Course Introduction

This course provides a balanced overview of a variety of connectivity related topics. The course is not intended as a programming tutorial, but rather gives an in-depth explanation of the concepts behind the connectivity of Connected Autonomous Vehicles (CAVs). It starts by exploring general networking basic concepts and then goes into the principles of wireless communications. Special consideration is given to the car-to-car and car-to-infrastructure basic and advanced topics.

This course also details the achievements of US developments and separately the EU approach to connectivity including special cases on Dedicated Short-Range Communication standards. Learners will find in-depth overviews of wireless technologies including Wi-Fi, GSM, 3G, 4G, 5G, SMS etc. One of the units specifically looks at the development of in-car applications, giving an overview of the Google and Apple approaches to in-car connectivity and development. Finally, the course introduces the likely interaction between the traffic and the local authorities’ traffic control centres for building future CAV-based Intelligent Transport System (ITS).

Course units

- Unit 1: Connectivity – basic networking concepts for Connected and Autonomous Vehicles (CAVs)
- Unit 2: Vehicle telematics
- Unit 3: Introduction to ad-hoc networks – principles, problems, MANET, VANET
- Unit 4: Advanced – working within MANETs, VANETs for future ITS
- Unit 5: Introduction to (CAV) connectivity technologies – Wi-Fi, GSM, 3G, 4G, 5G, SMS
- Unit 6: Designing V2V and V2I applications – reference implementations and connectivity considerations
- Unit 7: Development of in-car apps
- Unit 8: Connected cars and the future of traffic control systems
- Unit 9: Final Assessment

Learning outcomes

- Understand the principles of modern networking systems and create novel (wireless) networking architectures for connected vehicles and infrastructures
- Understand the principles of modern wireless technologies - WiFi, GSM, 3G, 4G, 5G, SMS – and build applications using them
- Understand the principles of building modern ITS using wireless technologies and use these wireless technologies for designing wireless connectivity paradigms for CAVs
- Learn how to develop, design and build new in-car applications
- Learn how modern ITS can use CAVs for the purposes of providing better traffic control

Course content may be subject to change or updates. Please contact the IET for the latest course content.
Expert multidisciplinary e-courses for engineers at all career stages

Key features
- The first course on the market to provide an overview of wireless technologies and their relationship with CAV concepts
- Offers an in-depth overview of the wireless technologies and their pros and cons for use in CAVs, which is necessary for the design of CAV future features
- It introduces advanced and novel communication paradigms for use in autonomous vehicles
- Provides detailed comparisons of the European and US approaches to communications networks and connectivity technologies

What makes the IET Academy online courses different?
A new training resource from the IET, the Academy provides flexible e-learning using the latest techniques to enhance engagement and recall.

Each individual unit is fully interactive, with tasks to compete along the way to help embed your learning. Hosted on the renowned Cross Knowledge platform, the Academy uses proven, effective learning techniques.

Benefits for organisations
This course can be booked for multiple users across your organisation, ensuring that your workforce is up to date and working to the same level. The flexible access allows learners to complete modules in their own time and at their own pace, so that businesses are not impacted by external training days.

Course pre-requisites
Learners should understand the basic general networking concepts – ISO 7-layer architecture, IP addressing and basic routing protocols knowledge.

Cost effective and flexible
For many engineers staying informed or changing technology to remain current in their role is paramount, however, finding the time and budget to attend external training is challenging. The IET Academy’s flexible learning platform allows access to training ‘anytime, anywhere’ or the course content can be quickly and easily integrated into an existing learning management system.

Target audience
- Developers and senior developers of networking systems
- Team leaders – connectivity (one level up from developers)
- Technical architects – designing novel connectivity concepts – high level concepts adoption
- Chief Technology Officers (CTO) – understanding and driving the development of novel applications in the connectivity of CAVs

Other related courses
- An Introduction to the Connected and Autonomous Vehicles Landscape
- Connected and Autonomous Vehicles – Computer Vision and AI
- Connected and Autonomous Vehicles – Cybersecurity
- Connected and Autonomous Vehicles – Sensors and Sensor Fusion
- Connected and Autonomous Vehicles – Human Factors and Human-Machine Interface

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