# Invitation for Expression of Interest (EoI)

# for

# Transfer of Technology (ToT)

C-DAC, Kolkata has developed a product, "Electronics based Dairy Solution"- A solution to monitor the Health Status & Milk Quality of individual cattle for dairy industries.

A brief write-up of "Electronics based Dairy Solution" is given below in this document.

Applications for Expression of Interest (EoI) are invited for the purpose of Transfer of Technology (ToT) / commercialization of the above-mentioned product from the organizations with relevant experience.

1. Interested bidders are requested to provide necessary information in a format mentioned under Annexure-I (Part-A and Part-B) below as part of their EoI bid/application along with all relevant supporting documents.

2. EoI bids need to be submitted in a sealed envelope with marking on top "**EoI for ToT of** Electronics based Dairy Solution" and it should reach the following address on or before **29.11.2024 by 5.00 PM**

   The Director
   Centre for Development of Advanced Computing (C-DAC), Kolkata
   Plot - E 2/1, Block - GP, Sector - V, Salt Lake Electronics Complex,
   Bidhan Nagar, Kolkata – 700091.

   Phone No: 033 2357 9846 / 5989 / 4764/3581

   EoI bids shall be opened on **03.12.2024 at 11.00 AM**

3. C-DAC Kolkata reserves the right to extend above mentioned bid submission deadline, in which case, all rights and obligations of C-DAC Kolkata and the bidders relevant to the previous bid submission deadline shall remain same for the extended deadline.

4. C-DAC Kolkata also reserves the right to amend the EoI bid documents already published which would be binding on all the interested bidders. The amendment will be made available on C-DAC's website, i.e., www.cdac.in well in advance.

5. During evaluation process of the submitted EoI bids, C-DAC Kolkata may ask the concerned bidder to provide clarifications, if any, on its submitted EoI bid. The request for clarification from C-DAC Kolkata and the response from the bidder/s shall be in writing. No post-submission of EoI bids and/or clarification/s at the initiative of the bidder shall be entertained.

6. Bidders of the received EoI bids may be called for making a presentation before C-DAC Kolkata's ToT Committee for their business plan.

7. Representative/s of C-DAC Kolkata may visit bidder's premises, with prior information, to inspect and assess their facilities mentioned in their EoI bids.

8. After evaluation process of the received EoI bids, C-DAC Kolkata will invite submission of sealed Financial Bids from the technically selected bidders only.

9. C-DAC Kolkata reserves the right to reject all or any application without assigning any reason thereof.

10. EoI bids that are incomplete in any respect or those that are not consistent with the requirements as specified in this EoI document or those do not adhere to the format given below under Annexure-I (Part-A and Part-B), may be liable for rejection and no further correspondences will be entertained with such bidders.

11. **The ToT process will be done in two steps. First step is submission of technical bid as per the format mentioned at 'Annexure I'. The eligible bidder(s) will be notified for presentation. Based on that the selected bidder(s) will be communicated to submit financial bid as per the format mentioned at 'Annexure II'. Finally, the selected bidder(s) will be comminated the ToT agreement and further procedures.**

12. Canvassing in any form would summarily disqualify the bidder.

13. All cost and expenses associated with submission of EoI bids shall be borne by the bidders while submitting the EoI; and C-DAC Kolkata shall have no liability, in any manner in this regard, or if it decides to terminate the process of short listing for any reason whatsoever.

14. Contact person on behalf of C-DAC Kolkata for any clarifications on the above mentioned EoI bid document:


Dr. Hena Ray
Scientist E
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Scientist F
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Email: alokesh.ghosh@cdac.in


Competent authority
C-DAC Kolkata

# Technical Information

## 1. About C-DAC

Centre for Development of Advanced Computing (C-DAC) is the premier R&D organization of the Ministry of Electronics & Information Technology (MeitY), Government of India for carrying out R&D in IT, Electronics and associated areas. Different areas of C-DAC, had originated at different times, many of which came out as a result of identification of opportunities.

