



PANIMALAR ENGINEERING COLLEGE

An Autonomous Institution

[JAISAKTHI EDUCATIONAL TRUST]

Approved by AICTE | Affiliated to Anna University | Recognized by UGC

All Eligible UG Programs are Accredited by NBA

Bangalore Trunk Road, Varadharajapuram, Poonamallee, Chennai- 600 123

INDIA'S WOMEN CENTRIC NATIONAL LEVEL 24 – HOUR HACKATHON **TECHDIVATHON – 2.0**

She blooms. She leads. She conquers



Domain:E - VEHICLE

Problem Statements:

S.No	Title	Problem Statement	Description
1	AI-Optimized Battery Thermal Management System	Traditional EV cooling systems fail to adapt dynamically to battery load and weather variations.	Implements AI-driven predictive cooling with nanofluid-based heat exchangers for optimal temperature control and extended battery lifespan.
2	Ultra-Lightweight Smart Composite Chassis for EVs	EV range is limited by chassis weight and rigidity constraints.	Uses AI-designed graphene-reinforced composites that self-monitor stress points, enhancing strength-to-weight ratio and crash resilience.
3	Next-Gen Wireless EV Charging Network (6G-Enabled)	Current inductive charging lacks speed and energy efficiency.	Develops high-frequency 6G-assisted resonant charging pads for faster, secure, and cable-free power transfer.
4	Intelligent Regenerative Braking with Adaptive Energy Recovery	Static regenerative braking can't optimize across variable driving conditions.	Employs ML algorithms to adjust braking intensity and energy recovery dynamically for different terrains and speeds.
5	Quantum Battery Health Diagnostics System	Conventional monitoring can't predict early degradation accurately.	Uses quantum sensor-based diagnostics for real-time charge distribution mapping and predictive maintenance.
6	Automated Swappable Solid-State Battery Modules	Manual swapping of lithium batteries limits adoption.	Enables robotic, solid-state battery exchange with automated alignment and instant authentication using blockchain.
7	AI-Enhanced Compact Motor Drive System	EV motors still face energy loss and high cost issues.	Integrates AI-optimized inverter control with rare-earth-free motor design for improved torque and conversion efficiency.
8	Solar-Hydrogen Hybrid Charging Stations	Pure solar chargers face storage limitations during non-sunny periods.	Combines solar and green hydrogen systems for 24/7 renewable EV charging capability.

9	Smart Multi-Axle Drive Control System for Heavy EVs	Heavy-duty EVs lack efficient torque distribution for stability.	Uses AI-based load sensors to auto-balance torque across axles for optimized traction and battery usage.
10	Integrated Smart Safety Sensor Mesh for EVs	Existing safety systems react slowly to critical battery faults.	Employs IoT-based nanosensors with edge AI for real-time anomaly detection and predictive fault prevention.
11	AI-Based Energy Optimization and Route Learning System	EVs waste energy due to unoptimized driving patterns.	Uses deep reinforcement learning to analyze user behavior and traffic to minimize energy drain dynamically.
12	Cloud-Native EV Fleet Optimization Platform	Fleet data is fragmented across platforms.	Centralizes analytics with edge-to-cloud integration for predictive maintenance, routing, and carbon footprint tracking.
13	Deep Learning-Based Battery Life Forecasting Engine	Static models can't capture dynamic degradation trends.	Utilizes neural time-series models to forecast aging, enabling precise lifecycle and replacement predictions.
14	Autonomous EV Valet Parking with 3D Vision Mapping	Parking systems struggle in dynamic urban layouts.	Employs LiDAR and AI-based 3D mapping for self-navigation, collision avoidance, and space optimization.
15	Smart EV Navigation with Real-Time Charger Prediction	Navigation systems fail to account for charger availability and weather.	Integrates live charger data, weather forecasts, and traffic prediction using federated learning for route planning.
16	Blockchain-Secured OTA Software Ecosystem	OTA updates are vulnerable to cyberattacks.	Implements blockchain verification and differential update systems ensuring secure, decentralized firmware delivery.
17	Predictive IoT Maintenance with Edge AI Diagnostics	Cloud-only monitoring causes latency in detection.	Deploys edge computing modules on EV subsystems for instant fault prediction and maintenance scheduling.
18	AI Load Balancing for Smart Charging Networks	Peak load during mass charging events stresses the grid.	Applies AI forecasting and distributed energy allocation to maintain grid stability and efficiency.
19	Vehicle-to-Everything (V2X) Grid Interaction System	EV-grid communication lacks interoperability.	Integrates bidirectional energy flow between EVs, homes, and grids using 6G-based V2X protocols.
20	Eco-Driving Assistant with Emotion-Aware Feedback	Drivers lack motivation to maintain efficient behavior.	Uses AI-based driver emotion sensing and gamified feedback for improved energy conservation habits.
21	Bidirectional Energy Sharing for Smart Homes and Communities	Current V2G systems are limited to grid-only exchange.	Enables peer-to-peer home energy trading via EVs using blockchain smart contracts.
22	IoT-Enabled Smart Charger with Adaptive Pricing	Users can't optimize cost during dynamic electricity rates.	Connects with energy markets to auto-schedule charging during low-rate periods via IoT control.

23	AI-Adaptive Suspension System for Electric Mobility	Static suspension wastes energy and reduces comfort.	Uses AI sensors to adapt shock absorption dynamically to load, terrain, and driving style.
24	Hybrid AI Range Estimator with Weather & Terrain Sensing	EVs still provide inaccurate range predictions.	Combines sensor data, satellite mapping, and neural networks to predict range under real-time conditions.
25	Renewable Energy-Powered Smart EV Hub	Charging infrastructure doesn't balance energy from renewables efficiently.	Integrates wind-solar hybrid microgrid with AI load prediction for autonomous and green EV charging clusters.

Reviewer's Digital Signature

Reviewer's Name:

Position:

Organization:

Date:

Digital Signature: