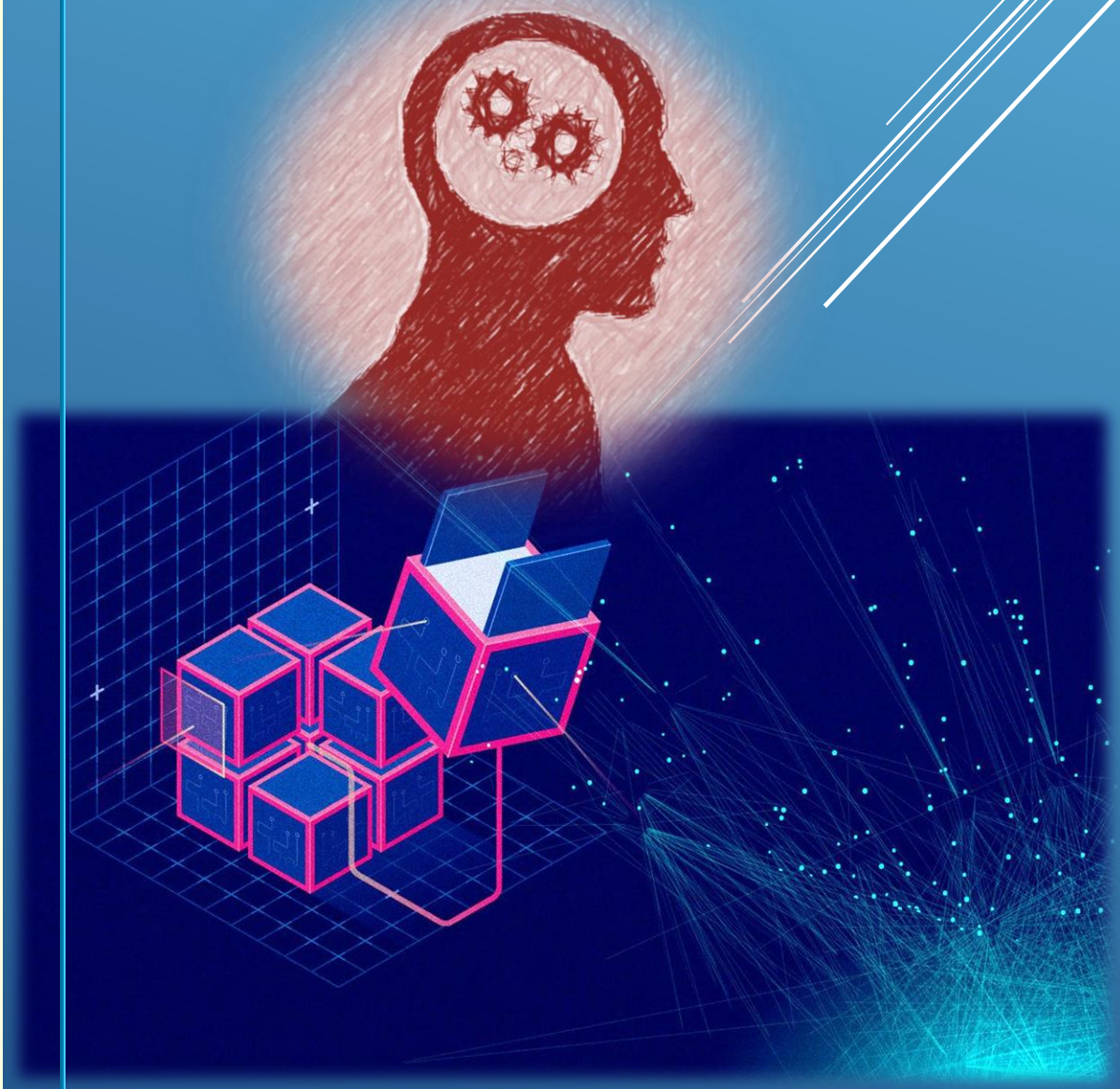
In association with

इलेक्ट्रॉनिकी एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
ELECTRONICS AND
INFORMATION TECHNOLOGY
सत्यमेव जयते



