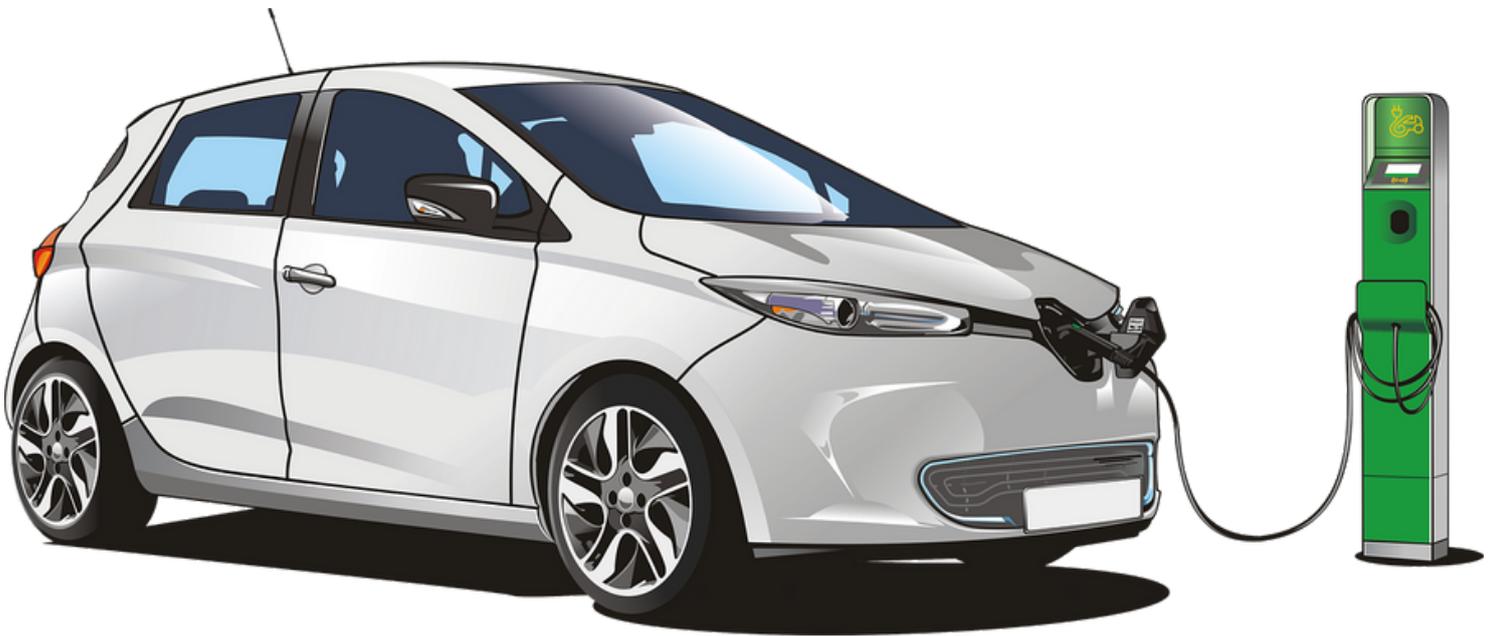


4<sup>th</sup> EDITION

**iTECINDIA** 2021  
E-Mobility for AatmaNirbharBharat

**INTERNATIONAL TRANSPORTATION  
ELECTRIFICATION CONFERENCE INDIA**

DECEMBER 16 - 18, 2021



**VIRTUAL EVENT**

**EVENT DIRECTORY**



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## Message from SAEINDIA President



**Mrs. Rashmi Urdhwareshe**

I have great pleasure in welcoming all of you, to the 4th Edition of iTEC INDIA 2021, in collaboration with IEEE IAS U.S.A. It all started in 2015 in Chennai, the Second Edition was in Pune in 2017, and the third Edition happened at Bangalore in 2019. Each Edition has grown in size and stature over a period. The fourth Edition is going to take place in Manesar at Haryana, near Delhi during December 16-18, 2021.

It is also my privilege to share with you all that, SAEINDIA would be planning its Silver Jubilee Celebrations throughout the country, culminating in the final event on November 2022.

