EV BIC Details

EV Battery Intelligence Challenge

Powering the Future of E-Mobility with Indigenous Compute

Overview: India's rapid transition towards electric mobility places unprecedented demands on battery safety, reliability, and lifecycle optimization. As EV adoption scales across two-wheelers, three-wheelers, passenger vehicles, and commercial fleets, battery intelligence, not just battery capacity, has emerged as the most critical differentiator for performance, cost, and safety.

The **EV Battery Intelligence Challenge** is a focused **national hackathon** aimed at developing cloud-connected, intelligent battery monitoring and management prototypes, built entirely on indigenous compute platforms. The program enables participants to design and validate real-world EV battery intelligence solutions using the **VSDSquadron ULTRA development board**, powered by the **THEJAS32 RISC-V processor** from **C-DAC (VEGA family).**

This hackathon directly addresses the need for self-reliant, scalable, and secure EV electronics, aligned with India's Atmanirbhar Bharat and semiconductor ecosystem goals.

Why This Hackathon Matters: Current EV battery systems in India largely depend on:
- Imported controllers and firmware
- Black-box battery management units
- Limited access to low-level battery data for optimization

The EV Battery Intelligence Challenge flips this model by empowering innovators to **build transparent, software-defined, and cloud-connected battery intelligence systems** using homegrown silicon and boards.

This initiative is not a theoretical exercise, it is designed to produce working prototypes that demonstrate:
- Battery health estimation and degradation tracking
- Thermal and safety monitoring
- Predictive analytics for battery lifespan
- Secure data pipelines from edge to cloud

Platform: VSDSquadron ULTRA + THEJAS32 (C-DAC VEGA)

At the heart of the hackathon is the VSDSquadron ULTRA, an advanced development platform built around the THEJAS32 RISC-V processor, developed by C-DAC under the VEGA initiative.

The platform enables:

- Real-time sensor interfacing (voltage, current, temperature)
- Deterministic control for battery management algorithms
- Secure firmware execution on indigenous RISC-V silicon
- Seamless integration with cloud dashboards and analytics engines

Participants gain hands-on experience in building edge-to-cloud EV intelligence stacks, a skillset increasingly demanded by EV OEMs, battery manufacturers, and mobility startups.

Hackathon Themes

Theme 1: Predictive Battery Health Analytics

a. **Problem Statement:** Design a cloud-based system that collects real-time data on EV battery parameters (voltage, current, temperature, SoC, SoH) and applies predictive algorithms to forecast battery degradation and remaining useful life (RUL) based on a dataset that is provided. The system should alert users and fleet operators about potential failures before they occur, ensuring safety and reduced downtime.

b. **Implementation Approach:**
- Develop real-time data collection and processing pipeline
- Implement predictive algorithms for battery degradation forecasting
- Create alert mechanisms for potential failures
- Design user interfaces for different stakeholders
- Validate against provided datasets

Theme 2: Intelligent Thermal Anomaly Detection

a. **Problem Statement:** Develop a cloud-integrated monitoring solution that detects and analyzes abnormal thermal patterns in EV batteries using IoT sensors. The system should employ anomaly detection models to identify hotspots or irregular heat distribution and also predict thermal runaway.

b. **Implementation Approach:**
- Build thermal pattern monitoring system
- Implement anomaly detection algorithms
- Develop thermal runaway prediction models
- Create real-time alerting system
- Design dashboard for thermal monitoring

<u>Theme 3: Fleet-Level Battery Performance Dashboard</u>

    a. **Problem Statement**: Create a centralized, cloud-based dashboard for fleet operators that aggregates battery performance data from multiple EVs in real time. The system should provide insights into energy usage trends, charging behavior, inefficiencies, and battery health comparison across the fleet, enabling data-driven decisions for cost optimization and preventive maintenance.

    b. **Implementation Approach:**
   - Develop multi-vehicle data aggregation system
   - Implement battery performance analytics
   - Create comparative analysis tools
   - Design intuitive fleet management dashboard
   - Build reporting and alerting features

Expected Outcomes & Industry Impact

This hackathon aims to create more than prototypes—it seeks to seed a domestic EV electronics ecosystem.

Key outcomes include:
   - Functional EV battery intelligence prototypes
   - Indigenous firmware and reference designs
   - Cloud dashboards demonstrating real-world battery insights
   - A talent pool trained on Indian RISC-V processors and boards

For the EV industry, this represents:
   - Reduced dependence on imported BMS solutions
   - Faster innovation cycles through open, transparent platforms
   - A pathway to deploy Make-in-India electronics in future EV programs

Participants:
1.   Students
2.   Researchers
3.   Start-ups with 2 years old

Prize Pool - 2,15,000/-

1st Prize - 50K
2nd Prize- 35K
3rd Prize - 25K
Consolation for 7 teams - 15K each

Top 15 qualifying teams will receive the VSD Squadron Ultra Development Board, and all other physical components required will be reimbursed.

We will be having three sponsor types, Title, Gold & Silver.

Teams of 1 to 3 Members

Key Dates

1) **Registration Phase - 26 Jan to 10 Feb**
2) **Inauguration at CHRIST BKC - 11 Feb**
3) **Proposal Submission - 11 Feb to 13 Feb**
4) **Final Video & GitHub Submission - 16 Feb to 26 Feb**
5) **Top 10 Teams Shortlisting - 27 Feb to 28 Feb**
6) **Physical Demonstration - 10 Mar to 11 Mar**
7) **Valedictory - 12 Mar**

Website

EV BIC Website

Home
Landing page that displays the hackathon name, a concise tagline describing the event, and key introductory highlights.

About
Presents a detailed overview of the hackathon challenge, the development board being used, and the eligibility criteria for participation.

Themes
Outlines the hackathon themes or problem tracks, helping participants identify the focus areas for their projects.

Register
Dedicated page for collecting participant details, team information, and essential registration data.

Guidelines
Explains the rules of participation, permitted hardware and software resources, submission guidelines, and the judging criteria.

Sponsors
Highlights the organizations and partners that are supporting and enabling the hackathon.

Contact
Provides official contact information and communication channels for queries and support from the organizing team.