **AI for Science and Science of AI (ANRF)**

a. Hybrid AI-HPC Approaches for Scientific Discovery
b. Reimagining Design and Simulation through AI
c. AI for Next-Generation Batteries and Sustainable Energy Storage
d. AI for Medical Imaging
e. AI for Computational Chemistry
f. AI for Astrophysics, Cosmology, Nuclear and High Energy Physics
g. AI-guided Molecular Design or Quantum phenomena
h. AI methods inspired by Scientific Disciplines
i. AI for Earth & Geological Sciences & Engineering
j. AI for Multi OMICS for Plant and Animal Sciences

Program II: **AI for Engineering Design and Accelerated Materials Development (ANRF with DRDO)**

a. Accelerating Materials Discovery and Optimization with AI
b. Novel Materials design through AI for defence applications
c. Digital Twins for naval systems like AIP, advanced propellers, unmanned underwater systems
d. Real-time fluid dynamics modeling
e. AI-enabled design and maintenance of maritime systems

Program III: **AI for Weather and Climate Modeling (ANRF with MoES under Mission Mausum)**

a. AI emulators for physics parameterization and earth system models
b. Multimodal rainfall nowcasting
c. Climate modeling and environmental forecasting

Program IV: **AI for Bio and Life Sciences (ANRF with DBT)**

a. Biomanufacturing
b. AI-assisted strain selection and yield optimization
c. Enzyme design and biocatalysis
d. AI for Drug Discovery and Cell & Gene Therapies
e. AI for Computational Biology
f. AI for Protein and mRNA biologics
g. AI for Therapeutics and Vaccines

Nature & Duration of Support

- Proposals must be collaborative, demonstrating strong expertise in both core Sciences or Engineering and AI, and may involve multi-investigator or multi-institutional consortia.

Proposals featuring meaningful collaboration with startups and industry partners will be actively encouraged over purely academic proposals.

- Proposals relying solely on pre-2020 "black box" machine learning approaches (e.g., basic machine learning and regression models, shallow neural networks, or standard convolutional/recurrent neural networks (CNN)/(RNN) pipelines) will not be prioritized for support. Proposals are expected to use modern AI methods (post-2020) that reflect the state of the art in scientific applications, transfer learning or emergent properties etc. Fine tuning of open source state of art foundation models is also encouraged using specialized data sets.
- Research grants of up to **₹30 Crore for a period of 3 years** may be awarded, inclusive of GPU usage costs. In rarer cases, upto **₹50 Crore** will also be considered, commensurate with the projected deliverables and impact of the proposal.
- The budgetary provision for GPU usage must not exceed 70% of the total project cost.
- GPU usage will be supported only through MeitY's GPU-as-a-Service; purchase of GPUs or other HPC equipment will not be funded.
- Funding will cover Research Personnel (JRFs, SRFs, RAs/National Post Doctoral Fellows (NPDFs), Project Scientists etc.), AI/cloud compute hours, software tools, datasets, and experimental rigs. Additional allowable costs include travel, contingency, and institutional overheads as per ANRF norms.
- Funding may also cover on-demand HPC services through National Supercomputing Mission, to support experimental validation and hybrid science-in-the-loop approaches.
- Proposals with high capital cost requirements will not be supported.
- Duration of the projects shall not exceed 3 years.

Who Can Apply for Track I Projects

- Project proposals are invited in consortium mode, bringing together multiple Principal Investigators (PIs) and institutions/laboratories from academia, research organizations, industry, and startups.
- Each proposal must be submitted by a lead institution and will be headed by a lead PI.
- The lead PI will be from the academic institution or a National Research Laboratory, and must hold a regular position in the institution. The PIs can also be from Section 8 Companies and DSIR SIRO registered entities.
- Applicants must be Indian citizens or OCI holders.
- Applicants must have a Ph.D. in Science, Mathematics, Engineering, or relevant Social Sciences (for AI in quantitative social sciences) or M.D./M.S./M.D.S./M.V.Sc. degree holders.
- PIs nearing superannuation may apply if supported by a Co-PI from the same institution with at least 3 years of service remaining. Fellows under INSPIRE, Ramanujan, and Ramalingaswamy schemes may participate as Co-PIs.

Mode of Support

- The lead institution will be responsible for the financial and administrative management of the project.