# AgriEnICS GRAND CHALLENGE ON ELECTRONICS AND ICT APPLICATIONS IN AGRICULTURE, ENVIRONMENT

2022

# Contents

## Background

Ministry of Electronics and Information Technology, Government of India (MietY), has sanctioned a National Programme on Electronics and ICT Applications in Agriculture and Environment (AgriEnIcs) to C-DAC, Kolkata, on advanced research infrastructure and platform towards the application of Electronics and ICT technologies in the two significant sectors, Agriculture and Environment, under AgriEnIcs through a convergence of multidisciplinary technology areas and strategic alliances with a holistic look towards improving the lives of the people of India.

Under this Programme, the AgriEnIcs Grand challenge on Electronics and ICT Applications in agriculture, environment competition has been arranged to encourage innovative minds of India. To limit the scope within pragmatic boundaries, AgriEnIcs Grand challenge proposes to address only a few critical problems in the domains of Agriculture and Environment through Collaborative R&D projects as depicted in AgriEnIcs. However, a large number of issues in these sectors remain unaddressed. As a result, researchers, entrepreneurs, students, and Industries, across the country, are trying to address many of such critical problems in isolation and on a piecemeal basis. The "AgriEnIcs Grand challenge" program intends to bring a few significant R&D efforts under the AgriEnIcs umbrella. The selected applications will be nurtured into marketable products or services.

Mentorship, fund, and a suitable platform will be provided to qualified individuals or teams to implement innovative, cost-effective R&D ideas into an actual product.

## Topic

Proposals must provide a strong rationale for the work proposed, demonstrate a clear understanding of India's context and needs, and present a defined hypothesis and associated plan for how the idea would be tested or validated. In focusing on Electronics and ICT Applications in agriculture environment, here are a few thematic areas but not limited to:

- Application of IoT in Agriculture
- Mechanization & Robotics in Agriculture
- Agricultural Data Analytics
- AI-ML based Machine Vision
- ICT application in the Environment
- Any other suitable area on Electronics and ICT Applications in an agriculture, environment.

| Domain Area | Thematic Area | Sub-thematic Area |
|---|---|---|
| 1. Agriculture | • Application of IoT;<br>• Mechanization & Robotics; | **STGC-01:** EDGE computing device for livestock management. |

| | | |
|---|---|---|
| 2. Environment | • Data Analytics;<br>• AI-ML based Machine Vision;<br>• ICT application in Environment;<br>• Any other suitable area on electronics and ICT applications in an agriculture, environment. | **STGC-02:** Development of secured IoT framework for agriculture or livestock management.<br>**STGC-03:** Air, water, soil quality monitoring device.<br>**STGC-04:** Image Corpus creating for agri commodities.<br>**STGC-05:** Livestock disease prediction model using known data sets.<br>**STGC-06:** AI-enabled algorithm for detection of environmental stress, health and growth of farm animals/ birds.<br>**STGC-07:** Detection of behaviour (rumination, grazing, sleeping/idle condition, sickness) of livestock through video processing.<br>**STGC-08**: Detection of behaviour (eating, sleeping/idle condition, sickness) of poultry through video processing.<br>**STGC-09:** Robotic arm for selective leaf plucking.<br>**STGC-10:** Design of 6DoF Arm with multi-sensor interfaced End effector of 1 m reach.<br>**STGC-11:** Crop disease and weed detection.<br>**STGC-12:** Livestock health maintenance.<br>**STGC-13:** Water and soil management.<br>**STGC-14:** Surveillance systems to monitor farm fields.<br>**STGC-15:** Crop yield prediction.<br>**STGC-16:** Yield mapping.<br>**STGC-17:** Finding irrigation leaks, optimizing irrigation systems and measuring.<br>**STGC-18:** Dispersion model for a selected sector. |

