Organizer

PMANIFOLD

Certification Partner

ASDC
AUTOMOTIVE SKILLS DEVELOPMENT COUNCIL

ELECTRIC VEHICLE SYSTEMS ENGINEERING

ONLINE LEARNING AND CERTIFICATION PROGRAM

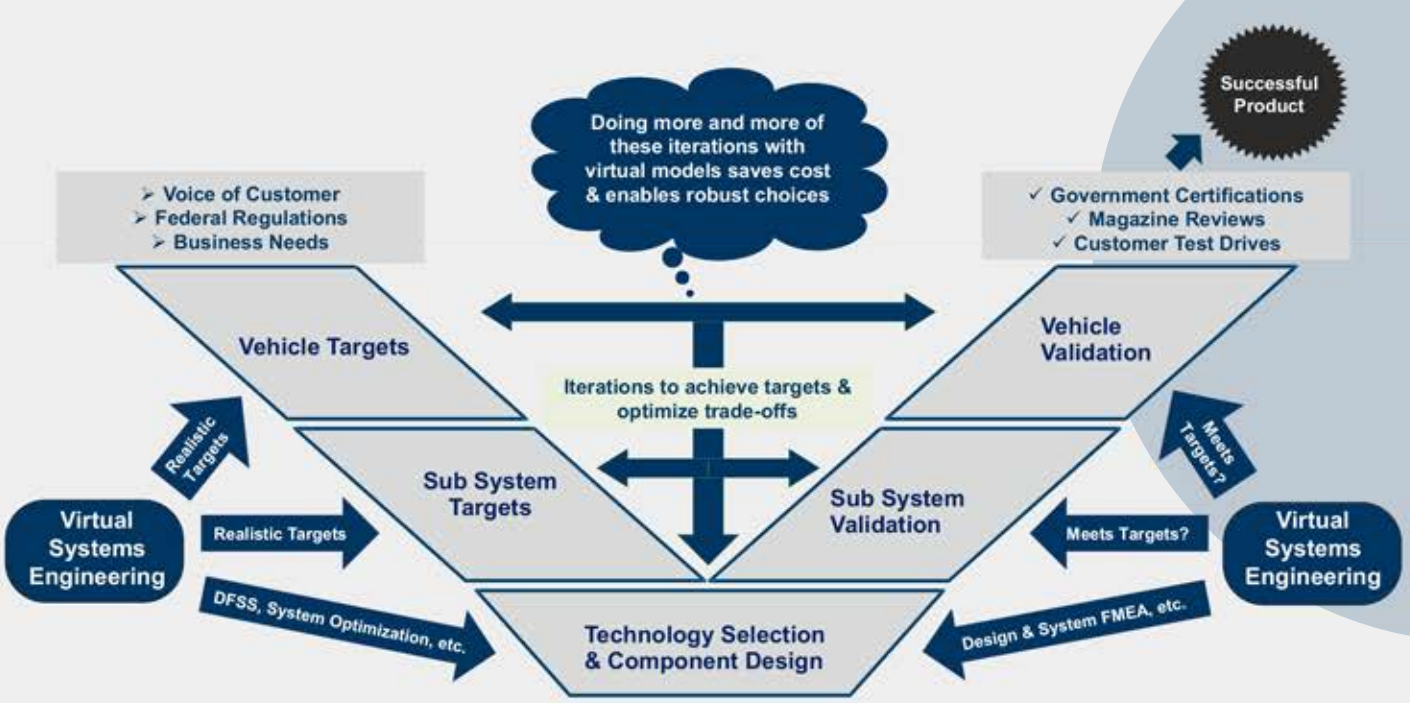
Electric vehicle system engineering program will provide you with knowledge of the EV system and subsystem basics, their functions, technical specifications and most importantly, you will learn how to do modeling and integrate sub-system by using tool including Excel and Scilab*.

UNIQUE HANDS-ON MODELING FOR PRODUCT DEVELOPMENT

Program will begin with basic understanding of the sub-systems (Battery, Motor, Charger, BMS, Controller, etc.) particularly the governing laws of the physics and then move on to the modeling of these sub-systems using Excel and Scilab. Once the sub-system is modeled, participant will get hands on experience in setting up simulations, executing them, processing results and drawing conclusions relevant to design and product definitions. The training will finally delve on how to set up optimization & robustness checks into simulation.

