

**SPEAKERS**



**Mr. Vishwas Vaidya** : Director (Hardware & Services), Spark Minda Technical Center, Minda Corporation Ltd. He has done his M tech in control engineering from IIT Delhi, and BE in Electronics and telecommunication from College of Engg, Pune. He has 27+ years of experience in the field of embedded systems, with HCL Ltd., Tata motors and General Motors. He hold 10 patents in the area of embedded electronic control systems and also have publications in international journals EDN, Electronic Design, ATZ, world-wide and SAE. His patent application related to "Indirect Injection Diesel EGR Controller" was awarded with "Best commercially Successful Invention" in 2012.



**Dr. P. Karthikeyan** : Professor in the Dept. of Automobile Engineering at PSG College of Technology, Coimbatore, INDIA. He has significantly contributed to fuel cell research in India. He received his PhD Degree at Indian Institute of Technology Madras (IIT-M), Chennai on 2008. He was received BOYSCAST fellowship (2009-10) from DST, Government of India for conducting Advanced Research Training in the area of "Fuel Cells - Water Management in PEM Fuel Cells" in USA. He had authored more than 40 research papers in reputed national and international journal, 18 peer reviewed international conferences, and filed 2 technical patent (Invention Disclosure No.: D2010-65)



**Mr. Chandrakant Awate**: Asst. General Manager, TATA Motors, ERC, Pune. He has his M.Tech in Powertrain Electronics from VIT University. He has Automotive Product development experience of 15+ years in the varied domain of Testing and validation, Road load data collection, Electric and Hybrid vehicle and Advance Driver Assist system (ADAS), currently he is heading ADAS COC (Centre of Competence) at Engineering Research Centre for Passenger vehicle business.



**Dr. S. A. Patil**: Dy. General Manager, Academy, ARAI, Pune. He has his Ph.D. from University of Texas at Dallas. He has academic and research experience of 15+ years in the varied domain of speech under stress, speaker variability under stress, adult-child interaction for language learning, non-linear modeling of speech and driver distraction modeling. Recently, he is in-charge of the academic activities at ARAI Academy.



**Dr. Philip Jose**: GM R&D (Electrical and Electronics) Bajaj Auto Ltd Pune. He received his B.Tech degree in Electrical Engineering from Indian Institute of Technology, Madras and subsequently received Masters and Ph.D. in the same subject from University of Minnesota, Twin Cities respectively. His research activities include powertrain system integration, high voltage systems on vehicles, and control systems.



**Dr. Sushil S. Ramdasi**: Dy. Director, Powertrain Engineering, ARAI, Pune. His Doctorate is in Controls for Electric Drives and Parallel Computing Microcontroller Architecture Development from VIT University. He has done Masters' Degree in Mechanical Engineering In Design Discipline also he has completed Master of Management Science in Management Information Systems. He has R&D experience over 20 years in ARAI, Pune. Presently, he is looking after engine design centre at PTE, ARAI and responsible for execution of various projects in design & development of engines, components & systems for meeting various emission norms, strength, durability and structural dynamics requirements. He has 2 patents on LPG fuel metering system and Gas air mixer for stationary application engines. Recently apart from IEEE and Elsevier, he has invited as a reviewer for IMECCHE (UK).



**Mr. M. M. Desai**: Dy. General Manager, Automotive Electronics Department, ARAI, Pune. Presently he is responsible for Evaluation, Testing of Automotive Electronics (EMI/EMC) and Certification, testing of Electric and Hybrid Electric Vehicles. He is working with ARAI for last 12 years.



**Mr. Manas Vora**: Sr. Electronics Engineer, Devise Electronics Pvt. Ltd., Pune. He is an Automotive Electronics professional with more than 4.5+ years of work experience in the area of Automotive Electronics, Battery and Battery Management Systems as well as Electric and hybrid vehicle integration. He has worked in multiple disciplines like R&D, HCV Assembly Line and Testing and validation of Automotive systems. He has been associated with companies like AMW, DC Designs. Presently he is working with Devise Electronics Pvt. Ltd., working in niche area of automotive electronics. He has completed M.Tech in Automotive Electronics & Embedded Systems from ARAI, Pune and Technical University of Braunschweig, Germany.