C-DAC is working on strengthening national technological capabilities in the context of global developments in the field and responding to change in the market need in selected foundation areas. In that process, C-DAC represents a unique facet working in close junction with MeitY to realize nation's policy and pragmatic interventions and initiatives in Information Technology. As an institution for high-end Research and Development (R&D), C-DAC has been at the forefront of the Information Technology (IT) revolution, constantly building capacities in emerging/enabling technologies and innovating and leveraging its expertise and skill sets to develop and deploy IT products and solutions for different sectors of the economy, as per the mandate of its parent, the Ministry of Electronics and Information Technology (MeitY), Government of India and other stakeholders including other funding agencies, collaborators, users and the market-place.

C-DAC, Kolkata is one of the 12 Centres of C-DAC in India and situated at most privileged and strategic location at Kolkata, India for pursuing R&D activities in the area of electronics & IT.

C-DAC Kolkata's laboratory infrastructure and manpower have got unique strength of pursuing R&D activities in the fields blended with electronics & sensing system, machine olfaction, advanced instrumentation, software development and soft computing.

## 2. Brief Description of the Product to be transferred

'Electronics based Dairy Solution' is the output of a Ministry of Electronics and Information Technology (MeitY), Govt. of India funded project titled "Electronic Platform to Monitor Cattle Health and Milk Quality". The solution comprises of two devices

### A. Go-Paryavekshak (Go-P)

**Features:**

a. Low cost solution for Indian farmers
b. Wearable, collar-mounted sensing device
c. Low power battery operated
d. Monitor health status i.e. Healthy, Unhealthy, Heat in 24x7
e. Automatic notification during "Unhealthy" and "Heat" situation
f. User-friendly multilingual GUI

g. Strongly correlated with visual observation

**Specification**

*Go-P Node*

- Wearable, collar-mounted sensing device
- 32 bit SoC
- In-built IMU sensor
- BLE 5.0 compatible
- 3.6V 20Ah rechargeable Battery
- IP67 Waterproof enclosure
- Polyester collar with proper matching load

*Go-P Gateway*

- 64bit SoC
- Integrated 2.4 GHz PCB antenna
- Long range (170m diameter)
- Bluetooth 5.0 enabled
- RAM
- High speed data transfer

*Go-P UI*

- Simple, user-friendly UI
- Multilingual (English, Hindi, Bengali) [customisable]
- Hourly Health Status (Healthy, Unhealthy, Heat) of each cow
- Cattle profile
- Downloadable history data for analysis
- Automated notification about cattle health

**Benefits**:

a. Disease prevention and reduced treatment cost
b. Improved Livestock productivity
c. Enhanced reproduction rates
d. Reduced mortality rates
e. Data-Driven decision making
f. Long-term sustainability

**Deployment**:

Presently total 32 number of Go-P systems have been deployed at National Dairy Research Institute, Kalyani (18 Go-P solutions) and two villages i.e. Dakshin Chandamari and Uttar Chandamari of Nadia, West Bengal (14 Go-P solutions).

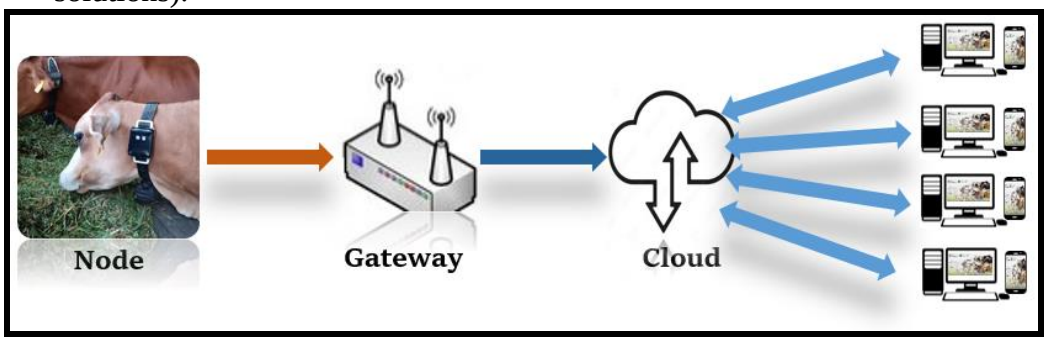


Fig: Image of 'Go-Paryavekshak Solution" *

* Indicative picture, as application of patent is in process.