SAEINDIA as most may be aware is the largest strategic ally of SAE International, which was founded in 1905 by Henry Ford 1 and Wright Brothers. SAE International is considered a One-Stop Source for standards globally.

During the last 25 years, SAEINDIA has built some marquee events like BAJA SAEINDIA, SUPRA SAEINDIA, AWIM competition, which has built a massive base for Engineering Students, to design and develop prototype vehicles, which can overcome very difficult challenges, in an oppressive terrain. SUPRA is encouraging Formula Type Race Cars for Engineering Students, igniting their curiosity and encouraging innovation and imagination, leading to e-BAJA Competition, for the 1st time independently.

During pre-pandemic years, we had over 45,000 + Student Members from 486 collegiate clubs countrywide.

I welcome all of you once again and request all to support & encourage, SAEINDIA in Knowledge Dissemination and Skills Enhancement of Indian Engineering Students & Professionals

## Message from Patron, iTEC INDIA 2021



**Mr. C.V. Raman**

**CTO at Maruti Suzuki India Limited**

It gives me great pleasure to share my comments on the 4th edition of iTEC INDIA 2021, which commenced initially on August 2015 in India, in collaboration with IEEE IAS (Industry Applications Society), which is taking place in an Annual and Biennial Manner in U.S.A, Europe, Asia, with increased participation over the years.

India is steadily moving forward with Electrification of Transportation in all the segments, with increased emphasis in the 2 & 3 Wheeler segment. The fact is that Electric Vehicles have made inroads, into Urban and Semi-Urban Areas faster than expected.

Electric Cars are slowly increasing in numbers and it is to be noted that, the Supporting Infrastructure and Congenial Ecosystem are planned and developed with massive support, from the Government and Policy makers. We have to simultaneously work on hybrid kits to convert existing IC Engine Vehicles, as millions of them on the road cannot be junked overnight.

Some of these important policies and priorities will be discussed in the 3 Day Conference and the Overseas Experts from the U.S.A, France and Germany; will share their experiences in their respective countries and how they found pragmatic solutions to the issues, arising from a practical standpoint.

The key questions remain how and where we can source Lithium Ion - a Critical Component for making Sustainable Batteries for Electric Vehicles. We should also look at alternative options for fossil fuels, in the form of renewable energies like Hydrogen, Solar Power, etc. This will help us to reduce the weight and cost of the Batteries, accelerating the emergence of Electric Vehicles in a faster pace and shorter time.

It is heart-warming to learn that, Indian Oil Corporation Limited, BPCL, HPCL would be setting up 22,000 Charging Stations, throughout the country in the upcoming years. This will assure the buyers of Electric Vehicles a robust supporting infrastructure, to invest in change of IC Engine Vehicles to Electric Vehicles.

We are in the midst of a sea change in transportation; iTEC India 2021 will point out the significant milestones, that we have to achieve to electrify transportation across all the segments.

## Chair, Steering Committee - iTEC INDIA 2021



**Mr. Dinesh Tyagi**

**Director at International Center for Automotive Technology, Manesar  
& Director- Technical at NATRiP, New Delhi**

As Chairman of the Steering Committee of the 4th edition of iTEC INDIA 2021 being held in Manesar, Delhi in Virtual Format, I have great pleasure in welcoming all the members, including overseas leaders and delegates.

As I took charge as Chair of the Steering Committee, comprising leaders and experts from the Automotive Fraternity, with the special emphasis on those connected with the electric vehicle segment. India is in the process of transitioning to electric mobility in all forms of transportation, including heavy vehicles and trucks. Indian e-Mobility has been given a tremendous push, by the Government of India with FAME I & II and PLI. The industry has also responded admirably well with the very special thrust, in the 2 & 3 wheeler segment and increased accent on electric cars. Electric SUVs introduced by the new entrants like Hyundai, MG, TML, etc., and established players like Maruti Suzuki have also announced broad plans to introduce new versions of electric vehicles.

