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ARAI
Progress through Research
Update
Transformation towards Progressive Mobility
Design, Development and Testing Services at ARAI
July – September 2024

Conferences / Workshops

- Workshop on Technology Prioritization for the Transport Sector
- Regional Workshop and Report Launch of Clean Air Project in India (CAP India)
- Symposium on International Automotive Technology (SIAT) 2026

New Capabilities / Development

- Establishment of Buzz, Squeak and Rattle (BSR) Test Facility for Automotive Component and Sub-system
- Meeting the EV Training Requirements
- ARAI Journal of Mobility Technology (Volume 5, Issue 1, January-March 2025)

❑ Workshop on Technology Prioritization for the Transport Sector

The “Viksit Bharat” initiative of Government of India aims to transform India into a developed nation by 2047. The great vison of “Viksit Bharat” articulated by Hon’ble Prime Minister of India, Shri Narendra Modi, cannot be achieved, without implementation of innovative technologies, and addressing the green initiatives. To address the challenges and identify and develop climate-resilient and sustainable technologies crucial for the transport sector, ARAI in association with Technology Information, Forecasting, and Assessment Council (TIFAC), New Delhi, organized Workshop on Technology Prioritization for the Transport Sector, from 30th and 31st July 2024 at ARAI’s state-of-the-art facility. This workshop aimed at identifying and prioritizing next-generation sustainable technologies for the transport sector, aligning with India’s vision of achieving net-zero emissions by 2070.

This workshop focused on critical domains, such as road, rail, air and water transport to advance decarbonization of India’s transport sector by identifying next-generation and climate-resilient technologies. The workshop sought to align technological developments with nation's broader goals of sustainable growth and energy security. By leveraging the STEEP framework (Social impact, Technological feasibility, Environmental benefits, Economic viability and Policy alignment), participants analyzed technologies to assess their potential for addressing urban air quality challenges, reducing reliance on fossil fuels and achieving energy efficiency.

Over 70 innovative technologies in the sector, such as Source of Energy, Advanced Battery Chemistry, Direct Electric Supply and Charging Infrastructure, Alternative fuels, Hydrogen Internal Combustion Engine, Material, etc. were discussed and evaluated, with an aim of creating a pathway toward sustainable development.

During the Inaugural Address, Dr. Reji Mathai, Director - ARAI, underscored the importance of advancing clean technologies in the transport sector. Dr. Mathai further stated that collective efforts from stakeholders across industries, academia and policymakrs will be essential for driving India towards sustainable future. Dr. Gautam Goswami, Head of Foresight & Vision Division at TIFAC, highlighted the strategic role of upgrading India's transport infrastructure to meet sustainability goals. Dr. Goswami also emphasized the importance of adopting interdisciplinary approach, involving diverse stakeholders, to address the pressing challenges of urban air quality, energy security and climate change. Shri Pankaj Sonalkar, Managing Director, Kalyani Powertrain Ltd., stressed the importance of developing robust, affordable and scalable technologies that are accessible to all. This session witnessed release of "**Technology Factsheet for the Transport Sector**", a comprehensive guide to the latest sustainable technologies.

Release of Technology Factsheet for the Transport Sector

The event brought together participants, including representatives from diverse sectors, leading automotive OEMs, startups, academic institutes and research bodies. The key areas discussed were adoption of alternative fuels, such as hydrogen and bio-fuels, development of advanced battery technologies, implementation of smart infrastructure for optimized transport networks, etc. The participants were actively engaged in ranking and scoring technologies using insights shared during the workshop. This exercise emphasized the need to align technological advancements with broader national imperatives, such as sustainability and energy security.

Notable contribution of Dr. Anuradda Ganesh, Senior Advisor (Technical), Cummins India, was the discussion on barriers to adopt advanced technologies and emphasized innovation as the key to achieving competitive and sustainable growth.

Discussion and brainstorming activity

The Participants

The workshop led to several key outcomes, such as identification of technology with high potential for carbon emission reduction, recommendation for integrating sustainable practices into transport policy frameworks and to support cross-sectoral innovation and investments, ensuring cleaner, greener, and more sustainable transportation landscape for the future. The workshop on Technology Prioritization for the Transport Sector successfully united stakeholders to identify and prioratise sustainable technologies critical for decarbonizing India's transport sector. By leveraging the steep framework, participants provided valuable insights to shape the future polices and support India's net-zero and "Viksit Bharat" goal. The release of the Technology Factsheet for the Transport Sector marked a significant milestone, offering roadmap for sustainable innovation. This collaborative effort has set the stage for cleaner, greener, and more resilient transportation future, emphasizing the importance of innovation, policy alignment, and collective action.

