



A Report on
“EXPERT TALK - 2024”
(19th February 2024, Tuesday)

GUIDE:

Gandhinagar University managed by Platinum Foundation inaugurated its speaker’s forum titled "GUIDE" on September 5th 2023 with an initiative aimed at bringing in prominent National and International professionals to facilitate insightful discussion, share knowledge and foster intellectual growth amongst students of various disciplines.

Event Overview:

Gandhinagar University had a privilege of hosting an “EXPERT LECTURE” on 19th February, 2024 under the **GUIDE lecture series** at its own green lush campus as a part of shaping education. The expert talk had been coordinated by Dr Nimesh Gajjar, Associate Professor & Head, Mechanical Engineering Department, Gandhinagar University. The session was delivered by Dr. Satyam Panchal, who is "Adjunct Professor" in the Department of Mechanical and Mechatronics Engineering/Chemical Engineering at University of Waterloo (UW), Ontario, Canada.

Event Objective:

The objective of this session on “**Advanced Lithium-ion Battery for Electric Vehicle and Modeling**” is to provide participants with in-depth knowledge and insights into the cutting-edge advancements in lithium-ion battery technology, particularly in the context of electric vehicles (EVs). The talk aims to address various aspects, including the latest developments in battery chemistry, design, and modeling techniques.

Program overview:

The event was inaugurated in the seminar hall followed by brief introduction of the honored guest, Dr Satyam Panchal. Dr Rajan Patel, Dean of Engineering & Technology had blessed the event with his esteem presence. The event was attended by all the esteem guest Head of Institutions and Head of the Departments. Around 250 students had attended the session of GUIDE lecture series.

Dr. Satyam Panchal discussed fundamental of battery cell, module and battery pack. He also explain the reasons to use Lithium-Ion battery in electric vehicle compare to other type of batteries with its physical demonstration. He cited many examples as well as success stories to encourage the students to come forward with new ideas in field of electric vehicle to overcome

the problem of conventional gasoline vehicles. He has provide a comprehensive understanding of the latest advancements in lithium-ion battery technology, emphasizing how these innovations contribute to improved performance, efficiency, and durability in the context of electric vehicles. He has presented an overview of the current state of advanced lithium-ion batteries manufacturing processes, and overall design that make them suitable for the demanding requirements of electric vehicles. He also explored his research work of the various modeling techniques used in the design and optimization of advanced lithium-ion batteries. This includes discussing simulation tools and methodologies that engineers and researchers employ to predict battery behavior, optimize performance, and extend the life cycle.

Session was followed by question-answers. The topic was so simplified that undergraduate students were also able to arise the questions which were satisfactory answered by Dr. Satyam Panchal.

The session was fruitfully accomplished with Vote of Thanks by Mr. Hardik Bhatt, Head of Electronics & Communication Engineering Department, Gandhinagar University.

Programme Outcome:

After attending this GUiDe session “**Advanced Lithium-ion Battery for Electric Vehicle and Modeling**”, interested students are able to identified potential challenges and research directions that need to be addressed to further enhance the performance and feasibility of these advanced batteries.

Photo Gallery:



Dr. Satyam Panchal (Adjunct Professor in the Department of Mechanical and Mechatronics Engineering/Chemical Engineering at University of Waterloo (UW), Ontario, Canada) during session



Students and staff members attending the session of Dr. Satyam Panchal

Satyam Panchal (Presenting)

Why Lithium-ion?

Discharging

Electrolyte (Polymer battery: gel polymer electrolyte)

Characteristic	Lead Acid	NiMH	Li-ion
Nominal cell voltage (V)	2	1.2	2.5 / 3.3 / 3.6-3.7
Specific Energy (Wh/kg)	30-45	30-80	90-220
Energy density (Wh/L)	60-75	140-300	280-400
Specific power (W/kg)	180	250-1000	600-3400
Cycle life	500-800	500-1000	1000-8000
Self-discharge (% per month)	2-4	20-30	2-5
Temperature range	-20-60	-20-60	-20-60
Relative costs	Low	Moderate	High

Source : Howstuffworks : <http://electronics.howstuffworks.com/everyday-tech/lithium-ion-battery1.htm>

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Dr. Satyam Panchal explaining why Lithium-Ion battery

Satyam Panchal (Presenting)

Battery Pack, Module, & Cell Specification

ESS Specification	Value
Valence IFR18650e	
Number of Battery Packs	3
Number of Modules	20
Number of cell per module	6 in series
Charge Voltage	3.65V Standard (3.4V Float, 4.2V Max)
Nominal Operating Voltage	3.2 V
Nominal Rated capacity (C/5)	1350mAh (1.4 Ah)
Discharge Cur-off Voltage	2.5 V
Cell Dimensions	Length: 65mm Diameter :18.2mm
Cell Weight	40 g

Each Module = 6 series X 49 parallel string = 294 cells (x20 module=5880 cells)

First Battery Pack, Third Battery Pack, Second & Third Battery Pack, First six Modules

Participants: Satyam Panchal, Dr. Nimesh Gajjar, Asif Momin, Hardik Gohel

Dr. Satyam Panchal explored the battery pack arrangement



Student Interaction