- Post selection of the project, funds will be allocated to lead institution, which will in turn be distributed to other academic/ R&D lab partners, as required.
- Collaboration: Startups and Industry partners are invited to participate in the mission as a collaborating partner with academic institutions/ R&D labs and can aim to leverage open-source outputs of the mission to drive their innovation. No financial support will be provided for industry and startups by ANRF in this mission.

What are the expected deliverables from a project under Track I:

Each supported project must produce either an open-source model or an open-source dataset or its combination thereof, as its primary deliverable. Every proposal should include four mandatory dimensions:

1. **Technical Efficacy** – accuracy, speed, and robustness measured on peer-reviewed benchmarks or, where those are absent, on pre-agreed data;
2. **Open-Science Contribution** – code, checkpoints, and datasets released under approved licenses, together with reproducibility scripts
3. **Technology Readiness** – attainment of TRL milestones aligned with the project's declared pathway to deployment.
4. All funded projects will be required to contribute at least one well-defined benchmark task or an open-source model to support open source competitions in Track - II.
5. The PIs/Co-PIs must commit to releasing intermediate artefacts under approved open-source licenses. *The details of the licence can be found here...*

Selection & Mode of Application:

- Under the Mission, a lead PI is eligible to submit only one proposal during a given call.
- Information to be provided for pre-proposal:

  Section A: Objectives, Technical efficacy benchmarks including TRLs, planned open-science contributions, deliverables, impacts, and milestones with a clear deployment pathway (maximum 3 pages).

  Section B: Budget Requirements

  Part I - Proposed GPU usage requirements and envisaged costs, with technical justifications (maximum 1 page). Principal Investigators (PIs) can calculate the usage costs through the India AI Compute portal.

  Part II - Details of other costs (Non-recurring, Consumables, Travel, Contingency, Research Personnel, and Overheads) (Maximum 1 page).

- Full proposals will be invited by ANRF, based on the evaluation of the pre-proposals.
- The proposals will be evaluated by a domain-specific Technical Advisory Committee (TAC), and applicants may be invited for presentations or discussions as part of the selection process.

Plagiarism Policy:

All proposals submitted under the AI-SE Mission must be entirely original in both concept and content, reflecting the applicant's own research ideas, methodologies, and planned activities. Proposals found to contain any uncredited or unattributed copied content, whether from published literature, online sources, or previously submitted work, will be summarily rejected without further review.

How to apply:

Proposals must be submitted through www.anrfonline.in and will be evaluated under ANRF's standard procedures, aligned with the implementation strategies of this Mission. Applicants should carefully review the detailed PI guidelines on the portal to ensure full compliance with submission requirements and formats.

Track - II (ANRF in partnership with MeitY)

National Challenges through open source contests: Under the broad umbrella of the AI-SE mission, open source challenges and contests will be undertaken to build a national common of open-source AI models, datasets, and evaluation benchmarks. Grand challenges, public competitions, and community benchmarking will be the goal of this initiative. A key purpose of this effort is to foster the engagement of the wider scientific community and latent talents, including researchers, students, and innovators from Tier II and Tier III institutions and universities, thereby ensuring inclusive participation and broad-based capacity building in AI for Science and Engineering.

Nature of Support for Contests and Challenges:

- The mission will have national competitions over the year, to build open-source AI datasets, build opensource models, and benchmarks.
- Around 10 national competitions over the year will be targetted.
- The competitions are open to all Indian citizens or OCI holders.
- The competitions will entail prizes and access to GPUs through MeitY's shared infrastructure.
- The expected deliverables will be build datasets or build models for opensource.
- The applicants should affiliate/partner with any Indian academic institutions ornational research labs if they win the contest, for GPU access/allocation.
- The PIs/Co-PIs must commit to releasing intermediate artefacts under approved open-source licenses. *The details of the licence can be found here...*

Implementation of Open Source Challenges and Contests:

- ANRF and MeitY will evolve mechanisms to support competitions to lead the development of national open-source AI models, datasets, and benchmarking platforms, including large-

scale competitions to crowdsource innovation. In addition ANRF and MeitY may procure support services for this AI Mission.

Operational details will be informed shortly.

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- any military or defence purposes;
- exploiting, harming, or attempting to exploit or harm minors;
- generating or disseminating verifiably false information and/or content with the purpose of harming others;
- generating or disseminating personal identifiable information without due authorization or for unreasonable use; and

- unlawful surveillance or profiling of individuals or groups.

(b) Users shall ensure alignment with the **National AI Strategy of India** and global frameworks such as the **UNESCO AI Ethics Recommendation**.

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