| | | |
|---|---|---|
| | | **STGC-19:** Capacitive sensor for environmental problems.<br>**STGC-20:** GIS & RS for natural resource management.<br>**STGC-21:** Urban flood modelling and management.<br>**STGC-22:** Low-cost microscopic/ instruments for plant disease identification.<br>**STGC-23:** Non-invasive portable instrument for rapid analysis of pungency and moisture content in spices/ crops.<br>**STGC-24:** Low-cost portable NIR spectroscopic device for estimation of quality of fruits/vegetables.<br>**STGC-25:** Low-cost portable, non-invasive technology for estimating protein, fat and formaldehyde content in meat/fish.<br>**STGC-26:** Other which are relevant to the thematic area. |

## Problem statement

Agriculture plays a vital role in India's economy. Over 58 per cent of rural households depend on agriculture as their principal means of livelihood. Moreover, agriculture, fisheries, and forestry are among the most significant contributors to the Gross Domestic Product (GDP). The agriculture sector in India is expected to generate better momentum in the next few years due to increased Government initiatives and plans in agricultural infrastructures such as irrigation facilities, warehousing, cold storage, better marketing process, and the introduction of advanced technologies.

In this scenario, electronics and ICT can play a vital role in significant improvements to all agricultural processes, from soil preparation, sowing seeds, applying fertilizers and pesticides, irrigation, harvesting, storage, and processing, up to the final stages of marketing and transportation. Overall growth is thus expected in the lives of the Indian farmers and their families. Food safety is another important aspect related to agriculture. For example, excessive applications of chemical fertilizers and pesticides affect the quality of the produced commodities. They may be associated with severe health hazards to human consumers. Electronics sensor-based technology has the potential to rapidly detect the traces of such chemicals in foods for human safety.

Extensive research activities and the development of products and solutions on various facets of agriculture are proposed to be carried out under this AgriEnIcs Grand challenge platform. This effort promises to play a catalytic role in national agricultural development in diversification, enhancing productivity, minimizing resources, adding value, capturing markets, improving food quality and safety, and balancing ecological interests.

Environment pollution has become a global issue since the middle of the last century. At the same time, the problems are more compounded in a developing country like India with the pressure of enormous population density. Pollutants in the air, soil, and water can havoc with biotic entities, including humans. They may lead to serious health hazards, including death. Therefore, the government of India has come up with a set of regulatory policies and mitigation strategies to control pollution in our country.

The intensity of pollution has a direct relationship with its sources. Moreover, it has spatiotemporal variation depending on surrounding weather and environmental parameters. Hence, to control pollution, knowledge of the level of pollution and the nature of pollutants both in spatial and temporal domains is critical.

Electronics sensing technology is a perfect choice for rapidly monitoring air, soil, and water pollutants. In contrast, ICT technologies can play their role in capturing, storing, analyzing, and disseminating the acquired information. Therefore, partnerships and networking are essential for multidisciplinary fields like agriculture and environment electronics. Such research must be conducted through alliances and collaborations with domain-specific research organizations**.**

## Important Dates

Date of Call for Proposal (CFP) publication: **1st November 2022**

Submission of concept note: **28th November 2022**

1st Round Evaluation/ Selection: **9th December 2022**

2nd Round Evaluation/ Presentation: **15th December 2022**

Submission of revised proposal and fund disbursement: **30th December 2022**

Projects start: **10th January 2023**

## Terms and conditions

- **Who can apply:** Indian nationality are eligible to apply under the call for proposal:
  - Startups
  - Entrepreneurs
  - Companies in the allied fields
  - Society/ Trust/ NGO/ Foundation/ Association established in India under the relevant Indian Law.

- **Duration:** Maximum 12 months' timeline for completing the proposed objective.