## B. Mastitis Detector (MAST-D)

'MAST-D' is the output of a Ministry of Electronics and Information Technology (MeitY), Govt. of India funded project titled "Electronic platform to monitor cattle health and milk quality". It is a high-throughput field portable screening device with bio compatible sensor to detect mastitis of cow milk. Throughout the detection it will empower the dairy industry and save the huge financial loses of the farmers.

**Feature**

| | |
|---|---|
| Milk type | : Cow milk. |
| Time of Analyses | : 1 min |
| Sample temperature range | : 15°C to 40°C (optimum temp 26°C to 32°C) |
| Sensor dipping length | : 3cm (up to the starting of green marked line) |
| Sample Volume | : 50ml |
| Display | : 1.3 inch OLED Display |

**Specifications:**

Mechanical Specification
Dimension: W x D x H: 6cm x 1.7 cm x 10cm
Material: Acrylonitrile Butadiene Styrene (ABS)
Electrical Specification
Voltage: 3.7 Volt DC
Supply Type: Battery
Battery: BL-5C 1090mAh 3.7V 3.8Wh
Sensor Used
Dimension: W x D x H: 0.6cm x 0.15 cm x 6cm
Material: Copper cladded FR4 sheet
Coating Material: PMMA

**Benefits:**

MAST-D is a novel, user-friendly device designed to overcome these challenges. It is lightweight, compact, and simple to use, making it accessible to a broader audience, including farmers and common people. The device offers several advantages over existing solutions:

1. Portability: The device is lightweight, compact, and low cost, making it easy to carry in a pocket.
2. No Chemicals/Additives Required: No chemicals or additives are required for testing, making it a safe and convenient option.
3. Digital O-LED Display: The device provides a simple and easy-to-understand output, displaying "Healthy" or "Mastitis" on its digital O-LED display.
4. Low Visibility Testing: The device can be used in environments with low visibility, making it suitable for use in a variety of settings.
5. Flexible Sample Collection:: A sample can be collected in a container and tested using the device, eliminating the need for direct milking during testing.
6. No Installation or Maintenance Overhead: The device requires no overhead for installation and maintenance, making it a convenient option for users.

7. Temperature Compensation: The device is designed to operate in Indian weather conditions and includes temperature compensation, ensuring accurate results.
8. Made in India: The device is proudly made in India and has been tested for a long time (3 years) at ICAR-NDRI, ERS, Kalyani, West Bengal for validation.
9. Multi-User Benefits: The device is beneficial for milk producing companies, common people, veterinary experts, milk test centres, and more.
10. Sensor Cleaning: The device requires sensor cleaning after each measurement to ensure accurate results.

**Deployment:**

Presently the sensing system has been developed and deployed at ICAR-NDRI, ERS, Kolkata towards extensive field trial.


Fig: MAST D: mastitis detector

**Present Day Technological Relevance:**

### A. Go-Paryavekshak (Go-P)

Cattle farming, an ancient and lucrative enterprise thrives globally. India, boasting the highest population densities, leads in annual milk production. Cattle health is inherently fragile, with risks such as bloating and various ailments posing serious threats. Timely intervention is crucial to prevent severe health complications.
Conventionally, an experienced herdsman would take care of comparatively fewer cattle and would have direct contact with them, while, on modern automated farms, very few people look after a large number of cattle, hence decreasing the direct contact with them. Thus, this creates a greater need to monitor the animal's health.
In dairy animals, where artificial insemination is the main means of breeding the females, recognition and interpretation of a cow's heat signs are of utmost importance. Proper heat detection can only lead to the appropriate timing of artificial insemination to attain a high conception rate on a farm.
Regular manual observations of the health of each cow are not at all possible in large farms with large numbers of cows. Hence, there is a definite need for sensor-based round-the-clock monitoring of important health parameters at the individual cow level for early and timely disease detection, thereby preventing economic loss through proper treatment and other remedial actions.

C-DAC, Kolkata with ICAR-NDRI, Kalyani took the initiative to develop the Go-Paryavekshak system to address the problem. This system utilizes advanced technologies such as IoT devices, sensors, and data analytics to continuously track various health parameters of cattle, including movement, feeding habits, and heat signs.