❑ Regional Workshop and Report Launch of Clean Air Project in India (CAP India)

In response to Govt. of India's National Clean Air Program (NCAP) launched by Ministry of Environment, Forest and Climate Change (MoEFCC), Swiss Agency for Development and Co-operation (SDC) initiated long-term (4 years) 'Clean Air Project in India (CAP India)' in November 2019 in Pune, Nashik, Kanpur and Lucknow. Overall objective of the project was to support India's efforts to improve air quality while contributing to public health, environment and climate change mitigation. ARAI has executed various project components of the CAP India for Pune.

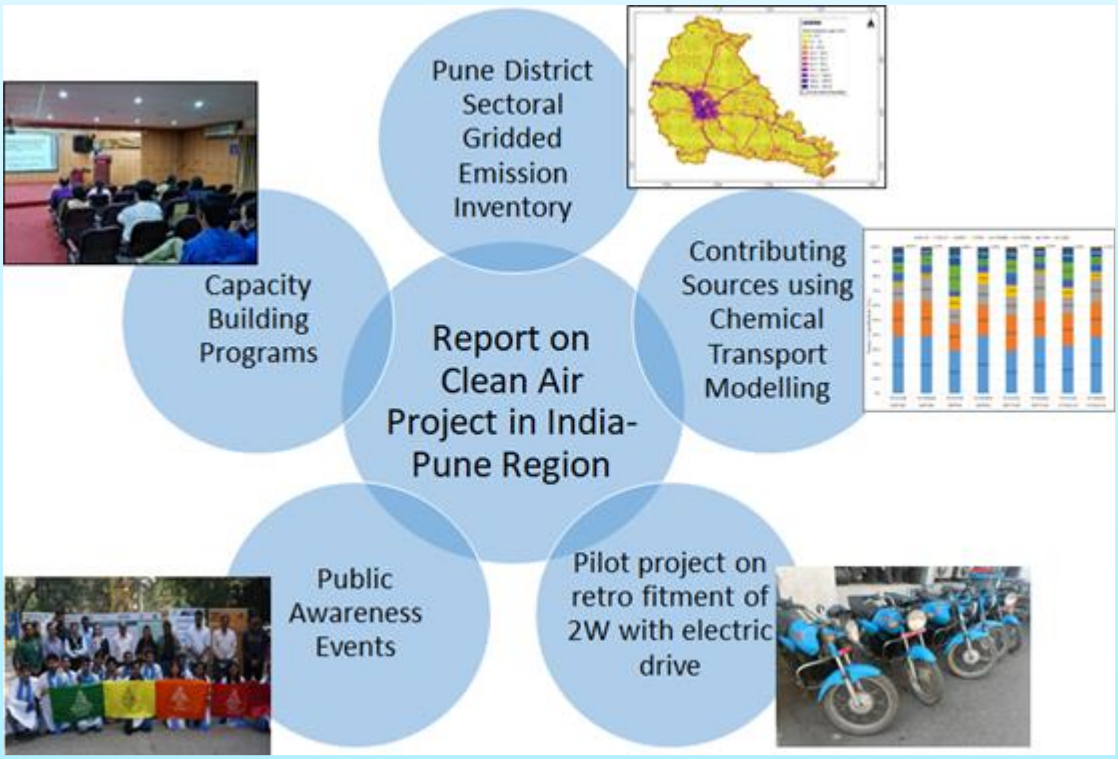
The project also directly contributed to achieving the objectives of the National Clean Air Program (NCAP) of India through technical assistance in improving air quality at regional and specifically at urban scale in four focused cities in India. To achieve the aim, the project focused on three outcomes (see Figure 1).

Figure 1: Targeted project outcomes in CAP India project

To showcase the findings and communicate the learnings from the project, a regional workshop was organized in Pune on 8th August 2024 at ARAI, Pune. Key stakeholders, such as Ministry of Environment, Forest and Climate Change (MoEFCC), Central Pollution Control Board (CPCB), State Pollution Control Boards and Municipal Corporations, Smart City Cell, Research Institutes, Non-governmental organizations (NGOs) who are responsible for suggesting and implementing solutions on the ground participated in the regional workshop. Report on "Clean Air Project in India: Pune Region" was launched during the workshop at the hands of Dr. Avinash Dhakne, Member Secretary-MPCB, Shri Sanjay Shinde, Deputy Commissioner (Env), Pune Municipal Corporation in the presence of Dr. Reji Mathai, Director-ARAI and senior officials from SDC, TERI and SIAM.