Besides, speakers from ARAI & other Industries are expected

**5 Day Proficiency Improvement Programme on Hybrid Drives, Traction & Controls at ARAI-Forging Industry Division**

**7<sup>th</sup> to 11<sup>th</sup> May 2018**

**REGISTRATION FORM**

Name, Designation, Dept., Office No., Mobile No. & Email ID :	
Delegate - 1	
Delegate - 2	
Delegate - 3	
Company Name & Address	
Co-ordinator's Name, Designation, Contact No., Email ID	
100% Advance Payment Details	

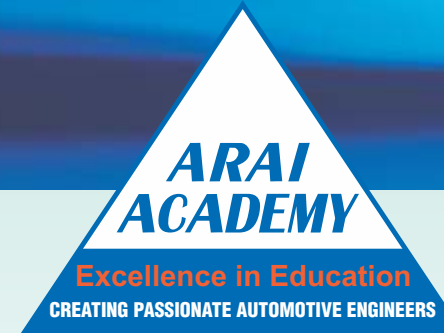
Please email/post duly filled-in registration form on or before 4<sup>th</sup> May 2018 to:

Dr. K. C. Vora, Sr. Dy. Director & Head, ARAI Academy

ARAI-Forging Industry Division, Chakan, B-16/1, MIDC Chakan, Taluka Khed, Dist Pune 410 501 (INDIA)

Contact No: 02135 396 660/ 661/ 666

Email: [training.pga@araiindia.com](mailto:training.pga@araiindia.com); [patil.pga@araiindia.com](mailto:patil.pga@araiindia.com); [training.fid@araiindia.com](mailto:training.fid@araiindia.com)

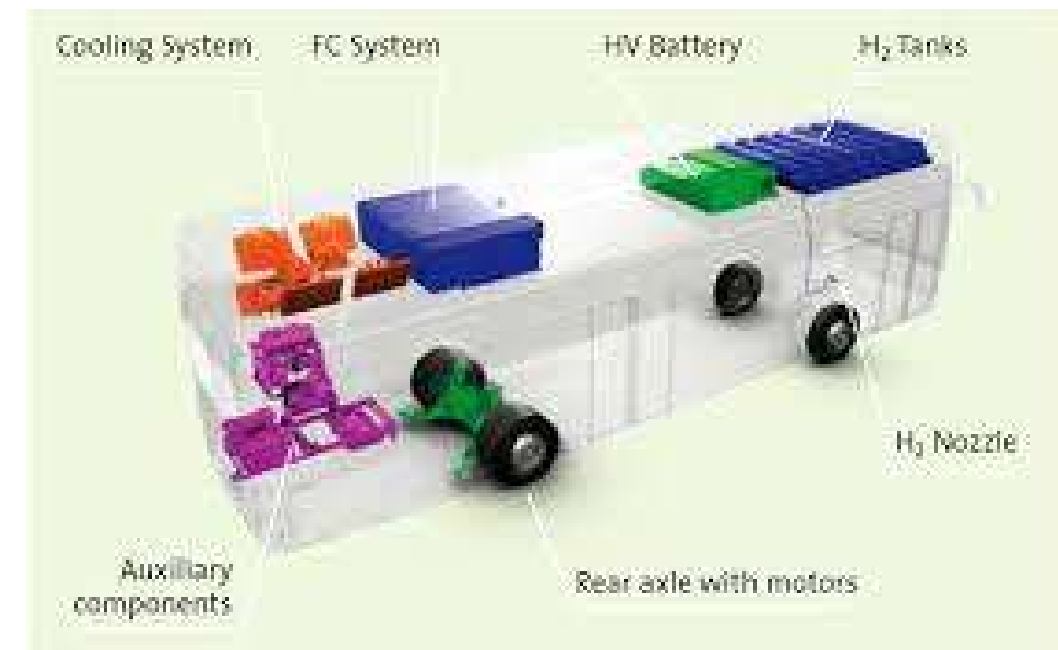


2015



2011

**5 Day Proficiency Improvement Programme on Hybrid Drives, Traction & Controls**



at

**ARAI-Forging Industry Division**

(The Automotive Research Association of India)

