



SRI VENKATESWARA COLLEGE OF ENGINEERING
AN AUTONOMOUS INSTITUTION - AFFILIATED TO ANNA UNIVERSITY
PENNALUR, SRIPERUMBUDUR TK - 602117, TAMIL NADU



ASSOCIATION OF ELECTRICAL AND ELECTRONICS ENGINEERS
PRESENTS

INTERNATIONAL WORKSHOP ON "TECHNOLOGY DEVELOPMENT OF E-VEHICLES"

NO REGISTRATION FEES
LIMITED NUMBER OF PARTICIPANTS
E-CERTIFICATES WILL BE PROVIDED



MEET OUR SPEAKERS



Mr. GANESH NAGARAJAN

DIRECTOR & COUNTRY MANAGER,
ePROPELLED SYSTEMS PVT LTD

TOPIC: FUNDAMENTALS OF EV TECHNOLOGY &
EV ARCHITECTURE

DATE: 28-5-2020 TIME: 10:00 AM TO 11:30 (IST)

TOPIC: EV TRACTION MOTOR DESIGN PROCESS &
CONSIDERATION

DATE: 28-5-2020 TIME: 12:30 AM TO 2:00 PM (IST)



Dr. A. DEEPAK

ELECTROMAGNETIC DESIGN ENGINEER,
ePROPELLED SYSTEMS PVT LTD

TOPIC: IMPORTANCE OF FEA TOOLS
IN ELECTRICAL DESIGN

DATE: 29-5-2020 TIME: 12.30PM TO 2:00PM (IST)



Mr. HARISH K

LEAD - POWER ELECTRONICS SOFTWARE,
ePROPELLED SYSTEMS PVT LTD

TOPIC: xEV'S CONFIGURATIONS & CONTROLS

DATE: 29-5-2020 TIME: 10:00 AM TO 11:30AM(IST)



Dr. SATYAM PANCHAL

ADJUNCT PROFESSOR,
DEPT OF MECHANICAL AND MECHATRONICS ENG,
UNIVERSITY OF WATERLOO,CANADA

TOPIC : FUNDAMENTALS OF LITHIUM-ION BATTERY
AND ELECTRIC VEHICLE MODELING

DATE: 30-05-2020 TIME: 8:00 AM TO 9:30 AM (IST)



REGISTER
HERE

DATE : 28-05-2020 to 30-05-2020

CONVENER

Dr.KR.Santha, Vice Principal
Professor & Head
Department of EEE

CO-ORDINATORS

Ms.S. Arulmozhi, AP/EE
Ms.N. Shanmugavadivu, AP/EE
Ms.M. Sasikala, AP/EE
Mr.M. Ranjithkumar, AP/EE
Ms.K. Suganthi, AP/EE

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Report

Three days Online International Workshop on "Technology Development of E-Vehicles"

The EEE department of Sri Venkateswara College of Engineering organized three days online international workshop on "**Technology Development of E-Vehicles**" from 28 May 2020 to 30 May 2020. Faculties, research scholars and students of various engineering colleges and SVCE registered for this event. Nearly 300 participants registered for this event. The main focus of the workshop was to impart knowledge on the fundamentals and architecture of E-vehicles, selection of motor, battery and control aspects in E-vehicle technology. The sessions were organised in online using Google Meet and also were live streamed for the benefits of faculty and students of EEE.

The workshop commenced with a welcome address to the expert and participants and the objectives and importance of the workshop was explained. Dr.KR. Santha, Vice Principal-SVCE Professor and Head of the Department-EEE addressed the gathering with importance of the workshop. Dr.KR Santha further introduced the topic of the lecture to the participants by sharing her views and made the participants aware of the scope in future.

DAY 1 – Session 1 : 28/05/2020 - 10.00 AM to 11.30 AM

The lecture for the first session of day 1 was delivered by Mr. Ganesh Nagarajan, Director, ePropelled Systems Pvt. Ltd. The topic was **Fundamentals of EV Technology & EV Architecture**.

Nearly 208 participants attended online session and about 80 students joined the live stream session.


The Speaker started the presentation with the brief history of electric Vehicle. Architecture of electric and hybrid electric Vehicle was discussed in detail. Also, different types of electric motors used in EV and the characteristics expected from them for EV application were discussed.

