

Industry Interaction Topic

Category	Topic	Brief on topics
Vehicle Dynamics	Steering Systems	Fundamentals of Steering Systems
	Braking Systems	Fundamentals of Braking Systems
	Powertrain	Fundamentals of Power Train - Engine, Transmission , Shaft , Differential
	Tires	Tire Fundamentals , Tire modeling - Pacejka's Magic Formula
	Forces Acting on vehicle	Estimation of Wheel Torque ,Estimation of Fx , Longitudinal Load Transfer , Lateral Load Transfer
	ESP	ABS - Fundamentals TCS- Fundamentals YSC - Fundamentals - Over Steer , Under Steer, Yaw rate determination , Coeining Physics , characteristic sped , critical speed , side slip angle, estimation of curve radius , understeer gradient detemination
	Longitudinal Dynamics	Fundamentals and Controller Basics
	Lateral Dynamics	Fundamentals and Controller Basics
	VDC controls	Architecure , Kalman Filter Fundamentals
	Communication Protocols	Overview of CAN, LIN, Flexray and basics of ethernet in Automotive
IPG CarMaker	IPG CarMaker General overview	Introduction to the tool, general features available, Project folder creation and its importance, first test run, IPG Movie, IPG Control, storing results, etc., Q&A
ADAS Autonomous Vehicle	Vehicle Generator	Vehicle model development from the scratch, full parameterization, model check and adding 3D files for visualizing the vehicle in virtual environment, hands-on, Q&A
	ADAS-Scenario editor	Creation of an environment, different approches like manual road creation, map based creation, etc., hands-on, Q&A
	Driver & Manuever	Driver modelling, Driver adaption, Maneuvering, DVA, hands-on, Q&A
	RT Expressions	Minimanuever command language and RT Expressions in CarMaker, hands-on, Q&A
	ADAS- Traffic creation	Traffic objects addition like vehicles, pedestrians, kids, animals, etc., hands-on, Q&A
	ADAS Sensors & Environment parameters	Different types of ADAS sensors in CarMaker and its applications, hands-on, Q&A
	ADAS - Vehicle control	Integration of Vehicle control models (Carmaker default models, integrating Simulink models and C-code models), hands-on, Q&A
	Test Automation	Test Manager, Script control, hands-on, Q&A
	Data Recording in CarMaker	Data recording component which can be used to generate log file defined for evaluation
ADAS Autonomous Vehicle	Overview of ADAS and Autonomous Driving	History and background of ADAS, evolution of Automated Driving and their linkage
	SAE level for AD	Explanation of various SAE levels and expected autonomy

	Overview of ADAS Functionalities	Overview of ADAS functionalities (EBA, ACC, LCF, etc.) and sensors involved in realizing those functions
	Introduction to system architecture concepts	Introduction to System Architecture (L0 and L1 level), case studies of system architectures from previous Autonomous Vehicles (if possible)
Sensing, Perception	Introduction to different sensing systems	Overview of different sensors and their applicabilities, concept of multiple sensor integration depending upon application needs
	RADAR	Basic concepts of Radar like FMCW, dopplers, azimuth estimations, range, radar cube, etc. Overview of long range and short range radar, applications, pros and cons
	Camera	Principles of Camera functioning, FOVs, types of cameras like mono, stereo, etc., applications, pros and cons
	LiDAR	Working principles of LIDAR, types of LIDARs, applications, pros and cons
	Ultrasound & Other Sensors	Working principles of Ultrasonic, ranges, applications, pros and cons
	IMU	Concepts of IMU, various axis data sensed, working principle and basic concepts
	GPS	Principles of GPS, working of sensors based on satellite, usage and integrity in Automotive
	Concepts of fusion	Understand need of fusion, types of fusion methodologies, how fusion is done (e.g., low level, high level fusion, Kalman Filter variants, etc.)
	Overview of AI/ML	Introduction to Machine Learning, various concepts like Neural Networks, application to ADAS.
Scenario Creation	Introduction to scenario creation	Basics of understanding a critical driving scenario in real world conditions, parameters to be considered for scenario re-creation
	Overview of regulations and consumer group protocols	Overview of NCAPs across the globe. Overview of other major regulations, e.g., UNE C152, etc.
	Introduction to various ADAS use cases defined in NCAPs	Walkthrough of use cases defined by NCAP, e.g., for EBA, etc.
	Overview of parameters to be monitored for scenarios	Introduction to various performance parameters like TTCs, position accuracies, sensitivity checks and data analytics, False Positive, True Negatives, etc.
	Introduction to data acquisition	Introduction to various data recorders, tools and equipments and analysis tools

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