Plot No. B-16/1, MIDC, Chakan, Taluka : Khed, Dist : Pune 410 501.

**7<sup>th</sup> to 11<sup>th</sup> May 2018**

Organized by



## BACKGROUND & OBJECTIVES

The evolution of vehicle has been phenomenal in the past two decades. The fossil fuels have been dominating the research on automotive technologies. It has been established fact that stocks of fossil fuels are limited and diminishing; and hence, cannot be depended upon for a long time. Alternate technologies such as battery and fuel cell as the power source will be the norm in the coming days.

Study of battery technologies, different electric motors and their control approaches, various architectures based on fuel cells and other propulsion power sources is the need of the hour.

This course will take you through the basics of hybrid vehicle technologies, types of motors for electric vehicles, various speed control strategies and architectures for hybrid traction. Demonstration of the demo vehicle is also planned during the session.

## INTENDED LEARNING OUTCOMES

On completion of the module, the delegates should be able to:

- Understand basics of Hybrid Drives.
- Understand Hybrid Vehicle Configuration.
- Get familiar with Energy Storage devices & its application.
- Understand Fuel Cell Technology.
- Understand various types of Motors for EV & HV applications.
- Understand design of EV Motors.
- Understand various Motor Controllers Design & Options.
- To know about Power Split devices for Hybrid Transmission.
- To know the Control Strategies for Electrification in HEV.
- Become self-disciplined and self-motivated, demonstrating personal responsibility in the pursuit of studies and professional practice.
- Lead Multi-disciplinary teams.
- Demonstrate independent learning ability necessary for conducting professional development.

**Note :** ARAI reserves the right to change the dates, schedule, contents, speakers, venue etc. for the programme without any notice.

## PROGRAMME

### Day One

- 08.30 - Registration
- 9.00 - Quiz
- 9.30 - Fuel Cell Technology for Automotive Application - A different Perspective
- 10.30 - Overview of Micro Controller Architecture for HEV & FCV
- 11.30 - Tea Break
- 11.45 - Introduction to Electric & Hybrid Electric Vehicles
  - Types & Configuration
  - Latest Research & trends in India & Globally
- 13.00 - Lunch
- 14.00 - Battery Technology
  - Types of Batteries
  - Battery Sizing (Battery Requirement in EV/HEV)
- 15.15 - Battery Management System( BMS) & Algorithms for SOC, SOH estimation
- 16.15 - Conclusion

### Day Two

- 09.00 - Requirement of electric motor for EV/Hybrid Application
  - Road load equation,
  - Parameters to decide motor requirement & Size
- 10.30 - Types of Electric Motor
  - DC, IM, PM, BLDC, SR
- 11.00 - Tea
- 11.15 - Types of Electric Motor (Contd.)
  - DC, IM, PM, BLDC, SR
- 11.45 - Motor Control System
  - Motor & Motor Cooling System
  - Validation Plan
- 13.00 - Lunch
- 14.00 - EV/HEV Testing Demo
- 16.15 - Conclusion

### Day Three

- 09.00 - Design of Power Electronics
- 11.00 - Tea
- 11.15 - Design of Power Electronics (Contd.)
- 13.00 - Lunch
- 14.00 - Control Strategy for Integration of Battery, Motor & System
- 16.15 - Conclusion