The AI-ML model has been developed to monitor the behavioural patterns of each cow accurately. An automated notification has been introduced for Farm Manager to get serious health issues well in advance. It helps the farm managers to overcome the skilled labour shortage problem. It increases the productivity and well-being of the farm.

### B. Mastitis Detector (MAST-D)

Mastitis is one of the significant diseases in the dairy industry. It is an inflammatory response of the udder tissue to microorganism infections. It is considered one of the most common disease leading to economic loss in dairy industries due to reduced yield and poor milk quality. Identification of subclinical mastitis is very difficult for the farmers / common people as no device is commercially available for field level subclinical mastitis detection at low price so, maximum situation they don't communicate with any veterinary expert. Therefore, the untreated sub-clinical mastitis moves up to clinical stage and this is also a reason of cow death major economic loss to dairy farmers. This is the worldwide problem and in this way milk production decreases and every year they face huge financial lose.

To address the problem IIT Kharagpur, C-DAC, Kolkata took initiative to develop a device for screening of mastitis in cow milk. Milk has an inherent ionic property due to the presence of ions like $Ca^{+}$, $Na^{+}$, $K^{+}$, $Cl^{-}$ in it. When a cow infected by mastitis, then

the ionic concentration in milk of that animal increases. The ion concentration depends on the infection level. In different infection level the ion concentration is different. The bio compatible impedance sensor is detecting the sample and the device is calibrated and showing the result as “Mastitis” or “Healthy”.

**Present Status of the Product:**

**A. Go-Paryavekshak (Go-P)**

Total 32 number of Go-P solutions have been deployed at the Nadia district of West Bengal. Eighteen Go-P solutions at ICAR-NDRI, Kalyani, Nadia and fourteen solutions at two villages i.e. Dakshin Chandamari and Uttar Chandamari of same district have been deployed. The data continuously transfers to the cloud through “Go-P gateway” are monitored and analyzed using developed Ai-ML model to predict the health status of each cow.

More than 90% Heat notifications were found accurate and successfully Artificial Inseminated, which gave 100% pregnant cattle as a result.

**B. Mastitis Detector (MAST-D)**

The instrument has been deployed at ICAR-NDRI, ERS and daily sample collection and testing is going.

In the month of July after our 8th set of experiment the accuracy came 94% sensitivity came 98% and specificity came 60%.

During this stage, C-DAC, Kolkata is facilitating the technology transfer of the ‘Go-Paryavekshak’ and ‘Mastitis Detector’ system. The ToT partner will take the responsibility and necessary actions towards market survey, clinical validation, form factor customization, certifications and other associated activities to take the devices sensing system at market and successful commercialization.

## 3.Scope of the ToT Process

The Transfer of Technology (ToT) would be made on non-exclusive basis and on sole discretion of C-DAC Kolkata. C-DAC Kolkata’s ToT package may contain following:

- ⊙ Technical Documentation of the product
- ⊙ Licenses of the software: The proprietary source code of the software will remain under the guardianship of C-DAC, Kolkata. As part of the royalty-based arrangement, the software will be handed over to the esteemed commercialization partner on a storage device during their sales events.
- ⊙ Bill of Materials of the total system
- ⊙ Test plan and procedure
- ⊙ User manual
- ⊙ Signing of ToT Agreement
- ⊙ Provision for imparting training to the technology recipients
- ⊙ Handholding support following ToT

**ANNEXURE- I**

**EoI of "Electronics based Dairy Solution" for ToT**

**The following details should be submitted along with EoI.**

## Part - A

| | | |
|---|---|---|
| **A.** | **Company Profile** | |
| 1. | Name of the Organization:<br><br>Website: | |
| 2. | Details of Contact Person:<br><br>Name:<br><br>Address:<br><br>Telephone:<br><br>Fax:<br><br>E-Mail: | |
| 3. | Year of Incorporation: | |
| 4. | Type of Organization:<br><br>A. Public Sector/Limited/Private Limited/Partnership/Proprietary /Society/Any other<br>B. Whether Foreign Equity Participation (Please give name of foreign equity participant and percentage thereof)<br>C. Names of Directors of the Board/Proprietors<br>D. Name and address of NRI(s), if any | |
| 5. | Category of the firm: Large/Medium/Small scale unit | |
| 6. | Address of the Registered Office: | |
| 7. | Number of Offices with address (Excluding Registered Office):<br><br>India | |

