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

SHER-E-KASHMIR UNIVERSITY OF AGRICULTURAL SCIENCES AND TECHNOLOGY
KASHMIR

सी डैक
CDAC

Agri-Excellence Hackathon - 2026

AI, Electronics & ICT Solutions for Saffron, Walnut & Apple







INNOVATIVE SOLUTIONS FOR

Saffron Improvement Programme

Technology for Walnut

Apple Quality Estimation

Organized by: C-DAC, Kolkata

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Agri-Excellence Innovation Hackathon 2026

AI, Electronics & ICT Solutions for Saffron, Walnut & Apple

1. Introduction

The Agri-Excellence Innovation Hackathon 2026 is proposed as a national-level innovation initiative to promote the application of Artificial Intelligence (AI), Electronics, and Information and Communication Technologies (ICT) for solving real-world agricultural challenges in the Himalayan region. Organized as a pre-event activity aligned with India–AI initiatives, the hackathon focuses on three strategically important crops—Saffron, Walnut, and Apple. The program aims to engage students and young professionals in developing scalable, field-relevant technological solutions that can enhance crop productivity, quality, sustainability, and farmer decision-making while strengthening the innovation ecosystem under the Agri-Excellence project.

2. Scope of the Hackathon

The scope of the hackathon includes ideation, design, development, and validation of AI-, electronics-, and ICT-based solutions addressing crop-specific challenges in saffron, walnut, and apple cultivation. The solutions may cover areas such as precision agriculture, crop health monitoring, yield prediction, post-harvest quality assessment, decision support systems, IoT-based sensing, robotics, and data-driven analytics. Selected teams will be supported through mentorship, review mechanisms, and a paid internship to convert ideas into working prototypes over a six-month period.

3. Problem Statements

Agriculture and horticulture play a decisive role in India's economic growth, rural employment, and foreign exchange earnings. High-value horticultural crops such as saffron, walnut, and apple are among India's most important cash products, with significant demand in international markets. These commodities contribute substantially to export revenues, strengthening India's position in global agri-trade and supporting national economic growth. However, despite their high market value, the production and post-harvest handling of these crops continue to face critical challenges related to labor dependency, operational safety, climate variability, quality consistency, and limited adoption of advanced technologies.

The saffron, walnut, and apple sectors face interconnected challenges of labor scarcity, operational risk, quality inconsistency, and limited technological penetration. Addressing these issues through intelligent electronics, robotics, AI/ML, and advanced imaging technologies is crucial for sustaining India's competitiveness in global markets. The proposed thematic initiatives aim to modernize harvesting and post-harvest processes, reduce human drudgery and risk, enhance product quality and safety, and ultimately contribute to higher farmer incomes, export growth, and long-term agricultural sustainability in India.

In this context, the integration of electronics, robotics, artificial intelligence (AI), machine learning (ML), and advanced sensing technologies offers transformative potential. Automation and intelligent systems can address long-standing bottlenecks in harvesting, processing, grading, and quality assurance. By reducing reliance on manual labor, improving precision, enhancing safety, and ensuring consistent quality, technology-driven solutions can significantly increase productivity, profitability, and sustainability in these high-value agricultural sectors.

Saffron cultivation is one of the most labor-intensive agricultural activities in India, primarily due to the extremely short harvesting window and the delicate nature of the saffron flower. The stigma, which constitutes the valuable saffron spice, must be harvested and separated immediately after flowering. This process demands a very large workforce within a limited time period, making it costly, inefficient, and highly vulnerable to labor shortages and weather uncertainties. Manual plucking and stigma separation are also prone to inconsistencies and losses. Therefore, there is a critical need for AI/ML-based plucking point identification systems integrated with robotic arms or mobile robotic platforms to precisely identify and harvest saffron flowers. Furthermore, automated stigma separation using intelligent vision-based robotics can significantly reduce manpower requirements, improve processing speed, and ensure uniform quality, thereby enhancing overall productivity and farmer income.

Walnut cultivation presents a different but equally severe set of challenges. Walnut trees are typically very tall, making manual harvesting a risky and hazardous operation. Accidents during harvesting are common, and the dependence on skilled labor further escalates operational costs. Additionally, determining the optimal harvesting time for green walnuts is difficult, as the fruits are not easily visible from the ground. Post-harvest processes such as segregation of in-shell walnuts, quality grading, and detection of harmful neurotoxins also rely heavily on manual inspection, which is time-consuming and unreliable. These challenges necessitate the development of a smart green walnut harvester capable of safe and timely harvesting, along with intelligent systems for automated segregation, quality grading, and neurotoxin detection using sensors and AI/ML techniques. Such solutions can significantly enhance worker safety, reduce losses, and ensure compliance with export quality standards.

In the case of apple production, grading and quality assessment are among the most critical and resource-intensive operations in the value chain. While external defects such as bruises, color variations, and surface blemishes can be partially addressed through conventional vision systems, internal defects remain largely undetectable using traditional methods. This limitation leads to inconsistent quality, reduced consumer trust, and economic losses, especially in export markets. There is a pressing need for AI/ML-based software capable of real-time external defect detection in conveyor-based

grading and sorting systems, synchronized precisely with mechanical actuators. Moreover, advanced hyperspectral imaging combined with 3-D convolutional neural networks (CNNs) is essential for non-destructive detection of internal defects and comprehensive quality analysis of apples.