In this context, iTEC INDIA 2021, an International Conference organized by SAEINDIA, in collaboration with IEEE IAS US assumes significant importance. As I recall in the early part of this year, during the 1st Steering Committee, we looked at the challenges faced in organizing a physical conference and kept the option open till July/August 2021, to organize a Hybrid or Virtual format. When we were reasonably certain that the Hybrid model would be feasible, we announced that the conference would be held in Hybrid format. The enthusiastic response which we received from the Industry, Tier - 1 & Tier -2 suppliers was indeed very encouraging. We did make it clear that the virtual option would still be looked at, in case the COVID-19 pandemic reemerges again.

We did not however foresee the emergence of Omicron, which completely upset all our plans and also that of overseas leaders and experts including SAE International and IEEE IAS U.S. I must compliment the Organizing Team was fully prepared to convert the event into a virtual format and the seamless transmission, with which they made the event in a virtual format, without any of the sponsors going back on the commitment. This indicates the maturity of the organization viz. SAEINDIA and the confidence enjoyed by the organization, in the minds of industry supporters and participants. I am sure this edition of iTEC INDIA would be a great success in the virtual format, with delegates exceeding 500 from all over India.

It is bound to enter as a landmark event, in spite of the challenges and trying times we encountered, from the time we conceived the event till its execution in full. I wish the Organizing team all success.



## Chair, Organizing Committee, iTEC INDIA 2021



**Dr. Tapan Sahoo**  
Executive Director, MSIL

I am delighted to welcome all of you for the 4th edition of ITEC INDIA 2021. The theme for the conference is e-Mobility for AatmaNirbhar Bharat in consonance with the policies set out by Government of India. The conference comes at a critical juncture for India as we are embarking on the path of electrification. This is the current trend across the globe and the shift requires creation of supporting infrastructure and establishing an e-mobility ecosystem for faster adoption. Indian e-mobility has been receiving considerable push from the Government of India with FAME I & II and PLI (Performance Linked Incentive).

Keeping the above in mind, ITEC INDIA 2021 will have 5 Plenary Sessions, 27 Technical Sessions with 94 papers being presented both from India and abroad. Global leaders and experts in e-mobility will join in different sessions and contribute their knowledge and experience and what has been achieved elsewhere.

It is heartening that policymakers including Hon'ble Minister for Heavy Industries, Transport Minister from Government of Delhi, Senior Secretaries from the various departments concerning e-Mobility will address the participants and share their perspective on important topics related to transition to e-Mobility.

We have faced unanticipated challenges to settle for Hybrid format of Conference and later converted it into virtual format on account of sudden emergence of Omicron. I thank the Steering Committee for guiding the Organizing Team to charter the course corrections at an appropriate time for making the event truly participative benefitting the key stakeholders.

My complements to the entire organizing committee for putting up a splendid event. Hope you have a great learning experience at ITEC 2021.



## About iTEC INDIA 2021

### **THEME: E-MOBILITY FOR AATMANIRBHARBHARAT**

In continuation to the successful conduct of three editions of International Transportation Electrification Conference, SAEINDIA & IEEE IAS, are organizing the 4th Edition of International Transportation Electrification Conference (iTEC) India 2021 in a Virtual format to enable participation for delegates from India and abroad.

iTEC India brings together leaders, experts technocrats, professionals, academicians working in electric vehicle technology areas, on a common platform to exchange technological ideas, identify the challenges ahead, find appropriate solutions and lay out a technology road map for the future.

The theme of iTEC INDIA 2021 is "e-Mobility for AatmaNirbharBharat", keeping in tune with the latest trends and future challenges being faced by the Electric Vehicle Industry. We are expecting participation of over 350 delegates, including the presentation of about 90+ technical papers at the Conference. Papers presented in iTEC India 2021, will bear IEEE numbers and will find a place in IEEE XPLORE Digital Library.

iTEC India 2021 will be a significant event, since our country is gearing up for adopting e-Mobility as the future of mobility in India by 2030. iTEC India 2021 will act as a platform for Indian as well as the global automotive industry, academia, technology and ecosystem solution providers, in their endeavour towards showcasing India's e-Mobility mission, for a sustainable and safe future.



