



FACULTY DEVELOPMENT PROGRAM

WITH

JB INSTITUTE OF ENGINEERING AND

TECHNOLOGY

&

PANTECH SOLUTIONS INDIA PVT LTD

AUTONOMOUS VEHICLE DESIGN

Organised By: JB Institute of Engineering & Technology

In Association With: Pantech Solution India pvt.ltd

Technical Person: Sasi Kumar

PROGRAM DETAILS

- **Title:** AUTONOMOUS VEHICLE DESIGN
- **Date:** 13-07-2026 TO 17-07-2026
- **Timing:** 06:00 PM to 08:00 PM
- **Mode:** Online
- **Academic Year:** 2025-2026
- **Faculty co-ordinator:** Dr. P. Duraipandy

INDEX

- INTRODUCTION
- OBJECTIVES
- CONTENT
- AGENDA(DAY WISE)
- BROCHURE
- SAMPLE CERTIFICATE
- REGISTRATION LIST
- FEEDBACK LIST
- CONCLUSION
- VOTE OF THANKS

INTRODUCTION

Autonomous Vehicle Design is the process of developing intelligent vehicles that can operate and navigate without direct human intervention. These vehicles use advanced technologies such as Artificial Intelligence (AI), sensors, cameras, LiDAR, radar, GPS, and machine learning algorithms to perceive their surroundings, make decisions, and drive safely. Autonomous vehicles aim to improve road safety, reduce traffic congestion, enhance transportation efficiency, and provide greater mobility for people.



OBJECTIVES

- To develop vehicles capable of sensing and understanding their environment accurately.
- To implement intelligent decision-making algorithms for safe navigation and control.
- To reduce road accidents caused by human errors.
- To improve traffic flow and transportation efficiency.
- To integrate advanced sensors, cameras, and communication systems for real-time monitoring.

- To enhance passenger comfort, convenience, and accessibility.
- To optimize fuel consumption and support sustainable transportation.
- To enable vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication.
- To ensure reliable obstacle detection, lane keeping, and path planning.
- To create safer and smarter transportation systems for future mobility.

CONTENTS:

- **Introduction on Autonomous Vehicle System**
- **Labeling -MATLAB / Simulink**
- **Driving Scenarios – MATLAB/ Simulink**
- **Adas Algorithms – MATLAB/ Simulink**
- **Analysis and Implementation (ADAS)**

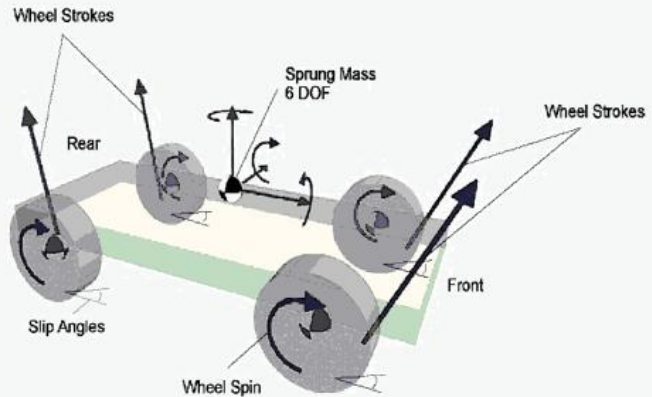
DAY 1

INTRODUCTION ON AUTONOMOUS VEHICLE SYSTEM

An Autonomous Vehicle System is an intelligent transportation system that enables a vehicle to operate with minimal or no human intervention. It combines sensors such as cameras, LiDAR, radar, GPS, and ultrasonic sensors with Artificial Intelligence (AI) and machine learning algorithms to perceive the environment, make driving decisions, and control vehicle movement. The system continuously monitors road conditions, detects obstacles, plans safe paths, and ensures efficient navigation

Introduction

- Vehicle dynamics is aim to describe how a vehicle moves on the road surface which it is under impact of forces between the tire and the ground.
- According to newtons second law, of mechanics
- How much power is required to overcome the zero position



www.pantechlearning.com

DAY 2

LABELING-MATLAB/SIMULINK

Data labeling is a crucial step in autonomous vehicle development. In MATLAB and Simulink, labeling tools are used to annotate objects such as vehicles, pedestrians, traffic signs, and lanes in image and video datasets. These labeled datasets are used to train and validate AI-based perception models. MATLAB provides apps like Ground Truth Labeler that simplify the process of creating accurate training data for object detection and classification.