Inbox - mranjith@svce.ac.in - X Meet - gux-rxps-ppe New Tab

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REC LIVE Ganesh Nagarajan is presenting

Introduction



Electric machines are one of the core technologies for EVs. The general requirements of electric machines for EVs are much more stringent than those for industrial applications. These requirements are

- High power density and high torque density
- Wide speed range , covering low-speed creeping and high-speed cruising
- Wide constant power operating capability
- High torque capability for electric launch and hill climbing
- High intermittent overload capability for overtaking
- High reliability and robustness for vehicular environment
- Low noise
- Reasonable cost

PADMANABAN EEE has left the meeting

ePropelled Confidential

People (128) Chat

RAJESH MEC 10:56 AM
Sir which configuration is better efficient, series or parallel hybrid

Ezhilmaran murugesan 10:59 AM
Great morning M.Ezhilmaran Associate professor Chennai institute of technology

PURUSHOTHAMAN D S Eee 11:00 AM
Sir, Your voice is clear only

Dr. R. Kannan 11:01 AM
Audio is clear sir.

PADMANABAN EEE 11:02 AM
What vechile have better speed normal vechile or e vechile

PADMANABAN EEE 11:05 AM
Audio is not clear

Senthilmurugan S 11:07 AM
Now it's ok clear


Send a message to everyone

11:10 AM 5/28/2020

all mail id - mranjith@svce.ac.in - X Meet - gux-rxps-ppe New Tab

https://meet.google.com/gux-rxps-ppe?amp%3Bauthuser=0

REC LIVE



People (134) Chat

suriya ponnambalam 11:23 AM
Which type of vehicle gives much life time whether EV or fuel vehicle?

Santhanakrishnan T 11:23 AM
Is there any technique for optimizing the battery charging of EV?

HOD EEE 11:23 AM
Thank you very much Sir, You have been highly supportive to us and shared your knowledge and valuable time.

Babu.E EEE 11:24 AM
Good morning to all. This is E.Babu, AP/EEE, Jai shriram Engineering College, Tiruppur.

suriya ponnambalam 11:24 AM
Your session is very informative thank you sir

PADMANABAN EEE 11:24 AM
Which speed is better e vechile or normal vechile??

Send a message to everyone

Ganesh Nagarajan

11:25 AM 5/28/2020

DAY 1 – Session 2 : 28/05/2020 – 12:30 PM to 02.00 PM

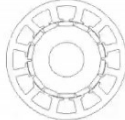
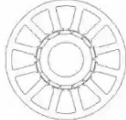
Mr Ganesh continued his presentation in the session 2 on the same day titled **EV Traction Motor Design Process & Consideration.**

The presentation dealt with the design process involved in electric motor such as cooling methods applied for electric motors and losses in various types of motors. He also touched upon the thermal analysis approach and design process flow of electric motor.

Electrical Design

Stator and rotor dimensions :

The split ratio (the ratio of the stator bore diameter to the stator outer diameter D_{sb}/D_o) has a significant influence on the torque capability and efficiency of the cylindrical permanent magnet machines

“Electrically powered vehicle” covers a range of configurations, with different motor layouts in each case.

- (1) Long cylindrical type intended for use in conjunction with a reduction gear. Used primarily in EVs.
- (2) Flat cylindrical type intended to be built into the transmission or located between the engine and transmission. Used primarily in HEVs

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CHOICE OF ROTOR

Topology selection

| | Surface magnets | Inserted Magnets | Buried Magnets |
|----------------------------------|---|------------------|----------------|
| Torque/Weight ratio | +++ | +++ | +++ |
| High speed running possibilities | + | ++ | +++ |
| Torque ripple | Depends on the winding, geometrical parameters of the stator slots and rotor magnet, and also on the supply command | | |
| Power factor | + | + | ++ |
| Efficiency | ++ | ++ | +++ |
| Costs | Surface magnets are more easy to industrialize, but it is necessary to make decision on the complete machine | | |

DAY 2 – Session 3 : 29/05/2020 - 10.00 AM to 11.30 AM

On Day 2 Session 3, Mr. Harish K, Lead Engineer - Power Electronics Software division, ePropelled Systems Pvt. Ltd. He spoke on **xEV's - Configurations & Controls**.