# AatmaNirbhar Bharat in E Mobility

## iTEC INDIA 2021

Will present an array of papers across different topics  
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3	Mrs Rashmi Urdhawarshe	President (SAEINDIA)	Co Chair
4	Dr RK Malhotra	Director General (FIPI) & Past President (SAEINDIA)	Member
5	Dr Tomy Sebasitan	IEEE	Member
6	Dr Georges Zissis	IEEE	Member
7	Mr IV Rao	TERI	Member
8	Mr Mahesh Babu	Mahindra	Member
9	Mr Balraj Bhanot	BIS	Member
10	Dr SSV Ramkumar	IOC	Member
11	Mr Vikram Gulati	TKML	Member
12	Mr.Shashi Singh	MD, AVL India	Member
13	Mr.Shailesh Chandra	President – Electrification, Tata Motors	Member
14	Dr. A Prakash	VARROC Engineering Ltd.	Member
15	Dr. Naveen Gautam	Hella India Automotive Pvt. Ltd.	Member
16	Mr. N K Minda	Minda Group	Member
17	Mr Sohinder Gill	CEO – Hero Electric	Member
18	Mr Guruprasad Mudlapur	Bosch India	Member
19	Mr Isao Hattori	Denso India	Member
20	Dr.Arunkumar Sampath	Chair – M&EB, SAEINDIA	Member
21	Mr Prashant Doraiswamy	MD - Continental / Vitesco	Member
22	Dr. Tapan Sahoo	Sr. VC ,SAENIS	Member, Chair OC ITEC 2021
23	Ms. Pamela Tikku	ICAT	Member, Co Chair – OC ITEC 2021
24	Mr. Pritam Singh	ICAT	Secretariat – Steering Committee

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S.no	NAME	ORGANISATION	Position in the Committee
1	Dr Tapan Sahoo	Sr. VC ,SAENIS; Maruti Suzuki	Chair
2	Ms Pamela Tikku	ICAT	Co-Chair
3	Mr Sandeep Raina	Maruti Suzuki	Industry Interface Committee, Chair
4	Dr. Kamal Vora	ARAI	Industry Interface Committee, Co-Chair
5	Mr. Anoop Bhat	Maruti Suzuki	Technical Committee, Chair
6	Prof. Akshay Rathore	IEEE IAS	Technical Committee, Co-Chair
7	Dr. Allabaksh Naikodi	Royal Enfield	Technical Committee, Co-Chair
8	Mr. Amit Karwal	ICAT	Technical Committee, Co-Chair
9	Mr. Prashant Vijay	ICAT	Finance Committee, Chair
10	Mr N S Rao	Maruti Suzuki India Limited	Finance Committee, Co- Chair
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13	Mr. Anubhav Singla	Maruti Suzuki	Exposition Committee Co-Chair
14	Mr. Rajendra Khile	Renault Nissan	Exposition Committee, Co-Chair
15	Mr Alok Jaitley	Maruti Suzuki	Event Management, Chair
16	Mr. Sameer Shikalgar	ICAT	Event Management, Co Chair
17	Mr Deepak Sawkar	Maruti Suzuki	Media/Communications Committee, Chair
18	Mr. Vikas Sadan	ICAT	Media/Communications Committee, Co-Chair
19	Dr Kamal Vora	ARAI	Academia Interface Committee, Chair
20	Dr Maji	Northern Section	Academia Interface Committee, Co-Chair
21	Prof Leenus Martin	SRM University	Academia Interface Committee, Co-Chair
22	Mr. Anurag Jain	ICAT	Secretariat – Organizing Committee
23	Mr. Anup Kacker	SAENIS	Secretariat – Organizing Committee
24	Mr. Bibhu Kumar	ICAT	Secretariat – Organizing Committee