*MATLAB based training also available

More and More EVs and sub-systems DESIGN, CALIBRATION & TESTING becoming Virtual



OUR UNIQUENESS

Industry Valued Certification
Joint certification with **ASDC** on completion

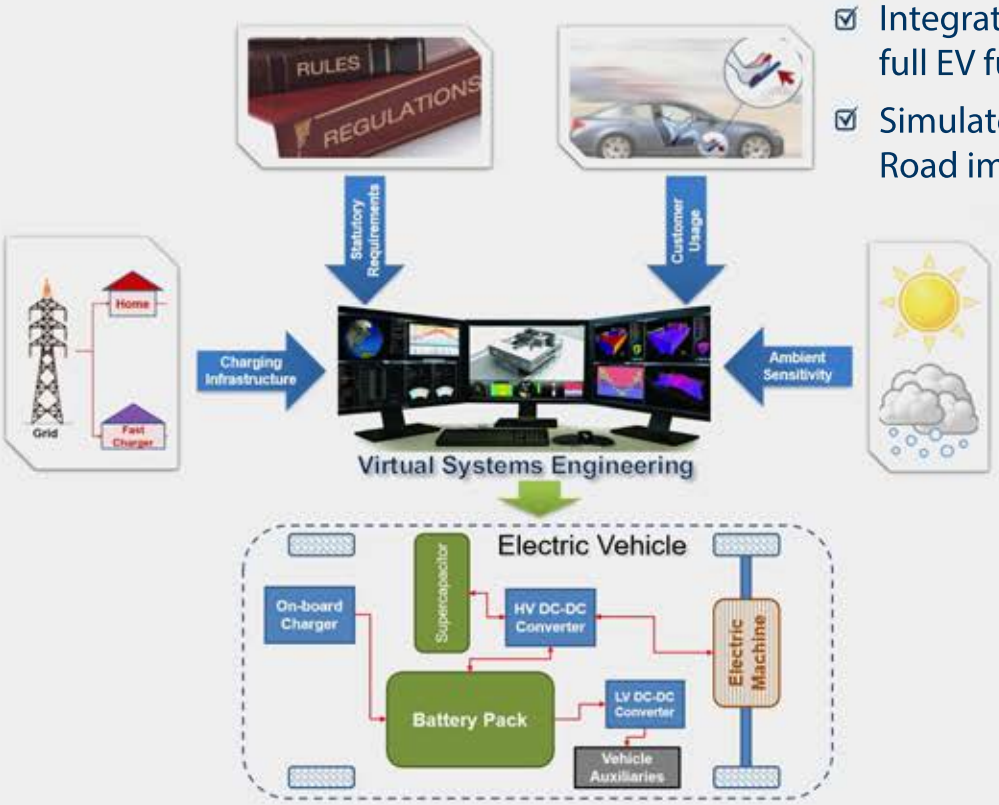
Global EV Experts
Trainers worked on global EV platforms & programs

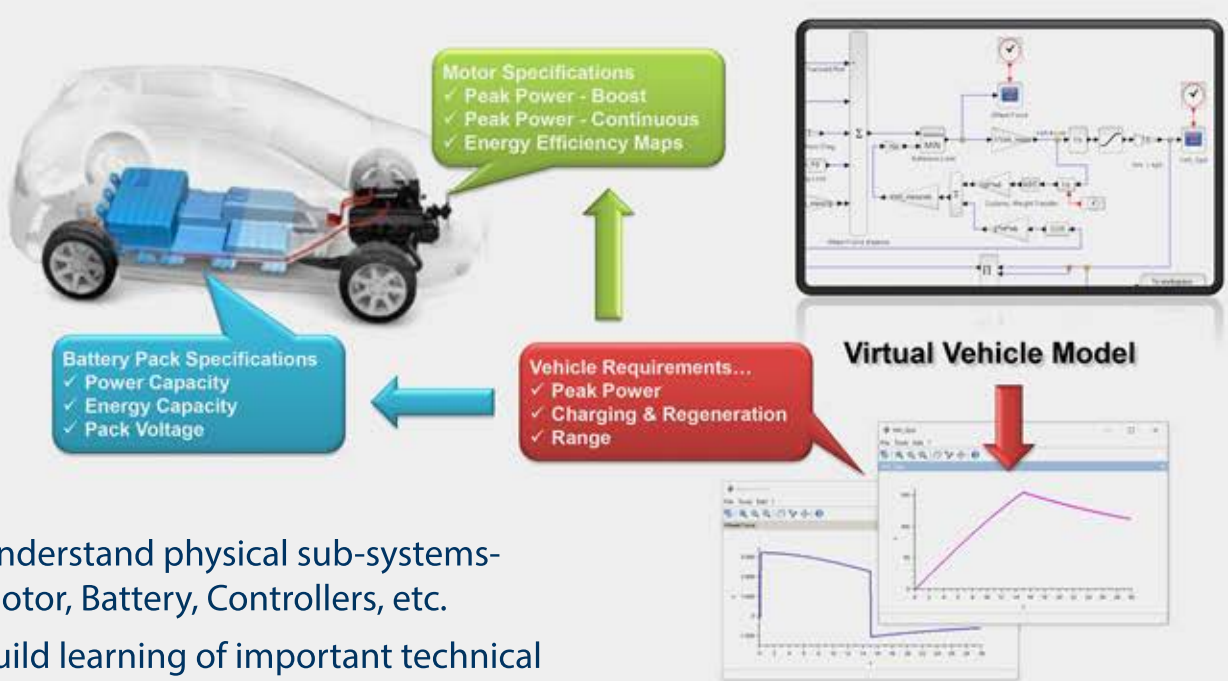
Hands-on Modeling
Weekly practice sessions using Excel and Scilab