Nearly 196 participants attended online session and about 80 students joined the live stream session. Mr. Harish explained about concept of hybrid power drain, different xEV's configuration (based on power flow and motor position). The different configurations of EV based on power flow, Motor position and power have been dealt in this session. He focused on the Low level and High-level power application control strategies in EV technology. He also spoke about some software control for power electronics drives and clarified the queries of participants. MATLAB and other model-based design platforms for EV has also been dealt in detail.

Types of xEV's based on Power flow

(a) Series-HEV: Engine fuel → Engine → Generator → Power converter → Motor → Differential gear. Storage energy is connected to the Power converter.

(b) Parallel-HEV: Engine fuel → Engine → Motor/generator. Storage energy → Power converter → Motor/generator. Both paths lead to the Differential gear.

(c) Series-Parallel HEV: Engine fuel → Engine → Generator → Planetary gear → Differential gear. Storage energy → Power converter → Motor/generator → Planetary gear → Differential gear.

Need for configuration

To achieve the optimal speed-torque characteristic and to meet the operational constraints of vehicle

- Initial acceleration,
- Gradability
- Maximum cruising speed with minimum power requirements.

Vehicle parameters:
 $M = 1500 \text{ kg}$
 $I = 0.01$
 $C_D = 0.2$
 $A = 2.0 \text{ m}^2$
 $V_{max} = 160 \text{ km/h}$
 $V_{cr} = 100 \text{ km/h}$
 $t_a = 10 \text{ Sec.}$

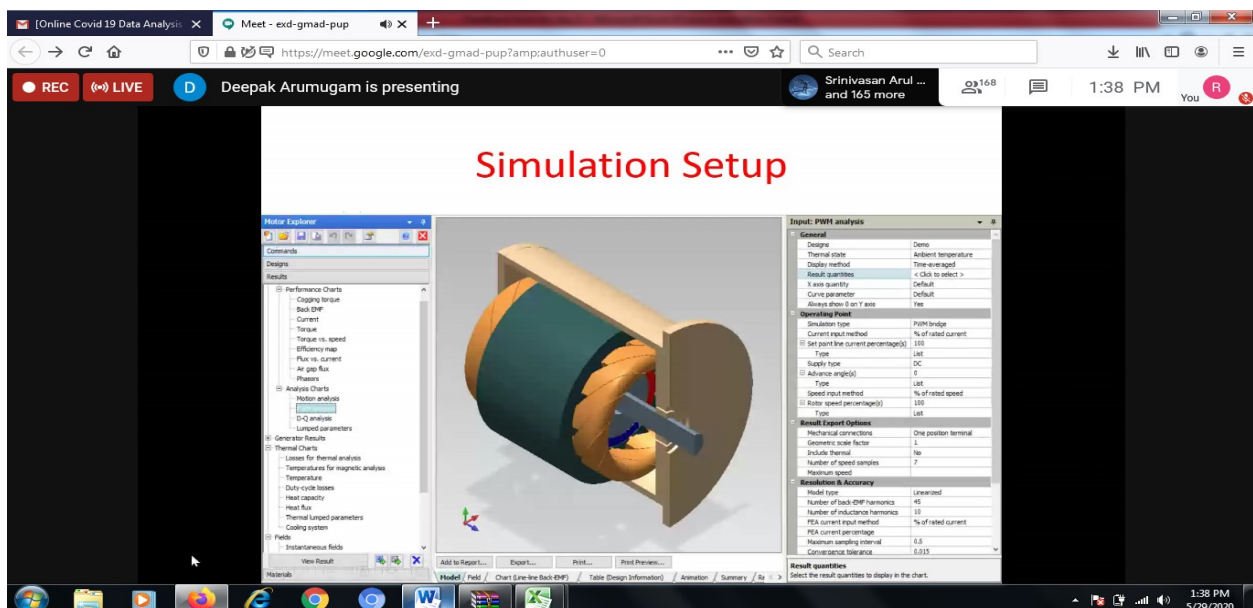
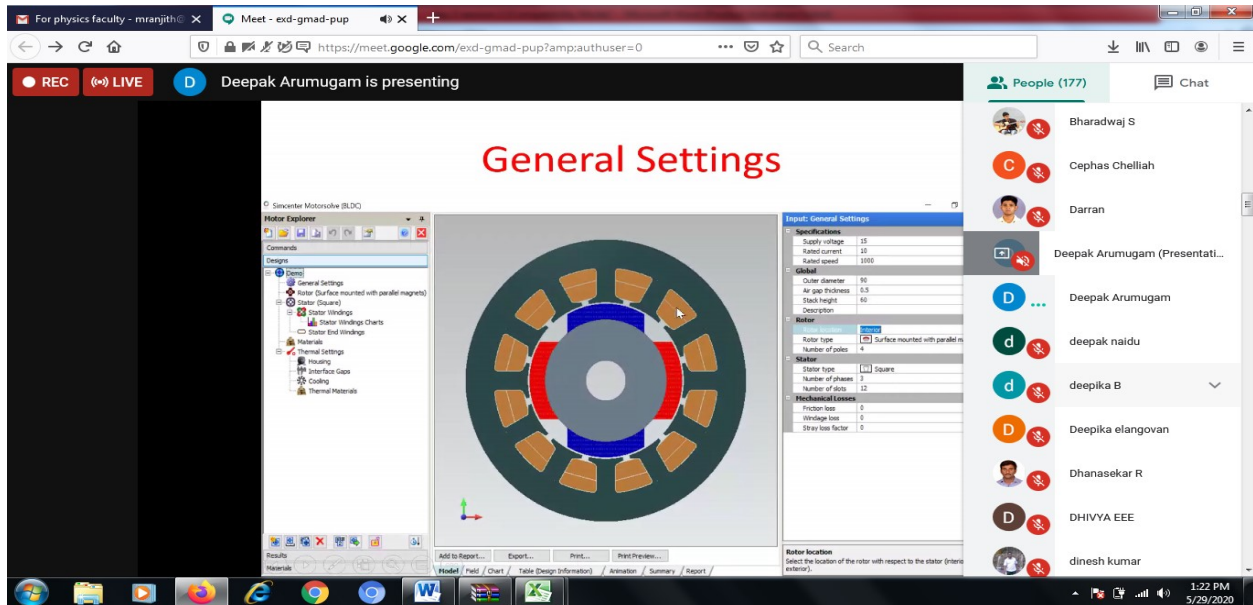
Tractive effort and power versus vehicle speed with different speed ratio x.