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Minister, MoHI



**Dr. David Schutt**  
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**Prof. Wei-Jen Lee**  
President, IEEE IAS



**Mr. C V Raman**  
CTO, Maruti Suzuki  
Patron-ITEC INDIA 2021



**Dr. Uwe Grebe**  
EVP, AVL List GmbH



**Mrs. Rashmi Urdhwarsh**  
President, SAEINDIA  
Co Chair (Stg Committee), ITEC INDIA 2021



**Mr. Dinesh Tyagi**  
Director, ICAT  
Chair (Stg Committee), ITEC INDIA 2021



**Dr. Tapan Sahoo**  
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Chair (Org. Committee), ITEC INDIA 2021



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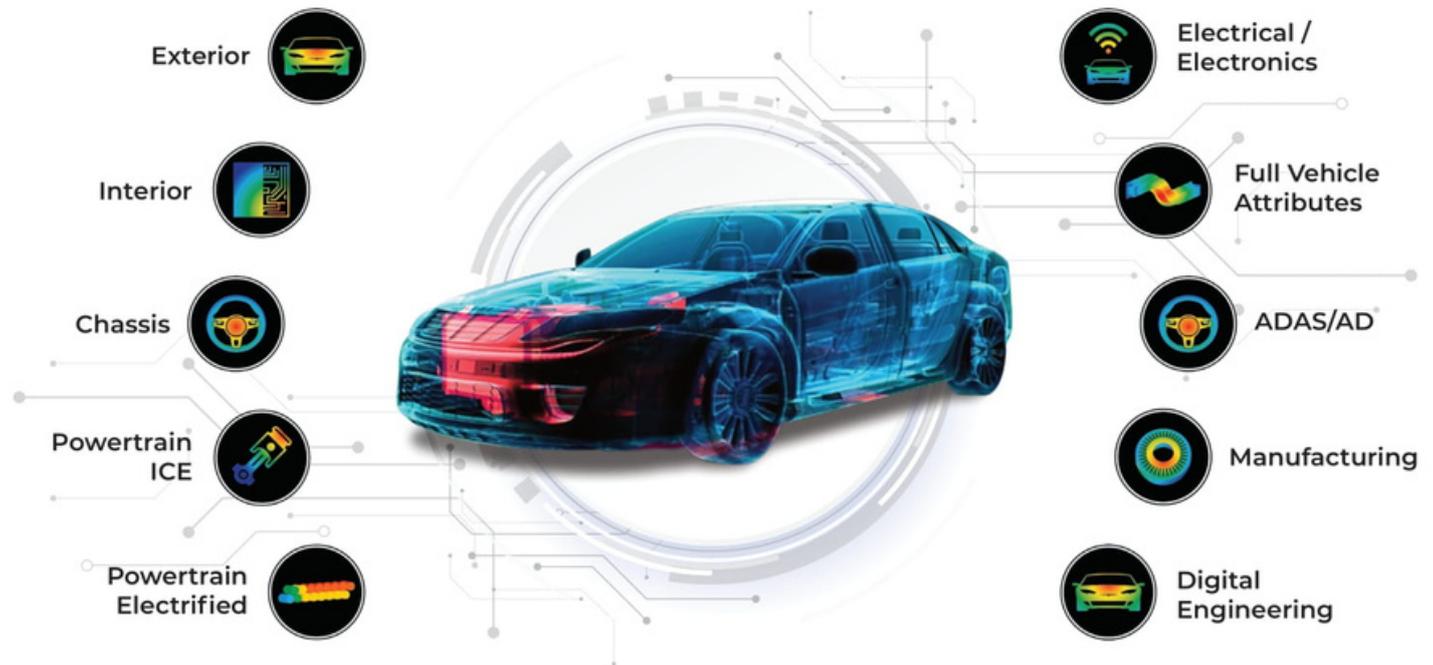