Rolling Resistance Force(F_r)

- The rolling resistance of the tires on the hard surfaces is primarily caused by hysteresis on tire materials.
- The hysteresis causes an asymmetric distribution of ground reaction forces.
- This phenomenon results in shifting of the ground reaction force slightly (P) forward. In $P = m * g$
 m = mass of vehicle
 g = gravity force

Rolling resistant moment (T_r) = $P * a$

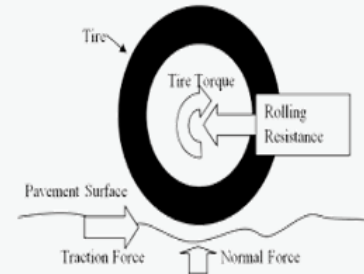
The force required to keep rolling (F) = $T_r / R_d = (P * a) / R_d = R_d = P * f_r$

where,

f_r = rolling resistance coefficient

now,

$$F_r = m * g * f_r$$



www.pantechlearning.com

DAY 3

DRIVING SCENARIOS -MATLAB/SIMULINK

Driving Scenarios in MATLAB/Simulink are virtual environments used to simulate real-world traffic conditions. Engineers can create highways, intersections, roundabouts, pedestrians, and different weather conditions to test autonomous driving algorithms. Simulation helps validate vehicle behavior before real-world deployment.

Aerodynamic drag:

- If a vehicle moving with a speed in air medium, it encounters force resisting its motion, the force is referred to as aerodynamic drag.
- Its classified in two forms, they are
 1. shape drag
 2. skin friction
- The air and vehicle skin produces friction that results in the second component of the drag.

$$F_d = \left(\frac{1}{2}\right) \cdot \rho \cdot C_d \cdot A \cdot v^2$$

where,

ρ – Air Density kg/m^3

A – Frontal Area m^2

C_d – Drag Coefficient

v – Velocity of the Vehicle m/s



www.pantechlearning.com

DAY 4

ADAS ALGORITHMS- MATLAB/SIMULINK

Advanced Driver Assistance Systems (ADAS) algorithms enhance vehicle safety and driving comfort. MATLAB/Simulink supports the development of features such as Lane Departure Warning (LDW), Adaptive Cruise Control (ACC), Automatic Emergency Braking (AEB), Traffic Sign Recognition (TSR), and Blind Spot Detection (BSD). These algorithms process sensor data to assist drivers and prevent accidents.

Grading resistance (Or) Hill climbing force :

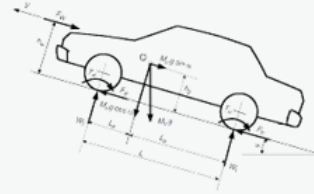
- When a vehicle goes up or down a slope, the weight produces a component which always in downward direction.
- The third force that acts on a vehicle is the gradient force, and it occurs when the vehicle is driving on an uphill or a downhill road.