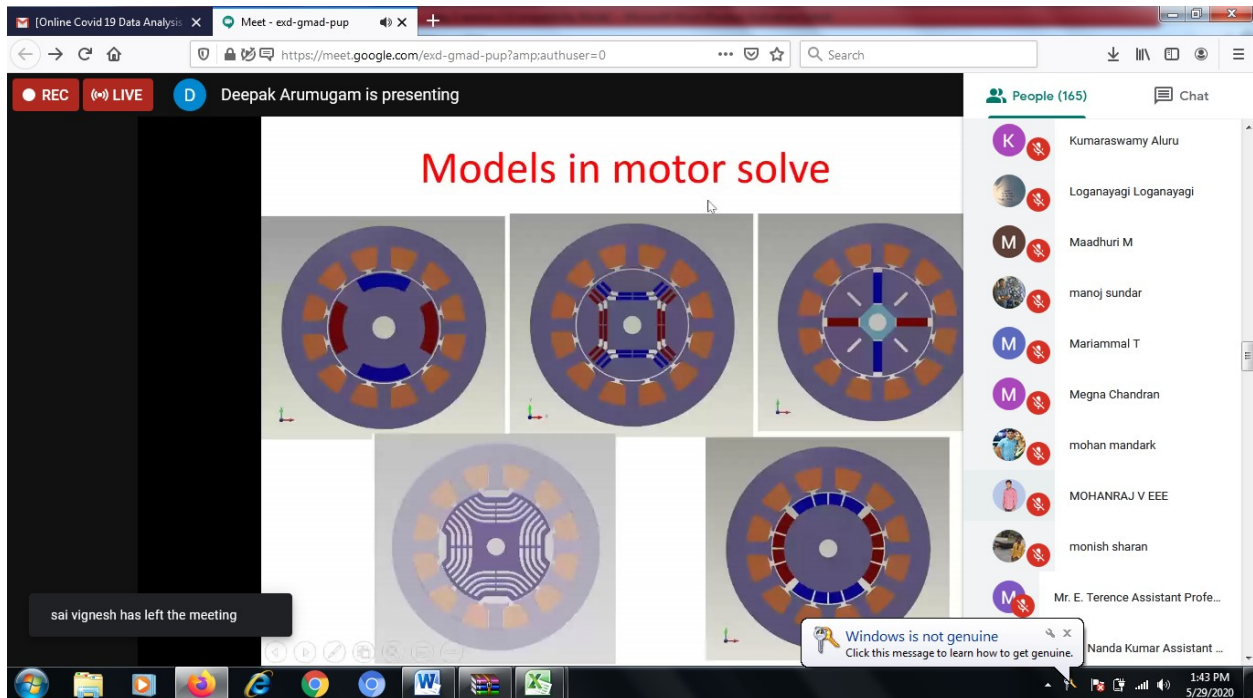
| Speed ratio (x) | Power (P _m) |
|-----------------|-------------------------|
| 10.0 | 62.5 kW |
| 8.0 | 63 kW |
| 6.0 | 65 kW |
| 4.0 | 70 kW |
| 2.0 | 98 kW |
| 1.5 | 127 kW |