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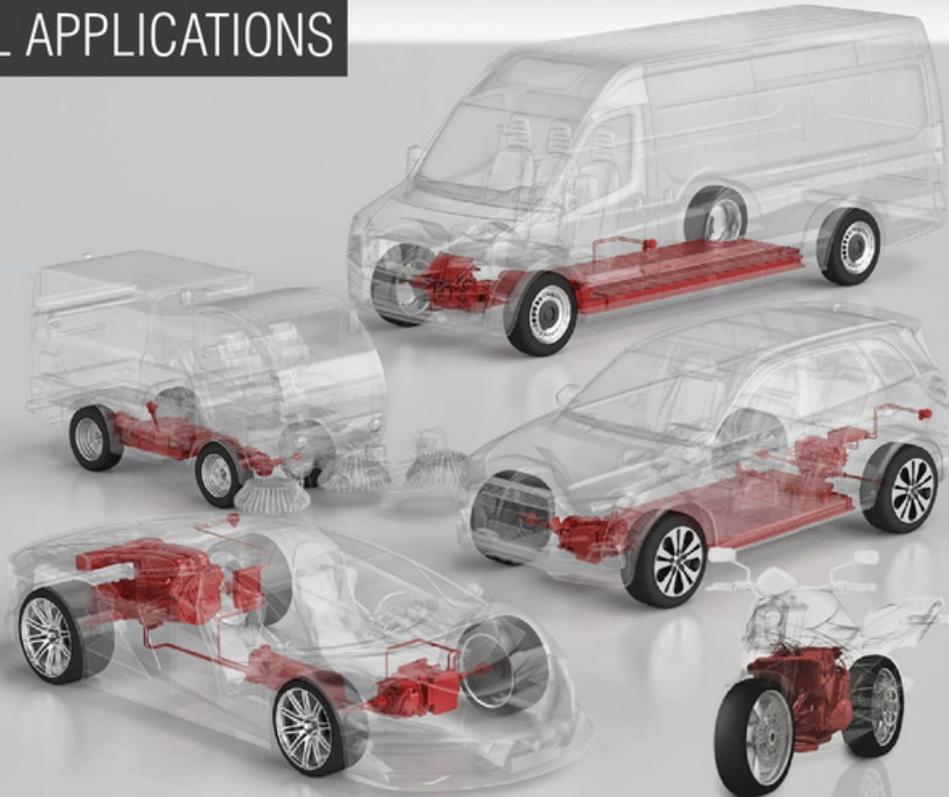
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***DENSO***  
Crafting the Core

Building India as world class automotive manufacturing hub, DENSO started its operation in India more than 30 years back in 1986, Meeting local needs of India through our six group companies operating to develop and manufacture the products best suited for Indian market with a skilled team of over 4,000 associates.

We value the DENSO tradition of Monozukuri as we pursue new value and craft the core of better future.



## PLATINUM SPONSOR



FEV is a leading independent international service provider of vehicle and powertrain development for hardware and software since 1978. The range of competencies includes the development and testing of innovative solutions up to series production and all related consulting services. The range of services for vehicle development includes the design of body and chassis, including the fine tuning of overall vehicle attributes such as driving behaviour and NVH. FEV also develops innovative lighting systems and solutions for autonomous driving and connectivity. The electrification activities of powertrains cover powerful battery systems, e-machines and inverters. Additionally, FEV develops highly efficient gasoline and diesel engines, transmissions, EDUs as well as fuel cell systems and facilitates their integration into vehicles suitable for homologation. Alternative fuels are a further area of development.

The service portfolio is completed by tailor-made test benches and measurement technology, as well as software solutions that allow efficient transfer of the essential development steps of the above-mentioned developments, from the road to the test bench or simulation. FEV's South Asia Technical Center is in Pune, the heart of the Asian Automotive Industry. FEV India Pvt. Ltd. is the company's second location in India, following its Indian headquarters located in Delhi. The Indian Technical Center went into operation in July 2006. Currently FEV India has offices across all major automotive hubs of India, i.e., Delhi, Pune, Chennai, and Bengaluru. FEV India satisfies all requirements in the field of automotive powertrain and vehicle development. Clients can expect highly qualified teams and most modern test facilities.

FEV offers a complete range of development services:

### Vehicle Engineering

- BiW, Interior, exterior, platform, lighting, CAE for crash, durability & NVH

### Electrification

- Design & development for battery, e-machine and inverters including control software

### Electrical & Electronics

- EDS, E/E architecture, diagnostics, HV wiring harness and safety

### Software engineering

- ADAS, connectivity, FuSA, security, AUTOSAR, V&V, data science & prognostics

### Testing solutions

- Planning, equipment supply, installation commissioning & after sales of test benches

### Powertrain

- Design, CAE, prototyping, engine & vehicle calibration, and validation



## PLATINUM SPONSOR



**HORIBA**  
Automotive

The Company manufactures and sells automotive emission measurement systems, environmental measuring instruments, wide range of scientific analyzers, and medical diagnostic analyzers, and measuring equipment used in the semi-conductor industry. HORIBA also manufactures and markets peripheral measuring and analysis devices. Moreover, the Company equips such facilities as laboratories with measuring and analytical equipment for R&D, production, and other applications.