- **Application Process**

  Please be advised that the entire application process is online through the AgriEnIcs portal.

  i. Proposals in the correct format will be submitted on the online portal by interested applicants
  ii. After initial triage, review panels established under the AgriEnIcs Grand challenge will evaluate the proposals submitted.
  iii. Post proposal review and legal eligibility check, the applicants will be invited to present their proposals in detail to Project Review and Steering Committee (PRSC).
  iv. Once Due Diligence is successfully completed, AgriEnIcs Grand challenge will request for submission of a full proposal with a detailed methodology and plan of implementation.
  v. AgriEnIcs Grand challenge will then enter into separate funding agreements with successful awardee recipient(s) to govern the project terms and conditions and fund disbursement modalities.

- **Application instructions***

  1. Please visit the AgriEnIcs website at www.agrienics.in and follow the link to the registration and submission portal.
  2. If you are applying to an AgriEnIcs Grand challenge for the first time, please note that you will have to register on the portal. The verification and activation of your new account may take up to 24 hours before you can apply for the scheme. Please take this into account while applying.
  3. The online form needs to be filled completely with all appropriate documents uploaded.
  4. Please also ensure that the Proposal Summary document is uploaded based on the format provided. Incomplete proposals will be rejected in the triage round.

  * AgriEnIcs Grand challenge will not be able to provide individual feedback to applicants those who are not selected for further rounds.

- **Mentorship:** The funding agency may provide the mentorship of experienced scientists and professors from national institutes. Participants may also propose a qualified panel of expert mentors to guide them in implementing the project.

- **Publication of Call for Proposal (CFP):** The call for proposal will be published on the official social media accounts of the C-DAC and organizing project partners.

- **Evaluation of Proposals:** An Expert Committee will conduct the project selection and progress monitoring based on the following criteria:

    1. ***Novelty and Innovation:*** Does the proposal capture enough novelty to address the discussed challenges.
    2. ***Approach and methodology:*** Is the research plan, objective and proposed schedule clearly presented and realistic. Is there clarity in the objectives and work plan? Are the proposed timelines and milestones appropriate, feasible, and technically sound? Is there a high likelihood of the objectives being completed in the given timeframe? Will the demonstration take place in difficult/ challenging India-centric setting?
    3. ***Deliverable/Translational Feasibility:*** Relevance and clarity of anticipated outcomes & deliverables to future implementation of the projects and commercialization.
    4. ***Sustainability and adaptability of System:*** Does the proposed solution take into account the complexity of the proposed geographical setting and context.
    5. ***Organizational and investigator capability:*** Is the team composition covering key scientific and engineering challenges that this challenge is seeking to address? Is the research and development team appropriately trained, experienced, and positioned to carry out this work? Is the work proposed appropriate to the experience level of the principal investigator and other proposed members? Is there strong evidence of substantive organizational capability and commitment? Is there experience in the development of partnerships, and in multi-investigator projects? Are collaborative arrangements in place?
    6. ***Best value:*** Is the cost of the proposed effort reasonable relative to the complexity of the proposed work and the degree of risk and advancement proposed?

- **Award:** A fund upto ₹15 Lakh (max. for each selected project) may be awarded based on the proposal's merit. The award money may be disbursed to the awardee in the project mode or phase-wise (preferably quarterly) upon submitting a satisfactory progress report. Based on adequate technology/ prototype demonstration, 1 or 2 best solutions will be hand-held towards productization/ commercialization.

- **Allowable Costs:** No 'Non-Recurring budget' will be allocated under the project to procure any capital instrument or facility creation, or any type of civil work. Only 'Recurring budget' will be allowed: **Manpower** (Up to 30% of the proposed cost), **Consumables** (Up to 20% of the proposed cost), **Travel** and **Contingencies** (Including the training, Domain Expertise, Incubation centre rent, consultancy, and expenditure at Field trial). **Overhead** of each Primary & Collaborating Partners (not exceeding 10% of the total Recurring Cost)

- **Site of implementation:** The implementing team should work at any national incubation center or national R&D facilities with the approval of the competent authority. The funding agency will support the lab usage charges/rent (as part of the project cost).