$$F_g = m * g * \sin \theta$$

Total Tractive Power $P = F_{te} \cdot v$

Total Tractive Power $P = F_{rr} + F_{ad} + F_{hc} + F_{ia} + F_{wa}$

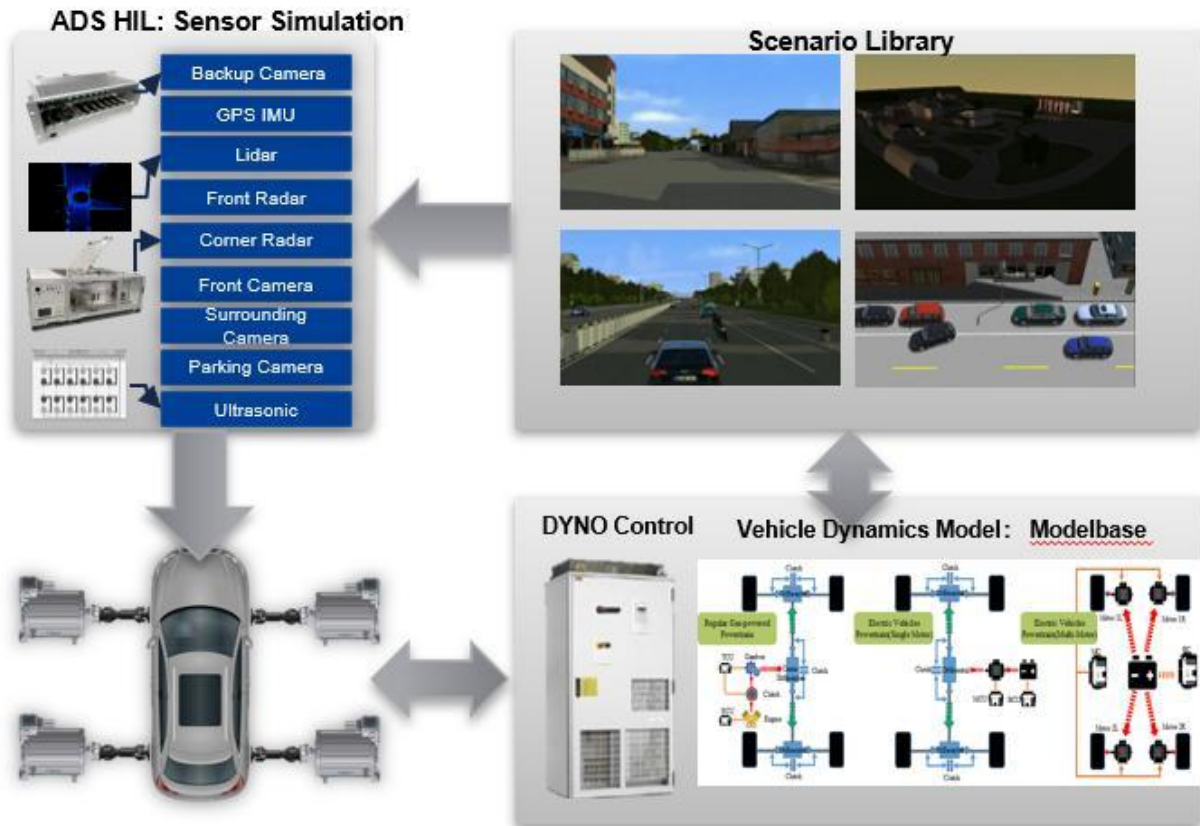
$$= \frac{1}{2} * \rho * C_d * A * v^2 + m * g * f_r + m * g * \sin \theta$$



DAY 5

ANALYSIS AND IMPLEMENTATION(ADAS)

The Analysis and Implementation phase involves testing, validating, and deploying ADAS algorithms. MATLAB/Simulink enables performance evaluation through simulation, Software-in-the-Loop (SIL), and Hardware-in-the-Loop (HIL) testing. This process ensures that ADAS features meet safety, reliability, and performance requirements before implementation in vehicles.



Technical Person Profile:

Name: Sasikumar R

Qualification: B.E. Mechanical Engineering

Experience: 3.5+ Years in Electric Vehicle Development

About

An enthusiastic engineer specializing in **Electric Vehicle (EV) hardware, embedded systems, and power electronics**. Experienced in developing EV prototypes, designing converters and inverters, and executing MATLAB/Simulink simulations. Skilled in PCB design, hardware testing, and resolving component-level issues using schematics and BOMs.

Key Skills

- EV Prototyping & System Integration
- DC-DC Converters & Multilevel Inverters

- BLDC Motor Control
- MATLAB/Simulink Simulation
- Cadence Schematic & PCB Design
- Battery Charging Systems
- Hardware Testing (IGBT, MOSFET)
- NX CAD Design

Experience Highlights

- Developed a complete **Electric Vehicle car prototype**
- 3 years of experience at **Pantech eLearning** in EV hardware & simulation
- Former **Quality Inspector** (EV Division), Ashok Leyland
- Built and delivered multiple EV student projects and hardware kits

Project Highlights

- EV Car Simulation & Battery Modeling
- Various DC-DC Converter Designs
- Single/Three-Phase & Multilevel Inverters
- DSPIC-based Battery Charging System
- BLDC Motor Controller Development

Strengths

Hands-on engineering, rapid prototyping, hardware troubleshooting, project coordination, and strong practical understanding of EV systems.