Figure 2: Dissemination of project outcomes to the stakeholders and launch of the report during the regional workshop

The report contains information on district level emission inventory for Pune for all sectors, sources contributing to the air pollution based on state-of-the-art tools and techniques for chemical transport modelling, pilot project on retrofitment of 2W with electric drive, various capacity building programs and public awareness events conducted during the project, proposed clean air action plan for Pune region.



This workshop facilitated large-scale dissemination of the project's results and promote cross-learning among the officials to replicate and scale the steps taken in pilot demonstrations, awareness generation, capacity building, and scientific assessments under CAP India. Participants were oriented on the benefits and high potential of the project outcomes for reducing air pollution in cities using scientifically backed methods, fostering the possibility of broader adoption across different states.

Symposium on International Automotive Technology, 2026

SIAT & SIAT EXPO 2026
28th to 30th January 2026 | PIECC Pune, INDIA

Symposium on International Automobile Technology (SIAT) is a benchmark biennial international event, widely acclaimed by the automotive fraternity. The last Symposium, viz. SIAT 2024, held in January 2024, has set a quality benchmark of delegate participation, presentation of papers / keynotes, panel discussion, etc. With the participation of 330 exhibition booths by domestic as well as overseas OEMs, the concurrent SIAT EXPO 2024 could also transact sizeable business over a period of 3 days.

ARAI, in association with SAE India SAE International (USA), is organizing 19th edition of SIAT, viz. **Symposium on International Automotive Technology, 2026 (SIAT 2026)**, from **28th to 30th January 2026** at Pune International Exhibition & Convention Centre (PIECC), Pune (India). The theme of **SIAT 2026** is **'Innovative Pathways for Safe and Sustainable Mobility'.**

SIAT 2026 will bring together automotive experts, researchers, technocrats and professionals all over the world, on common platform for presentation of papers / keynotes, discuss technological advancements, challenges ahead, growth perspective, etc. and exchange ideas focusing on advanced automotive technologies.

First Announcement of the Symposium was launched by Shri H. D. Kumaraswamy, Hon'ble Union Minister, Ministry of Heavy Industries, Government of India during the Bharat Mobility Global Expo 2025.

Please browse First Announcement of the Symposium using the below appended weblink.

Reference Technical Bulletin (RTB), containing technical articles, advertisements, case studies, will also be published on this occasion.

https://cms.araiindia.com/MediaFiles/First_Announcement_Call_for_Papers_12285.pdf

TOPICS OF SIAT 2026

- Active and Passive Safety
- Advanced Driver Assistance Systems (ADAS)
- Advanced Powertrain Technology
- Advanced Vehicle Dynamics
- Agriculture Tractors
- Alternative Fuels
- Automotive Lighting
- Autonomous Vehicles
- Construction Equipment Vehicles
- E-mobility
- Emission Measurement & Control Technology
- Circularity and LCA
- Harmonization of Regulations
- Hydrogen Fuel Cell and Hydrogen I.C. Engine
- Intelligent Transportation Systems (ITS)
- Materials & Manufacturing
- Noise, Vibration & Harshness (NVH)
- Mass Mobility Systems
- Simulation, Modelling and Digital Twin Technology
- Structural Reliability
- Testing & Evaluation
- Vehicular Technology
- Tyre Technology
- Automotive Cyber Security
- Artificial Intelligence in Automobile
- Software Defined Vehicles

CALL FOR PAPERS

The papers presented in SIAT 2026 will bear SAE numbers and will find place in SAE International database as well as will be published as Symposium Proceedings. Technical Papers / Keynotes are invited from the Automotive fraternity world-over, for presentation in the Symposium. Please upload abstracts of papers on 'SAE MyTech Zone', using the below appended link or QR Code, on or before 30th April 2025, for review.

https://www.sae.org/servlets/techpapers/enterAbstractForPapers.do?method=formView&evtSchedGenNum=369&prodGrpCd=SPEC&evtName=SIAT

Scan Here

Email ID for support: siat26_tprc@araiindia.com

SIAT EXPO 2026

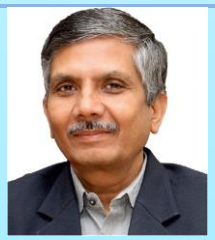
The concurrent SIAT EXPO 2026 will provide opportunity to the automotive and allied industry to showcase spectrum of their products, automotive testing and validation tools as well as services to the large gathering of experts. The exposition will attract automotive OEMs, Tier-I, Tier-II and Tier-III suppliers, start-ups, equipment manufacturers, CAD/CAM/CAE tool providers, technologists and engineering service providers. The Exhibition would be open to automotive fraternity and interested public, providing an excellent opportunity for business promotion, networking and dissemination of information. SIAT EXPO 2026 layout will be hosted on the websites of ARAI and SIAT 2026.