### Day Four

- 09.00 - Charging & Regenerative Braking
  - Types of Charging System
- 11.00 - Electric Vehicle Architecture for Electric Bus
  - System Architecture
  - Drive line , electric motor,
  - Low voltage operation
  - Strategies for start-stop application
- 12.00 - Fuel Cell Technology
- 13.00 - Lunch
- 14.00 - Success Story of Fuel Cell Technology
- 16.15 - Conclusion

### Day Five

- 09.00 - Testing & Validation of EV HV : Indian & Global Scenario
  - 11.00 - Tea
  - 11.15 - Hybrid Vehicle Modeling & Simulation
  - 13.00 - Lunch
  - 14.00 - Written Test
  - 15.00 - Summary, Discussions and Feedback
  - 16.00 - Certificate Distribution
  - 16.00 - Conclusion
- 3W HEV development

## WHO SHOULD ATTEND ?

- Organizations involved in R&D, design, manufacturing, testing, and product development teams specializing in
- Transmission / Gears/ Clutches/ Engine
- Automotive component manufacturers and suppliers of critical components
- Engineers working in the areas of Transmission
- Engineers who are interested in pursuing further studies on part time / full time basis
- Engineering / consulting companies
- Professors / engineering college students

## MODE OF PAYMENT

At Par / Multicity cheque or demand draft in favour of  
**The Automotive Research Association of India**  
 payable at Pune.

**ARAI**, over five decades, has provided its design and development expertise to the Indian automotive industry, focusing on the testing and evaluation of components and systems to meet national and international standards. ARAI strives to achieve international recognition in these areas. In keeping with the globalization of economy and business, ARAI continues to enlarge its scope of services to meet the requirements of automotive industries around the world. In addition to utilizing state-of-the-art technology, laboratories and highly-trained personnel, ARAI recognizes the need to develop a new generation of engineers to meet the demands of the automotive industry, not just in India but across the globe.

**ARAI ACADEMY** is classified into three divisions:

**LEARNING CENTRE** has embarked upon a programme of building up human resources by commencing educational programme (Graduate, Post graduate & Doctoral) with specialization in Automotive Engineering. It has tied up with VIT University (Vellore), Veltech University (Chennai), College of Engineering (Pune), Christ University (Bangalore), University of Alabama (USA), Tennessee Tech University (USA), Loughborough University (UK) and University of Braunschweig (Germany).

**KNOWLEDGE CENTRE** It has collection of around 23,000 books, standards, project reports, seminar/conference proceedings and around 75,000 SAE technical papers. It also has 237 eBooks. It subscribes to 40 national and international journals. It regularly publishes a monthly magazine 'Automotive Abstracts'. It also conducts literature / patent search for customer's projects.

**TRAINING CENTRE:** In line with Post Graduate and Doctoral Programs conducted by various universities abroad, ARAI Academy has devised various Proficiency Improvement Programmes (PIPs) & (ePIPs), to be taught by ARAI, Academia & Industry Experts. PIP gives engineers, faculty and student's

## REGISTRATION FEES

Category	Registration Fees (Rs.) (per participant)	Total Fees including Tax of 18% (Rs.) (per participant)
Engineers & Professionals	25,000.00	29,500.00
Teaching Faculty	15,000.00	17,700.00
Engineering College Students	10,000.00	11,800.00

Registration fees include:

- Breakfast
- Lunch
- Delegate Kit

knowledge and technical expertise in a wide range of automotive disciplines. It helps in understanding system's view point for automotive design and manufacture, with specific skills in formulating automotive engineering solutions in terms of their function and performance, through optional modules. Based on the present system in universities, credits are proposed for each module, so that the graduate engineers can attend various modules and sum-up the credits required for Master's or Doctoral Programs. Participants also get chance to visit related laboratories of ARAI and get hands on experience. Certificates are issued on the basis of attendance & written test conducted at the end of the programme. We also conduct Training Programmes through WEBEX and Domain Training Programmes for Automotive Industry at their site.

Please visit [www.araiindia.com](http://www.araiindia.com) for more information.



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