- **Intellectual property rights (IPR):** IPR will be jointly shared among the organizer project team, Grand Challenge implementing project team, and MeitY.

- **Reporting:** The implementing team must submit technical updates periodically, once each 30 days.

- **Completion report:** On completion of the proposed project, the implementing team must submit a detailed Standard operating procedure (SOP), techniques, and Technologies to the funding agency.

- Final decisions on any occasion will be taken by the organizing committee.

**Contact us:**

Agri Electronics and Environment Group
Centre for Development of Advanced Computing (C-DAC), Kolkata
Plot - E-2/1, Block-GP, Sector-V,
Salt Lake Electronics Complex, Bidhannagar
Kolkata, West Bengal 700091

Phone: 033 2357 9846 (ext. 288)
Fax : + 91 - 33 - 2357 5141
Email: agrienics@gmail.com
Website: www.agrienics.in

**Annexure I**

# Proforma for online submission of concept note

**For**

**AgriEnIcs Grand challenge on Electronics and ICT Applications in agriculture, environment**

**(No hard copy or soft copy of the application through mail is accepted)**

**Guidelines:**

The following details should be kept in mind during your document preparation:

- o Team Details – Qualification and experience of the team members
- o Workflow of your solution
- o Impact of your solution

## Applicant Registration Proforma (*Mandatory details)

| | | | | |
|---|---|---|---|---|
| **Applicant Name** | **:** | | | |
| **Affiliation** | **:** | | | |
| **Nature of the applicant** | **:** | **Startups/ Entrepreneurs/ Companies in the allied fields/ Society/ Trust/ NGO/ Foundation/ Association established in India under the relevant Indian Law/ Individuals including students and scholars through incubation centres** | | |
| **Contact Details** | | | | |
| **Address1*** | **:** | | **Address2:** | |
| **Street/Village*** | **:** | | **City/Town:*** | |
| **State*** | **:** | | **Country:*** | |
| **Pincode/Zip*** | **:** | | **Landline:** | |
| **Mobile*** | **:** | | **Website:** | |
| **Fax** | **:** | | | |
| **Brief Background of the applicant (Not required for individuals including students and scholars)** | | | | |
| **Year Of Establishment Of the Company** | | | | |
| **Number of Years since Registration** | | | | |
| **Registration Certificate Of Company** | | **(Upload)** | | |

**Project Coordinators Details:**

| | | | |
|---|---|---|---|
| **Title** | **Dr/ Mr/ Mrs/** | | |
| **First Name** | | **Last Name** | |
| **Affiliation** | | **Designation** | |
| **Gender** | | **Email** | |
| **Landline/ Mobile** | | **Resume** | **To be uploaded** |

**Co-Investigator/ Team members: (Max. 10)**

## Annexure I

| Title | Dr/ Mr/ Mrs/ | | |
|---|---|---|---|
| First Name | | Last Name | |
| Affiliation | | Role | Co-Investigator/ Team member |
| Gender | | Email | |
| Landline/ Mobile | | Resume | To be uploaded |

**Collaborator (if any): Y/N**

| Name | Affiliation | Resume | Expertise |
|---|---|---|---|
| | | To be uploaded | |