SPONSORSHIP OPPORTUNITIES

Options for sponsorship support to SIAT 2026:

- Platinum Sponsor
- Gold Sponsor
- Silver Sponsor
- Bronze Sponsor
- Associate
- Event Sponsor

SIAT 2026 will attract large number of delegates from India and abroad, besides visitors to the concurrent Exposition and provide worldwide publicity to the sponsors through displays and branding during the Symposium and the Exposition, so also through Symposium Proceedings, Advertisements in Technical Reference Bulletin, Information Booklet, Website, etc. Sponsors will also be entitled for free Delegates Registration. In nutshell, SIAT will add immense value and give wide visibility to the valued brands among the automotive fraternity world-over. Please share your choice of sponsorship at siat2026@araiindia.com .



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For more details, please visit: https://siat.araiindia.com

❑ Establishment of Buzz, Squeak and Rattle (BSR) Test Facility for Automotive Component and Sub-system

With the changing trends of mobility, comfort and evolving customer demands, NVH requirements for ICE and Electric Vehicles are becoming more crucial. Many times, buzz, squeaks and rattles in vehicles are the major source of customer dissatisfaction. ARAI has established BSR facility systems to help OEMs and their suppliers to develop and produce vehicles free of squeaks and rattles, with measurable quality. The state-of-the-art BSR facility having VPR+4D (Vertical Pitch and Roll with 4 DoF) can be used for product validation during design / development as well as for production verification, launch support and in-plant quality audits.

Roof and Floor Console BSR

Instrument Panel BSR

SALIENT FEATURES

- Dedicated facility for BSR evaluation of components, sub-systems and full vehicle
- 5 DOF system to simulate vertical, fore aft, lateral, roll and pitch
- Quiet room with background noise of 25 dBA
- Provision to simulate sine, PSD, random and acceleration time history excitation profiles
- Acceleration levels up to 2.0 g rms
- Shaker table maximum payload of 315 kg

APPLICATIONS

- Seats, Instrument panel and clusters, infotainment display units, door, steering system, sunroofs, floor and overhead consoles, HVAC control modules, RVM & ORVM, load floors, seat belts, gear shift levers, etc.
- All categories of vehicles up to SUV class
- Ideal for pre and post durability BSR evaluation in hot and cold environment conditions

❑ Meeting the EV Training Requirements

With faster adoption of electric vehicles, training requirements on different systems of electric vehicles have increased drastically. Various facilities are coming up at various locations in India to cater to the increasing demand. Since electric vehicle technology is completely different from conventional vehicle technology, the facilities shall be upgraded to cater to the present and future requirements as well. ARAI Academy houses different laboratory facilities catering to fossil fuel-based vehicle demonstrations, such as 75 kW engine Test Cell, various cut sections to demonstrate working of sub-systems, highlighting its working cycle in Automotive Engineering Systems Laboratory. All these facilities still find their relevance, as comparison between the two vehicles is necessary, while few of the systems such as braking system, HVAC and similar do not change dramatically. Over the years, these facilities have been utilized for training of working professionals and engineering students aspiring to work in the automotive industry.

In order to cater to the new requirements related to EV training, in addition to training of its trainers, ARAI Academy has set up a laboratory facility to include Hybrid Electric Vehicles and Electric Vehicle Laboratory. The source to deliver power to the wheels in EV requires combination of Battery and Motor. Hence, following equipment have been purchased:

1. Battery Cell and Pack Cycler
2. Electric Motor Trainer Kit
3. Power Electronics Workbench
4. Personal Protection Equipment and Toolkit for EV System Handling
5. Exploded View of the EV Systems
6. MATLAB software platform for training on EV systems simulation.

Additionally, ARAI Academy has developed its own BMS Trainer Kit, through which the learner can get the knowledge of basic concepts of battery management system.