I hold a Bachelor's degree in Mechanical Engineering from S.K.P Engineering College (2020). I currently have **over three years of experience in the Electric Vehicle (EV) domain**, where I work on EV hardware development, power electronics, embedded systems, and simulation.

I have contributed to the design and development of several EV projects, including a complete mini EV car prototype. My work involves **testing electrical components**, creating **schematic and PCB designs using Cadence**, developing **MATLAB/Simulink EV simulations**, and integrating systems such as DC–DC

converters, inverters, BLDC motor controllers, and battery charging systems. I also have hands-on experience in hardware wiring, troubleshooting using schematics and BOM verification, and supporting the transition from prototype to production. In addition to EV projects, I have worked on embedded applications, including **DSPIC-based battery charging systems**, BLDC control hardware, and BCI-based robotic interfaces. My experience spans project planning, hardware testing, component selection, and technical documentation. I also previously served as a **Quality Inspector at Ashok Leyland**, gaining exposure to industrial EV manufacturing processes. I am passionate about Electric Vehicle technology, hardware development, and practical engineering.

BROCHURE



JB INSTITUTE OF ENGINEERING & TECHNOLOGY
(UGC Autonomous)
Yenkapally(V), Moinabad(M), R.R.District, Hyderabad-500075 @ www.jbiet.edu.in

In Association With


Technology Beyond The Dreams

Scan the QR For
Registration Fee 199/-



Chief Patron:
Shri J. V. Krishna Rao
Secretary, JBES

Patrons:
Dr. P. C. Krishnamachary, Principal
Prof. Ch. Sanjay, Director, JBES

Convenor:
Dr. P. Duraipandy
Associate Professor and HoD, Dept. EEE

Coordinators:
Mr. S. Rathna Kumar, Assistant Professor
Ms. K. Babitha, Assistant Professor

ABOUT FDP:

Autonomous Vehicle (AV) systems are at the forefront of modern automotive technology, integrating advanced sensors, perception algorithms, and control systems. This workshop will cover the essentials of AV design, including sensor functionalities, data labeling, driving scenarios, ADAS algorithms, and system analysis using MATLAB/Simulink. This comprehensive program is ideal for those looking to gain hands-on experience and deepen their understanding of AV systems.

EXPECTED OUTCOMES

- Gain a strong understanding of Autonomous Vehicle architecture, sensor technologies, perception systems, and ADAS functionalities.
- Develop practical skills in data labeling, driving scenario analysis, and implementing AV algorithms using MATLAB/Simulink.
- Learn to analyze, test, and evaluate autonomous driving systems for real-world applications and intelligent mobility solutions.

ELIGIBILITY

Faculty members and PG students, Research Scholars and Industry Persons.

INFORMATION

Online sessions with links shared via WhatsApp/Email; E-certificates awarded upon 80% attendance and feedback submission.

Five Day FDP On:

**AUTONOMOUS
VEHICLE DESIGN**

Organised By:
Department Of Electrical and
Electronics Engineering

Date & Time:
13/07/2026 to 17/07/2026
6.00 P.M to 8.00 P.M



Participants List:

Name of the Participant (As per Certificate)	Designation	College Name
ABBARAJU HIMA BINDU	Assistant Professor	J B Institute of Engineering and Technology, Moinabad, Hyderabad
Mr. Wayphale Nilesh Shivaji	Senior Engineer Development	Platemasters, Pune
SANAM RATHNA KUMAR	Assistant professor	JBLET
N Bharath Kumar	Assistant Professor	Vignan's Foundation for Science Technology and Research
TAVVA RAVI SANKAR REDDY	LECTURER IN EEE	SRI VENKATESWARA GOVERNMENT POLYTECHNIC TIRUPATI
Dr.N.MANONMANI	Associate Professor	Karpagam College of Engineering
SHAIK SHAJIN	BTech	Amrita sai institute of science and technology
CHITTALURI SOMESWARA RAO	Professor	Sree Vahini Institute of Science and Technology (Autonomous)
Muhammad Uthman Ibrahim	Postgraduate Student	Abdullahi Fodio University of Science and Technology, Aliero then Kebbi State University of Science and Technology, Aliero, Kebbi State, Nigeria
Divya Ratna Manikyam Eedarada	Assistant professor	International School Of Technology and Sciences For Women Engineering College
Shilam Immanuel	BTech	Amrita sai institute of science and technology
Arramoni Amala	Arramoni Amala	Malla Reddy College of engineering and technology
NAGA SWETHA BOPPANA	Assistant professor	VNRVJLET
VK CHAKRAVARTHY NAIK	asistant professor	SK University College of engineering and technology
B DEEPAK KUMAR	ASSISTANT PROFESSOR	SREYAS INSTITUTE OF ENGINEERING AND TECHNOLOGY
Dr Rajesh Thipparaju	Associate Professor	J B Institute of Engineering and Technology
T.Shailaja	Asst.professor	JBLET,MOINABAD
Kavali Babitha	Assistant Professor	J.B. Institute of Engineering and Technology
UPENDRA GUDIMALLA RAO	Asst.prof	JBLET
P Swathi	Assistant Professor	Jbiet
P. DURAIPANDY	Associate Professor and HOD	J. B. Institute of Engineering and Technology
A Rajitha	Assistant Professor	J B Institute of Engineering and Technology