4. Topic

Proposals must present a strong rationale for the proposed work, demonstrate a clear understanding of India's agricultural context and sector-specific challenges, and define a testable hypothesis along with a clear plan for validation and field deployment. With a focus on Electronics and ICT applications for agriculture and allied environments particularly high-value horticultural crops such as saffron, walnut, and apple the thematic areas of interest include, but are not limited to:

- Saffron Improvement Programme
- Technology for Walnut
- Apple Quality Estimation

Thematic Area	Sub-thematic Area
Saffron Improvement Programme	**HSTA-01:** Saffron flower stigma separator.
	HSTA-02: Saffron flower plucking point identification using AI/ML
Technology for Walnut	**HSTA-03:** Smart Harvester for green walnut
	HSTA-04: Intelligent segregation of In Shelled walnut
	HSTA-05: Smart Quality Grading & neurotoxin Detection
Apple Quality Estimation	**HSTA-06:** AI/ML-based software for external defect detection for the conveyor-based grading/sorting systems and synchronization with the actuators
	HSTA-07: 3-D CNN based Hyperspectral Image analysis for Apple quality analysis
HSTA-08: Any other innovative AI, electronics, or ICT-based solution relevant to saffron, walnut, or apple value chains.	

5. Important Dates

- Official launch of the Agri-Excellence Hackathon: **9th January 2026**
- Participant Registration Start: **4th February 2026**

- Participant Registration End: **16th March 2026**
- 1st Round Evaluation/ Selection: **16th April 2026**
- 2nd Round Evaluation/ Presentation: **29th May 2026**
- Commencement of the Hackathon: **1st July 2026**
- Conclusion of the Hackathon: **31st December 2026**

Registration open: https://cforms.in/formview/Agri_hackathon_2026_CDAC

6. Terms and Conditions

A. Eligibility (Who Can Participate)

- Undergraduate (B.Tech or equivalent) and postgraduate (M.Tech or equivalent) students from engineering, science, and allied disciplines.
- Recent graduates or pass-outs (current year passout).

B. Application instructions

- Please visit the Agri-Excellence website at http://agriexcellence.in/hackathon/ and follow the link to the online registration and proposal submission portal.
- Participants may submit only one application per thematic area. If an applicant wishes to apply under more than one thematic area, a separate application must be submitted for each area.
- Undergraduate (B.Tech or equivalent) and postgraduate (M.Tech or equivalent) graduates must upload their final certificate or final-year mark sheet.
- Ongoing UG and PG students must upload their latest semester mark sheet along with a No Objection Certificate (NOC) from their institute.
- The online application form must be completed, and all required documents must be uploaded before final submission.

C. Application Process

Please be advised to read the instructions: https://agriexcellence.in/hackathon/

The entire application process is online through: https://cforms.in/formview/Agri_hackathon_2026_CDAC

- Proposals in the prescribed format shall be submitted by interested applicants through the online portal only.
- The entire application and selection process shall be conducted exclusively in online mode, and all required documents must be submitted electronically. Submission of hard copies is not required. However, in case of any discrepancy or mismatch in the submitted documents, hard copies may be sought.
- Necessary forms and related information can be downloaded from the website: http://agriexcellence.in/hackathon/

- After proposal review and legal eligibility verification, shortlisted applicants will be invited to make a detailed presentation before the Project Review and Steering Committee (PRSC).
- Submission of the application does not guarantee selection or approval.
- Based on the proposal evaluation and presentations, the PRSC shall decide the awardees eligible for funding and mentorship.
- The participation certificate shall be issued only upon successful completion of the full six-month duration of the Hackathon. In case of withdrawal or discontinuation, no certificate shall be issued.

D. Evaluation

Selection will be carried out by a duly constituted committee comprising domain experts from agriculture, AI/ML, electronics, and ICT. Evaluation criteria will include problem understanding, technical innovation, feasibility, scalability, relevance to domain, and prototype performance. Decisions of the committee shall be final and binding.

E. Award and Mentorship

Selected participants will receive an opportunity to realize and translate their concepts into functional, field-ready prototypes at the C-DAC, Kolkata facilities over a period of six months, with a consolidated monthly support of ₹10,000. Participants will also benefit from expert mentorship, certification, and hands-on exposure to national-level applied R&D activities, enabling validation and refinement of solutions for real-world agricultural applications.

F. Number of Awardee

Approximately 3-6 Awardee will be selected across the three thematic tracks, depending on the quality of solutions and recommendations of the evaluation committee.

G. Guideline for Awardee

- The awardee shall maintain regular and active participation throughout the entire duration of the Hackathon.
- The awardee shall not withdraw or discontinue participation midway through the programme without prior approval from the competent authority.

H. Intellectual Property (IP) Governance

All IP generated during the hackathon or internship period shall be governed by the IP policies of the implementing institutions. Participants may publish research outcomes arising from the hackathon only after obtaining prior approval from the competent authority. Any publication shall acknowledge the Agri-Excellence Innovation

Hackathon 2026 and associated institutions. Disclosure of confidential data, algorithms, or patentable material prior to IP protection shall not be permitted.

I. Completion Report

On completion of the proposed project, the awardee shall submit a detailed Standard Operating Procedure (SOP), along with the techniques and technologies developed during the project, to C-DAC, Kolkata.

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Register Now

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