| | | |
|---|---|---|
| | Abroad | |
| 8. | Certificate of registration as a manufacturing unit | |
| 9. | Permanent Account Number | |
| 10. | Sales Tax Number/VAT | |
| 11. | Status of ISO 9001, ISO 13485 and other Certifications | |
| 12. | Plan for certification of Electronics based Dairy Solution for compliance with regulatory requirements | |
| 13. | Annual Turnover for last 3 years: | |

**Part-B**

| **B.** | **ESSENTIAL REQUIREMENTS** | |
|---|---|---|
| 1. | The organization must be a reputed firm/Company/SME/ Start-up/R&D company incorporated in India with standing of at least 3 years. | |
| 2. | The turnover is to be a supported by financial statements of accounts/Annual reports duly certified by a Chartered accountant/Balance sheets of last 3 years/Income tax returns for the last 3 years period. | |
| 3. | Company profile, giving details of current activities and management/personnel structure including evidence of incorporation. The company should be registered and ISO 9001 or equivalent certified. | |
| 4. | Details of absorption of technology for a product/knowhow that has been taken up on production scale in the past may also be given. | |
| 5. | The manpower strength (Technical: Mechanical, Electrical, Electronics, Software & Non-Technical etc.) at various levels to | |

| | | |
|---|---|---|
| | be furnished.<br>Technical:<br>A. B.E./B. TECH/PhD<br>B. DIPLOMA<br>C. SKILLED TECHNICIANS<br>D. UNSKILLED<br>Non-technical: | |
| 6. | The list of machine tools/equipments/software/facilities available related with work to be furnished. | |
| 7. | The in-house technological expertise available to be furnished. | |
| 8. | The list of equipments available for inspection and quality control to be furnished. | |
| 9. | The industry should have adequate space for undertaking this work. Available space - Covered & Open to be furnished. | |
| 10. | List of products/technologies worked with as regular activity in last 3 years. Give the list of products/technologies with general specifications and the customers. | |
| 11. | List of PSUs/Govt. Customers – with contact details (Address, Telephone no., Contact Person). | |
| 12. | The details of sales, marketing and maintenance network to be furnished. | |
| 13. | The list of technical collaborations for various ongoing products may be furnished. | |
| 14. | The bidder shall provide details of the sub-vendors in case they propose to employ for Part-work. | |
| **C.** | **Expression of Interest: Spell out the extent of interest and envisaged market potential** | |
| **D.** | **The ToT will be done stage-wise: The preferred stages may be furnished.** | |

**Note:**

Data furnished above is by no means a qualification or disqualification. These are meant to facilitate technical comparison of the EoI bids. “NIL” entries against any particular row can also be given and will be considered.

I hereby declare that the above information is true to the best of my knowledge.

Signature with Name & Seal:

Place:

Date:

**ANNEXURE- II**

**Financial bid submission format for "Electronics based Dairy Solution" ToT**

*Company letter head*

1. Upfront Price:_____ (Rs. in Lakh)
2. Royalty proposed:

**a. Go-P:**

| Sl. No. | Go-P package | Inclusion | Royalty |
|---|---|---|---|
| 1 | Package – I | Nodes:1-5 nos.<br>Gateway:1 no. | Rs. ____ |
| 2 | Package – II | Nodes:6-10 nos.<br>Gateway:1 no. | Rs. ____ |
| 3 | Package – III | Nodes:11-18 nos.<br>Gateway:1 no. | Rs. ____ |

1. Requirement of more than 18 nos. of node may be served with the combination of mentioned packages.
2. Cloud service will be maintained by the company.
3. Cloud data will be shared with C-DAC, Kolkata for R&D purpose.

**b. MAST-D:**

| Sl. No. | On sale of each device | Royalty |
|---|---|---|
| 1 | MAST D system | Rs. ____ |

Signature with Name & Seal:

Place:

Date: