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Introduction to Autonomous and Electric Vehicles: A Functional Safety, SOTIF, and Cybersecurity Perspective

Course Duration: 2 Days - 8 Hours/day

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The automotive world is currently undergoing fundamental changes particularly in the development and deployment of electrical vehicles (EVs) and automated vehicles (AVs). The safety of the intended functionality (SOTIF) is becoming increasingly important for the analysis and design of highly automated vehicles. Critical design requirements for EVs and AVs include safety and cybersecurity. This two-day course will give the participant the base knowledge necessary to understand EV and AV design requirements from the perspective of Functional Safety (FS), SOTIF (safety of the intended functionality), and cybersecurity (CS). The course will also provide an overview of the standards ISO 26262 (FS), ISO/FDIS 21448 (SOTIF), and ISO/SAE 21434 (Automotive Cybersecurity). An overview of ISO 27001, United Nations (UN) regulation WP.29, and VDA ACMS (Automotive Cybersecurity Management System) will also be provided.

Learning Objectives

Participants successfully completing this course will be able to:

- List and explain the basic components, functionality, and architectures of EVs and AVs
- Explain the nature of thefunctional safety and cybersecurity requirements in the development of EVs and AVs.
- Analyze the SOTIF objectivesfor safety in the design of AVs.
- Analyze the perspectives ofSOTIF,functional safety, and cybersecurity in the design of EVs and AVs.
- List and explain the commonalities and design issues of safety and cybersecurity involving EVs and AVs.

Seminar Outline

Daily Agenda (approximate, based on class discussions)

Day One

- Chapter 1: Overview of Electric Vehicles
- Vehicle Architectures
- Brushless DC Motors
- Induction Motor
- Power Converters
- Batteries and battery management systems
- Powertrain controllers
- Chapter 2: Overview of Automated Vehicles
- Perception system and sensors
- Localization and mapping
- Path planning and decision making
- Motion control
- Chapter 3: Overview of functional safety (ISO 26262)
- Overview of automotive cybersecurity
- (ISO/SAE 21434), ISO 27001, WP.29, and VDA ACMS.
- Nature of functional safety requirements in the development of EVs and AVs.
- Nature of cybersecurity requirements in the development of EVs and AVs

Day Two

- Chapter 4: Overview of SOTIF principles
- SOTIF process flow
- SOTIF activities and supporting processes

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- Analysis of the SOTIF objectives for safety in the design of AVs
- Chapter 5: SOTIF Perspective
- Functional Safety Perspective
- Cybersecurity Perspective
- Commonalities and design issues of safety and cybersecurity involving EVs and AVs.

Who Should Attend

This course is designed for managers and new product development designers and support personnel.

Seminar Materials

Each participant will receive a seminar manual including breakout exercises.

Pre-Requisite

Participants should have a working knowledge of basic automotive functionality, components, and automotive electronics including hardware and software.

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