A.Shivaramakrishna	Assistant Professor	J.B. Institute of Engineering and Technology
J.KARTIGEYAN	Associate Professor	J.B.Institute of Engineering and Technology
CH SHRAVAN KUMAR REDDY	Assistant Professor	JB Institute of Engineering and Technology
M Vinod Kumar	Assistant professor	JBIE
A Lavanya	Asst.prof	JBIE
RAMESH KUMAR MENTE	Assistant Professor	DVR & Dr HS MIC COLLEGE OF TECHNOLOGY
Begari Snehankitha	Student	Jbiet
Arun kumar Allam	Student	JB INSTITUTE OF TECHNOLOGY
Chenagoni Anand	Student	J.B.Institute of Engineering and Technology
RAMABAI N	PG STUDENT	J.B.INSTITUTE OF ENGINEERING AND TECHNOLOGY
KONETI SANJU	Assistant Professor	Pallavi Engineering College
ALLAMPUR MANIDEEPKUMAR	MTEC -EPS	JBIE
Rumana Farooqui	Rumana Farooqui	Jbiet

FEEDBACK LIST

PARTICIPANT NAME (IN CAPITALS - FOR CERTIFICATE) First and last name	Feedback for the Technical Session [Technical Content of the Seminar]	Feedback for the Technical Session [Communication of the Presenter]	Feedback for the Technical Session [Information Shared during the Seminar]	Feedback for the Technical Session [Hands on Training - Practical Sessions]
KUMARARAJA K	Good	Good	Good	Good
SURESH T	Good	Good	Excellent	Good
Karthik N	Excellent	Excellent	Excellent	Excellent
SENTHUR NS	Good	Good	Good	Good
Ms.C.Gomathi	Excellent	Excellent	Excellent	Excellent
G.swarnalakshmi	Good	Good	Good	Good
Thomas koilraj T	Good	Good	Good	Good
A. Arunkumar	Excellent	Excellent	Excellent	Excellent

NAVANEETHAKRISHNAN D	Excellent	Excellent	Good	Excellent
SANDI SRIDHAR REDDY	Excellent	Excellent	Excellent	Excellent
Aravindh S	Excellent	Excellent	Excellent	Excellent
K.S.VIGNESWARAN	Excellent	Excellent	Excellent	Excellent
MANOJ S	Good	Good	Good	Good

SAMPLE CERTIFICATE:



CONCLUSION

Autonomous Vehicle Design represents a significant advancement in modern transportation by integrating sensors, artificial intelligence, computer vision, and control systems to enable intelligent driving. Through technologies such as MATLAB/Simulink modeling, driving scenario simulation, labeling, and ADAS algorithm development, autonomous vehicles can improve road safety, reduce human errors, and enhance driving efficiency. As technology continues to evolve, autonomous vehicles are expected to play a vital role in creating safer, smarter, and more sustainable transportation systems.

VOTE OF THANKS

I would like to express my sincere gratitude to all the participants, organizers, faculty members, and resource persons for their valuable contributions and active participation in this program on Autonomous Vehicle Design. Your support and enthusiasm made this session informative and successful. Thank you all for your time, cooperation, and continuous encouragement. Wishing everyone success in their future learning and professional endeavors.

THANKYOU

Regards:

Lavanya A

7411463434

lglr@pantechmail.com

Pantech solution India pvt ltd