DAY 2 – Session 4 : 29/05/2020 - 12.30 PM to 02.00 PM

This was followed by Dr. A. Deepak, Electromagnetic Design Engineer, ePropelled Systems Pvt. Ltd., Chennai in session 4 of day 2 titled **"Importance of FEA Tools in Electrical Design"** who threw light upon the machine design requirements in E-Vehicle applications.

Nearly 176 participants attended online session and about 80 students joined the live stream session Dr. Deepak highlighted on the various software tools used for machine design and also gave a demonstration on "Motor Solve" software for simple machine modeling. In addition, he briefly explained the various job and research opportunities in the field of machine design in future and motivated the participants.



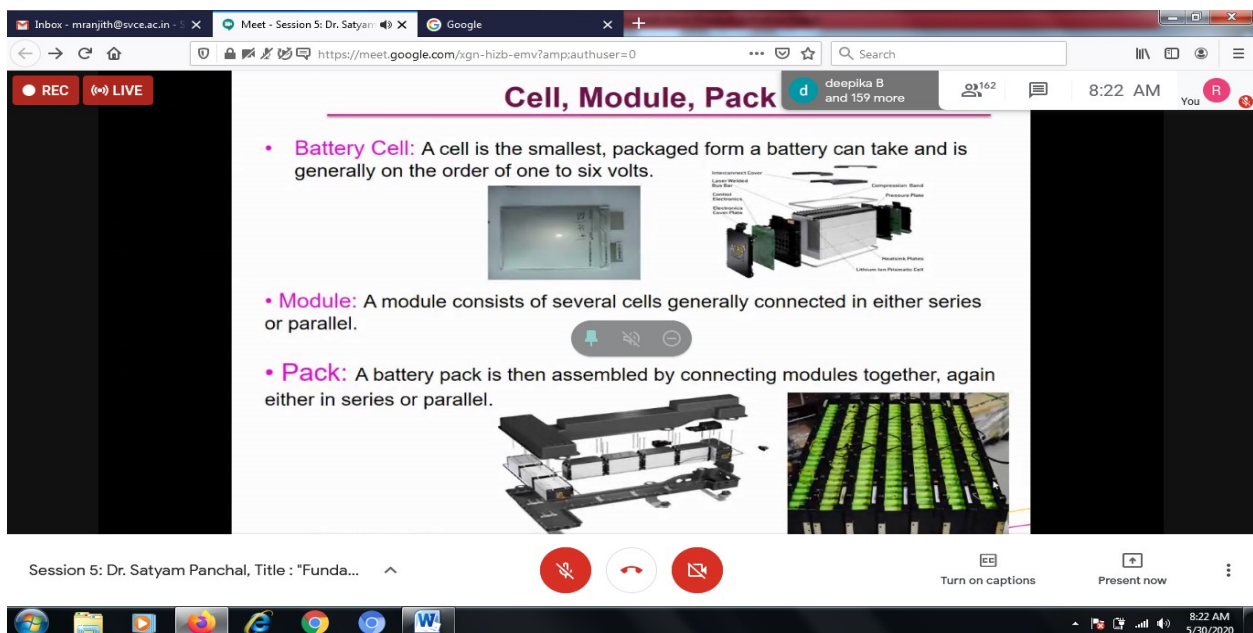


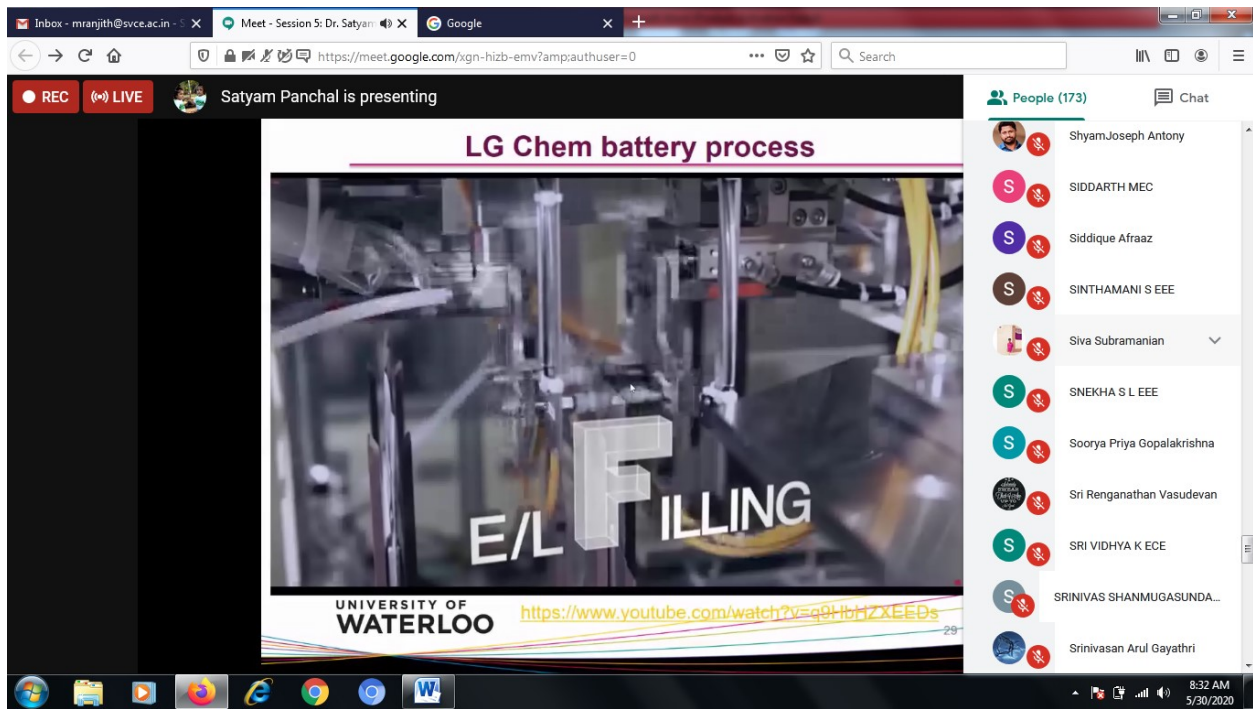
DAY 3 – Session 5 : 30/05/2020 - 08.00 AM to 09.30 AM

The international speaker Dr Satyam Panchal, Ph.D., P. Eng., Adjunct Professor, University of Waterloo, Canada threw further light upon the topic "**Fundamentals of Lithium-ion battery and Electric Vehicle Modeling**" during session 5 of Day 3, 30/05/2020 (8.00 - 9.30 AM).

Nearly 211 participants attended online session and about 80 students joined the live stream session.

This presentation dealt with the manufacturing process of Li- ion battery and challenges involved in the integration EV. Energy and Cost analysis of battery with EV was highlighted. Various EV modeling parameters and different battery models was explained in this session.





The vast majority of faculty and student participants participated actively by posting their questions and all doubts were cleared by the dignitaries and they also offered support for projects. Each and every session were highly informative, and lot of practical inputs were given along with a strong message about the importance of innovative outputs.

The workshop came to an end with thanks message from Dr. KR. Santha.

Nearly 230 participants actively attended all the online sessions through the Google meet and the Google Live Stream platform.

Participant's feedback was collected at the end of all the sessions. E-Certificates were sent to all the attendees to their registered e-mail ids.

S ARULMOZHI, AP/EE
Co ordinator

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