USEEN5 - Embedded Systems: Applications and Cybersecurity

Mis à jour le 26-06-2024

Code : USEEN5

Unité spécifique de type cours

6 crédits

Responsabilité nationale : EPN05 - Informatique / Sami TAKTAK

Présentation

Prérequis

Computer Science or Computer/Electrical Engineering Bachelor:

- Good knowledge in Architecture and Operating Systems
- Good knowledge of C programming
- Good comprehension of build systems and command line interaction with operating systems

Objectifs pédagogiques

The goal of this course is to study both hardware components and operating systems used in resource constraint applications often encountered in IoT and more generally in Embedded Systems. After completing this course, you will be able to build from scratch a complete embedded system: from selecting the right combination of hardware and software stack to the integration process suitable for building a specific project.

Compétences

- IoT engineer
- Hardware / Software integration engineer

Programme

Contenu

- Hardware Architecture:
  - Exploring processors for IoT applications
  - Mono-core vs multi-core vs system on chip architectures
  - Heterogeneous computing
- Operating systems for Embedded systems:
  - Boot process
  - Scheduling and real-time operating systems
  - Hardware / software integration: BSP, drivers, porting OS and libraries
- Build system for automated embedded and IoT software production
  - Tools for automated building of IoT operating systems and software: Buildroot, Yocto
  - Packages managers
  - Continuous integration infrastructure for IoT
- Cybersecurity and Hardening of IoT systems
  - Secure boot process
  - Securing network services and remote access
  - Secure update of applications and operating system

Modalités de validation

- Contrôle continu
- Projet(s)
- Examen final

Description des modalités de validation

Continuous Evaluation and final exam.

Bibliographie

Titre	Auteur(s)
High-Performance Embedded Computing	Marilyn Wolf