Live Online Delivery
Join and learn from anywhere with content access
(Separate in-campus program available)

Easy time outside work
Theory Session in evenings on alternate weekdays and Practice sessions on Saturday afternoon

- Learn modeling of individual in-vehicle sub-systems
- Integration of sub-models into full EV functional models
- Simulate Driver, Ambient and Road impact on EV performance





- Understand physical sub-systems- Motor, Battery, Controllers, etc.
- Build learning of important technical specifications and performance
- Modeling impact of changing design specifications

PROGRAM SCHEDULE

Week	Module	Session	Contents
Week 1	Module 1: EV Technologies & Integration Aspects	Session 1	Electrical Vehicle Sub-systems
		Session 2	Induction machines – motors & generators
			Energy storage – batteries
		Session 3	Charging & Regeneration
			Power electronics
	Practical	Practical 1* (optional)	Session on Excel as a technical calculation tool
Week 2	Module 1: EV Technologies & Integration Aspect	Session 4	Vehicle systems & dynamics
	Module 2: EV System Modelling & Simulation	Session 5	System modeling techniques & approaches
		Session 6	Physics-based (first principle) modeling
			Data based modeling
	Practical	Practical 2* (optional)	Session on Scilab as system modeling tool
Week 3	Module 2: EV System Modelling & Simulation	Session 7	Root Cause Analysis (RCA) & Failure Mode and Effect Analysis (FMEA)
		Session 8	Setting up a real-life problem in simulation
			Managing model fidelity, accuracy & utility
	Assessment	Assessment 1	Mid-term – 1-hour online quiz to be completed before end-of-day Saturday of week 3
	Module 3: Energy Management & Control	Session 9	Basics of control systems
			Open-loop control
	Practical	Practical 3	Scilab EV sub-system models and integration into the system model
Week 4	Module 3: Energy Management & Control	Session 10	Closed loop control
			Predictive & adaptive control
		Session 11	Battery management systems
			Energy management systems
		Session 12	Other control system interfaces
			Functional safety
	Practical	Practical 4	Scilab EV controller models and integration into the system model
Week 5	Module 4: Infrastructure Dependencies	Session 13	Charging & grid liability
			Charging protocols & safety
			Renewable energy – cyclicity & load balancing
			Telematics & connected vehicles
	Module 5: Customer Usage Patterns (Individual & Fleet)	Session 14	Legacy customers of IC engine based vehicles
			First-time buyer – directly electric vehicles
			Customer clinics to vehicle technical specifications
			Data collection & analysis
	Assessment	Assessment 2	Final 1-hour Exam with e-proctoring
	Practical	Practical 5	Simulations & postprocessing, feedback from faculty

- **1.5 hours Theory Session on Weekdays**
- **2 hours Practice Session on Saturday**
- **One self-paced midterm and one final assessment and practical work**
- **Certification based on assessment & practical work on course completion**

About pManifold:
A Strategic Research and Consulting company that is enabling Smart and Clean Tech Markets development and growth in Energy, E-Mobility, Solar, LVDC, Enviro and Urban sectors. It is helping industries and organization innovate and transform their solutions, services and business model for faster reforms, higher customer experience and profitable market growth. It's EV Training Practice specialized in niche EV system-oriented courses to help the industry build new skills and drive improved EV adoption & experience.

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