**Annexure I**

**Format for Bio-data to be Uploaded**

| | | | | |
|---|---|---|---|---|
| **1.** | **GENERAL PARTICULARS** | | | |
| **Name:**<br>Affiliation with address:<br>**Date of Birth:** | | | | |
| **2.** | **EDUCATIONAL DETAILS (GRADUATION ONWARDS)** | | | |
| **S. No.** | **Institution** | **Degree Awarded** | **Year** | **Field of Study** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| **3.** | **PROFESSIONAL CAREER (STARTING WITH THE MOST RECENT EMPLOYMENT)** | | | |
| **S. No.** | **Institution** | **Position** | **From (Date)** | **To (Date)** |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| **4.** | **HONORS/ AWARDS** | | | |
| **i.**<br>**ii.**<br>**iii.**<br>**iv.** | | | | |
| **5.** | **PUBLICATIONS (NUMBERS ONLY)** | | | |
| **i. Books:** **ii. Research Papers, Reports:**<br>**iii. Patents :**<br>**iv. Others (Please specify):** | | | | |
| **6.** | **LIST FIVE MOST RECENT PUBLICATIONS WITH IMPACT FACTORS/ ACHIEVEMENTS/ GRANTED PATENTS RELEVANT TO THE PROPOSED AREA OF WORK (IN CHRONOLOGICAL ORDER)**<br>**Details should include Title, Authors, name of the Journal, and issue & page no. year of publication. Also, provide a summary of the work reported in the publication in not more than 50 words.** | | | |

i.

ii.

iii.

| 7. | **PROFESSIONAL EXPERIENCE RELEVANT TO THE PROJECT (DO NOT EXCEED 100 WORDS)** |
|---|---|
| | |

| 8. | **ONGOING RESEARCH PROJECTS** | | | |
|---|---|---|---|---|
| **S. No.** | **Title of Project** | **Source of Funds** | **Amount** | **Duration (from – to -- )** |
| | | | | |
| | | | | |
| | | | | |

| 9. | **RESEARCH PROJECTS COMPLETED DURING THE LAST THREE YEARS** | | | |
|---|---|---|---|---|
| **S. No.** | **Title of Project** | **Source of Funds** | **Amount** | **Duration (from – to -- )** |
| | | | | |
| | | | | |
| | | | | |

**It is certified that the above particulars submitted are true and correct.**

**Place:** **Signature :**
**Date :**

## Annexure II

**Proposal Reference No.: CDACK/AGNee/2022-23/00**

1. **Domain area (Select the applicable area):** Agriculture/ Environment

2. **Thematic Area (Select on the applicable area):** Application of IoT in Agriculture/ Mechanization & Robotics in Agriculture/ Agricultural Data Analytics/ AI-ML based Machine Vision/ ICT application in the Environment/ Other

3. **Sub-thematic area (Select on the applicable area): STGC-01/ STGC-02/ STGC-02…..**

4. **Title of the Concept Note:** (max. 50 words)

5. **Technology readiness levels: TRL 01/ TRL-02…../TRL-09** (Refer to BIRAC Technology readiness levels: https://www.birac.nic.in/desc_new.php?id=443)

6. **Expertise** (relevant concerning the submitted technology, if any)**:** (max. 100 words)

7. **Objectives:**

8. **Budget** (Rs. In Lakh)**:**

9. **Duration** (In Months)**:**

10. **Technical details:**
    - **A. Background (Including National and International Status)** (max. 150 words)
    - **B. Market Outreach** (max. 200 words)
    - **C. Methodology** (max. 200 words)
    - **D. Expected output** (max. 50 words)

11. **Networking Approach/complementary between the partners/collaborator** (If collaborator available)**:** (max. 200 words)

12. **How can the idea/ solution go to market?** (Market analysis/ Business Plan/Commercialization, max. 200 words)