## PLATINUM SPONSOR



Cars are what Maruti Suzuki builds. Experiences are what it creates.

Experiences fuelled by innovations, forward thinking, and a commitment to bring the very best to Indian roads. From the day the iconic Maruti 800 was launched in 1983, the company has been spearheading a revolution of change. Turning an entire country's need for driving, into its love for driving.

However, tastes and demands keep on evolving with each new generation of Indians. This has not been looked at by Maruti Suzuki as a challenge, but as an inspiration to go beyond traditional boundaries of car-making. Infusing design and technology is one such step it has taken to make its cars meet new age expectations smoothly.

Today, Maruti Suzuki has its eyes set firmly on the possibilities of tomorrow. And everybody is invited on this journey.



## PLATINUM SPONSOR



The demand for sustainable mobility is growing worldwide. Hence, Vitesco Technologies provides the right drive technologies: clean, smart and electrified. Based in Regensburg, Germany, with almost 40,000 employees at around 50 locations worldwide, we pursue the objective of playing a leading role in the electrification of vehicles. To achieve this, we follow a clear strategy emphasizing sustainability, we live our brand and our values: Passionate, Partnering and Pioneering.



## GOLD SPONSOR



### Changing Tomorrow, Together

Business is complex. But in complexity, there is opportunity for innovative solutions. Our comprehensive, open-architecture solutions for data analytics & AI, computer-aided engineering, and high-performance computing (HPC), enable design and optimization for high performance, innovative, and sustainable products and processes in an increasingly connected world.



## GOLD SPONSOR



Hexagon is a global leader in digital reality solutions, combining sensor, software and autonomous technologies. We are putting data to work to boost efficiency, productivity, quality and safety across industrial, manufacturing, infrastructure, public sector, and mobility applications.

Our technologies are shaping production and people-related ecosystems to become increasingly connected and autonomous — ensuring a scalable, sustainable future. We believe in a world where economic growth does not come at the expense of the planet and its people, and that we should drive sustainability efforts in every aspect of our business.

At our very core is a powerful vision of a future where data is fully leveraged so that business, industry and humanity sustainably thrive.

Hexagon (Nasdaq Stockholm: HEXA B) has approximately 21,000 employees in 50 countries and net sales of approximately 3.8bn EUR.



## GOLD SPONSOR



**MATLAB**® is the easiest and most productive computing environment for engineers and scientists. With math, graphics, and programming, it's designed for the way you think and the work you do.

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## SILVER SPONSOR



Making its mark in the International Grid of Automobile Components manufacturing, UNO MINDA steers ahead as a leading Tier 1 supplier of Proprietary Automotive Solutions to Original Equipment Manufacturers (OEMs). Incepted way back in 1958 with a meagre start-up capital and now notching up a group turnover beyond US\$1 Billion, speaks volumes of the conglomerate that it is today.

For more than six decades, UNO MINDA has made significant contributions to the automotive industry supply chain with innovative products, designed and engineered for efficiency with an emphasis on enhanced comfort levels and fine-tuned response.

UNO MINDA has 71 manufacturing plants in India, Indonesia, Vietnam, Spain, Morocco, Mexico Colombia, Germany design centers in Taiwan, Japan & Spain sales offices in North America, Europe and ASEAN Countries.

With the human edge of a highly motivated workforce of over 23000 team members, the Group is headquartered in Manesar, Haryana, India. We have more than 15 engineering, research and development centers globally.

Technology and innovation are two key pillars of UNO MINDA philosophy. Our underlying vision is to create a culture that fosters great ideas that can be the basis for planning ingenious products, successfully manufactured to deliver value to our customers.