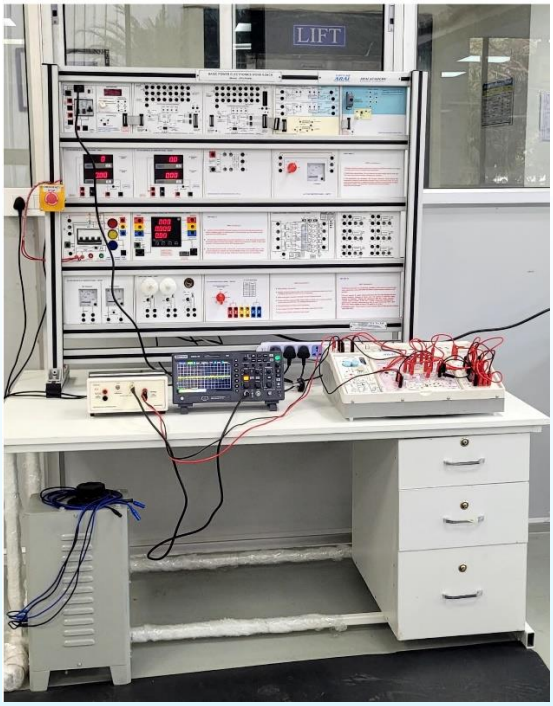
ARAI Academy welcomes prospective partners to engage with us in its journey of education in the Automotive world.

Academy organizes short training programmes scaling for the duration of one-day to three-days. Over the period, ~20 programmes are conducted in the field of Electric Vehicles, for imparting training to over 700 working professionals.

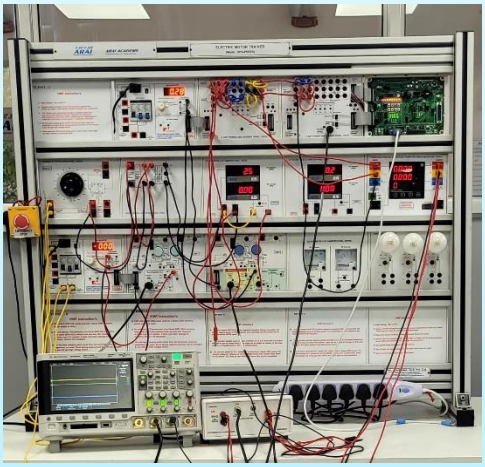
Major training programs conducted at ARAI Academy:

1. Electronic Systems for Smart Mobility.
2. EV Motors: Balancing Performance, Efficiency and Drives
3. EV Machine Modelling and Control using MATLAB/Simulink
4. Charging Infrastructure Technology Requirements and Interoperability
5. EV Batteries – Fires and Safety
6. EV – Fundamentals

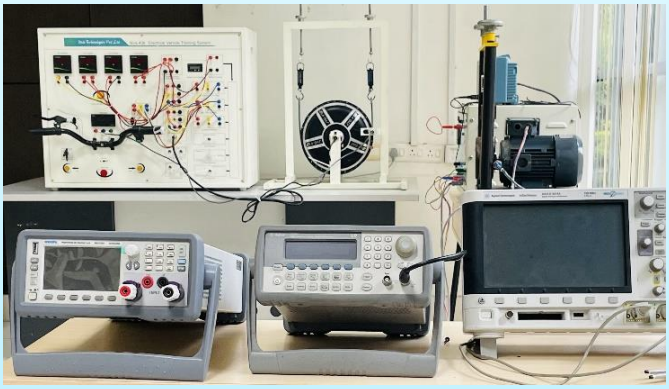
Battery Cell and Pack Cycler



Power Electronics Work Bench



Electric Motor Work Bench



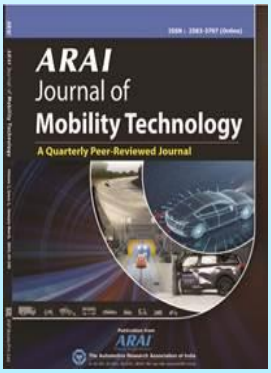
Electric Vehicle Trainer Kit

EV Sub-system Breakout Board

Electric Motor Hardware-in-loop Test Set up

Battery Management System (BMS) Trainer Kit

❑ ARAI Journal of Mobility Technology (Volume 5, Issue 1, January-March 2025)



ARAI Journal of Mobility Technology mainly focuses on automotive and related topics. It is available online and in print version. The aim of bringing out this journal is to help professionals, researchers and students share their original research in the field of mobility technology. One of its goals is to provide platform for publishing articles on variety of automotive and allied subjects. Papers published in this journal are taken up and well-promoted by the automotive and research communities.

The journal welcomes contribution from researchers all over the world and is aimed at scholars, academics and professionals in the automotive industry.

First edition of the journal for the year 2025 (**Volume 5, Issue 1, January-March 2025**) has been released online. If case of any requirement of full-text papers, please feel free to contact us. For more details, you can visit the website at https://araijournal.com/index.php/arai

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