13. **Budget & Justification:**

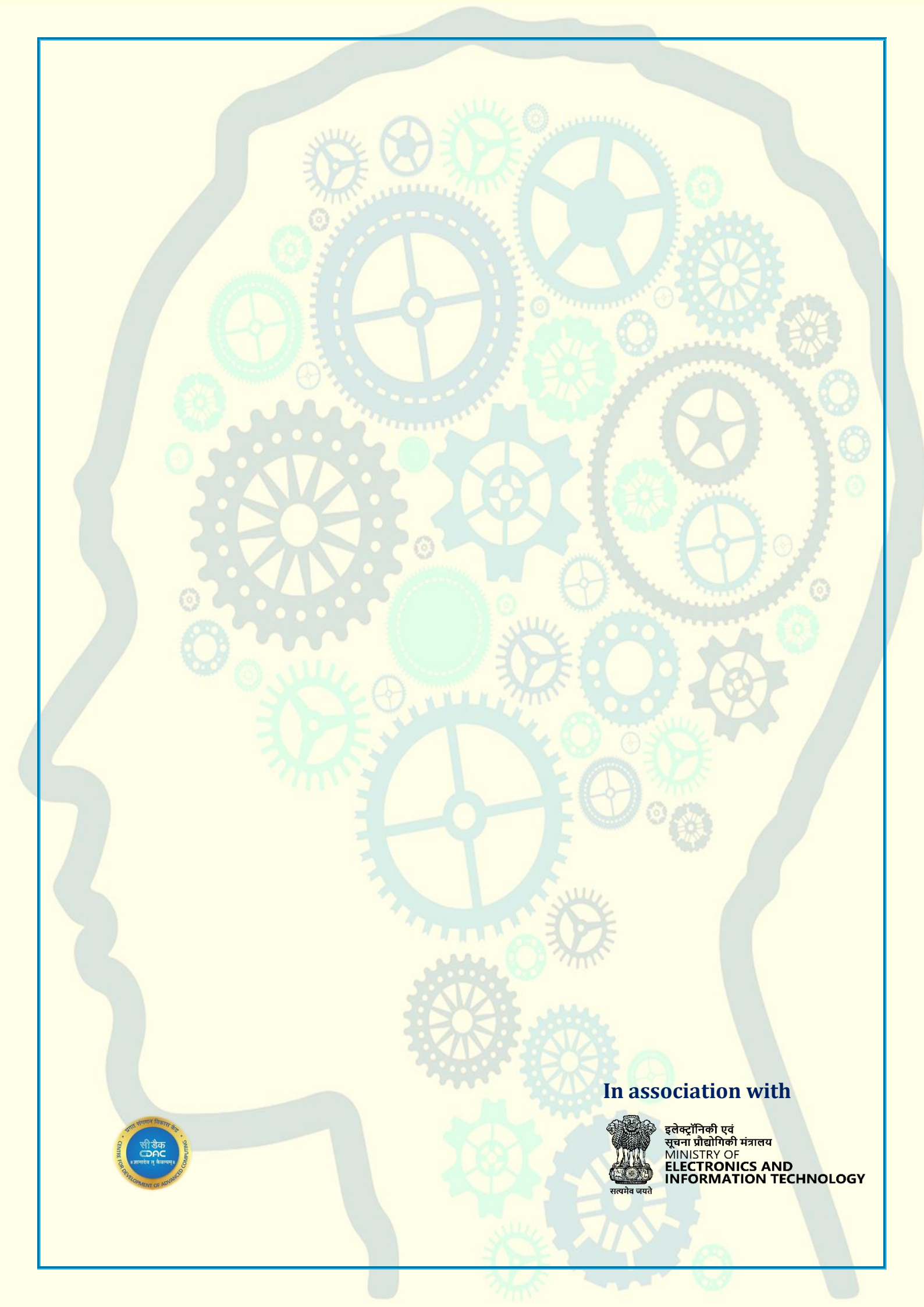
| Head | Phase wise break up (₹ in Lakh) | | |
|---|---|---|---|
| | 1st phase (0-6 months) | 2nd phase (6-12 months) | Total |
| **Consumables** | | | |
| **Manpower** | | | |
| **Travel** | | | |
| **Contingencies (Including the training, Domain Expertise, Incubation centre rent, consultancy, and expenditure at Field trial)** | | | |
| **Overhead** | | | |
| **Total** | | | |
| **Grand Total** | | | |

**A. Justification of consumables:**

**B. Justification of manpower:**

**C. Justification of travel:**

**D. Justification of contingencies:**



**In association with**

इलेक्ट्रॉनिकी एवं
सूचना प्रौद्योगिकी मंत्रालय
MINISTRY OF
**ELECTRONICS AND**
**INFORMATION TECHNOLOGY**
सत्यमेव जयते