## BRONZE SPONSOR



SMR is a global company with a high level of innovation. Originally coming from the pure mirror business, today SMR is specialist in rear view mirror systems as well as pioneer in intelligent camera systems for automotive applications. Our goal is to actively help forming the future of the automotive industry – with innovative technologies that make driving more comfortable and safer.

As part of the Motherson Group, we are optimally networked for reacting quickly to customer requirements and making use of synergy effects. For example, we work closely with our sister companies SMP, MSSSL, SMIA, SMRC, PKC and Motherson Innovations. SMR offers a creative working environment, in which everyone can participate actively and develop in line with his or her individual abilities and preferences.



# Program Agenda

16th December (Day 1 Program)						
START	END	Auditorium	Session Hall 1	Session Hall 2	Session Hall 3	Session Hall 4
9.00 AM	10.30 AM		Track-1-1 (4 Papers)	Track-2-1 (4 Papers)	Track-3-1 (4 Papers)	Track-5-1 (4 Papers)
10.30 AM	11.00 AM	Tea break				
11.00 AM	12.30 PM	Inauguration				
12:30PM	1:00 PM	Lunch+Networking+Expo visit				
1.00 PM	1.30 PM					
1.30 PM	2.30 PM		Track-8-1 (3 Papers)	Track-7-2 (2 Papers)	Track-6-1 (3 Papers)	Track-7-1 (3 Papers)
2.30 PM	4.00 PM	Plenary Session 1 Panel Discussion on Aatmirbhar Bharat - "INDIA's Journey towards Self Reliance on EV technologies"				
4.00 PM	4.30 PM					
4.30 PM	6:00 PM		Track-4-1 (4 Papers)	Track-2-2 (4 Papers)	Track-3-2 (4 Papers)	Track-5-2 (4 Papers)
6:00 PM						

**16 DEC 2021**



17th December (Day 2 Program)						
START	END	Auditorium	Session Hall 1	Session Hall 2	Session Hall 3	Session Hall 4
9.00 AM	10.30 AM		Track-1-2 (4 Papers)	Track-2-3 (4 Papers)	Track-3-3 (4 Papers)	Track-5-3 (4 Papers)
10.30 AM	11.00 AM	Tea break				
11.00 AM	12.30 PM	Plenary Session 2 Panel Discussion: Innovation and Start-up Experience in transforming mobility				
12:30PM	1:00 PM					
1.00 PM	1.30 PM	Lunch Break	Lunch + Networking + Expo visit			
1.30 PM	2.30 PM		Track-8-2 (3 Papers)	Track-7-4 (3 Papers)	Track-3-4 (3 Papers)	Track-7-3 (3 Papers)
2.30 PM	4.00 PM	Plenary Session 3 Panel Discussion: Designing Affordable E-Mobility solutions for diverse consumers in the new world				
4.00 PM	4.30 PM		Tea break			
4.30 PM	6:00 PM		Track-1-3 (4 Papers)	Track-2-4 (4 Papers)	Track-8-3 (3 Papers)	Track-7-5 (3 Papers)

**17 DEC 2021**



18th December (Day 3 Program)						
START	END	Auditorium	Session Hall 1	Session Hall 2	Session Hall 3	Session Hall 4
9.00 AM	10.30 AM		Track-7-6 (3 Papers)	Track-8-4 (3 papers)	Track-7-7 (3 Papers)	
10.30 AM	11.00 AM	Tea break				
11.00 AM	12.30 PM	Plenary Session 4 Panel Discussion on Sustainable Mobility: India Centric Approach				
12:30PM	1:00 PM					
1.00 PM	1.30 PM	Lunch Break	Lunch+Networking+Expo visit			
1.30 PM	2.30 PM					
2.30 PM	3.30 PM	Student and Young professionals program Prize Announcement				
3.30 PM	4.00 PM	Break	Tea break			
4.00 PM	6:00 PM	Plenary Session 5 Panel Discussion on Enabling E-Mobility Ecosystem for faster adoption				
6:00 PM	6:30 PM					
6:30 PM	7.00 PM	Valedictory				

**18 DEC 2021**





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# MOBILITY ENGINEERING



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