Descriptions of Courses

Fundamentals on Digital Electronic Circuits for Future Vehicle

The objective of this course is to deliver fundamental concepts and design methods on digital circuits and computer systems, focusing on vehicular electronics. Starting from the concepts of combinational and sequential logics and their implementation methods, we cover how the computer system works and how to approach a complex system systematically by partitioning it into two parts, data-path and control circuitry. In addition, advanced techniques such as pipelining and memory hierarchy will be introduced.

Vehicle Dynamics and Control

The purpose of the course is to understand the basics of power transmission mechanism and steering, braking and suspension systems as well as mechanics between tire and various road surfaces. Two commercial softwares, Carsim and Simulink, will be taught to enhance the understanding of the dynamics of vehicle with and without various active chassis controls. Also, vehicle dynamics control algorithms are studied to enhance vehicle longitudinal, lateral, vertical, yaw and roll dynamics.

Analog Intergrated Circuits

Introduction of circuit design using Bipolar and CMOS technologies

Automobile Embedded System Programming

This lecture Covers the basic embedded system programming which includes the principles of operating systems, kernel programming, device driver programming (character devices, block devices, and interrupt handling)

Automotive Power Electronics Systems

This course deals with the basic principles and operations of power semiconductor devices, DC-DC converters, and PWM inverters. It also deals with DC drives and AC drives for various applications, i.e., automobiles, elevators, and cranes, etc.

Future Vehicle Capstone Design

This course helps to provide the students who already have taken engineering courses in "Division of Future Vehicle" the ability to apply the domain knowledge to practical automotive related industrial problems and the creative problem solving ability based on the design methodology and techniques. The design team starts to solve the problem by defining the problem and further tries to think out a new creative design followed by detailed design. The design team then makes a prototype and evaluate the result. In the whole process, the advisor group of professors and researchers related with the selected topic renders the assistance in order to achieve the design objective.

Electric vehicle control system

This course covers the subjects of dealing with the real world problems associated with applying control theories to automotive systems that have the unique design limits in cost and robustness as well as performance. The first half of the course introduces the operation principles and the modeling of automotive control system. The second half covers introducing several control design methods followed by controller design case studies.

Smart Vehicle Dynamics

The vehicle dynamics course is currently taught here is seldom used in the development process of automotive and tire companies. In order to overcome this difficulty, practical vehicle dynamics has been developed in Hankook Tire, and furthermore it is improved based on smart concept. Physical phenomena and various testing data are explained through mechanism studies and mathematical equations.

Fundamentals of Vehicular Electric Systems

This course introduces the basic concept and operational principle of electronic circuits, electromagnetics and semiconductors and applications to motor, sensor, communication system, and wireless charging systems are explained based on the fundamentals to enhance the design ability for converging vehicle and transportation technology.

NVH of Environment-friendly Vehicles

Fundamental knowledge on vehicle noise, vibration, and harshness (NVH) will be studied. The topics on the design and the passive/active measure techniques will be covered: Characteristics of sources, human response, identification of sources and paths, analysis of vibro-acoustics fields, and control elements.

Electric Vehicle Propulsion System Engineering & Experiment

This course is designed to introduce students to the state-of-the-art Electrified Powertrain technologies based on modeling, dynamics, and controls approach. The course focuses on the system-level design and control problems of hybrid electric vehicles. We will introduce the basic concepts, terminology, and solve engineering problems of hybrid vehicles using system dynamics &controls approaches.

Electric Vehicle Powertrain Engineering

This course covers the vehicular technology of electric powertrain, which includes the environmental impact, electric and hybrid-electric, wireless in-motion charging vehicular technology and their systems, and fuel cell technology, in addition to the current IC-engine technology. It will also cover the core technology of the electric vehicle system, such as the energy storage system, the electric propulsion system and the incorporation of the smart grid technology with the electric vehicle as a major future transportation system.

Automobile Special Topics in Electrical Engineering

The course covers the theories and applications of selected automotive electronics fields as needed.