- General Engineering Program
- A&M - Year 4
- Semester 8
- Advanced Software & Hardware 2

Advanced Software & Hardware 2

Données Générales			
Programme Académique	**General Engineering Program**		Responsable(s) Module JOUVE Christophe
Type de module : Unité d'Enseignement	**Advanced Software & Hardware 2** (LIIAem08UUASH2)		
Crédits (ECTS)	5		
Effectif maximum	80		
Durée totale : 42h00	Periode Semester 8	Langue d'enseignement :	

- General Engineering Program
- A&M - Year 4
- Semester 8
- Advanced Software & Hardware 2
- API Language And Robotic Systems

API Language And Robotic Systems

Données Générales			
Programme Académique	**General Engineering Program**		
Type d'EC : Cours	**API Language And Robotic Systems** (LIIAem08EAPISysRob)		
TP : 16h00 Cours : 6h00 Durée totale: 22h00	Statut	Periode Semester 8	Langue d'enseignement : French

Prérequis

Évaluation(s)			
N°	**Nature**	**Coefficient**	**Objectifs**
1		1	Written exam

- General Engineering Program
- A&M - Year 4
- Semester 8
- Advanced Software & Hardware 2
- Digital Servo

Digital Servo

Données Générales

Programme Académique	**General Engineering Program**
Type d'EC : Cours	**Digital Servo** (LIIAem08EAssNum)

TD : 6h00 TP : 4h00 Cours : 14h00 Travail personnel : 10h00 Durée totale: 34h00	Statut	Periode Semester 8	Langue d'enseignement : French

Acquis d'apprentissage

"Common programming control techniques and their typical applications.
Main methods, their limitations and common applications of digital regulators.
Technical vocabulary of these methods.
Ability to choose a solution adapted to the processes to be controlled according to the specifications of the manufacturer.
"

Contenu

"Modeling of the sampled signals, the Z transform, recurrence equation
- Servo-controls of the sampled linear systems.
- The digital equivalent of an analog PID corrector
- RST correctors
- Control with internal model (predictive control)
- Analysis of robustness and performance
- Temperature regulation of a unit heater
"

Prérequis

Automation 1

Bibliographie

1-.F. Franklin, J.D. Powell, and A. Emami-Naeini, "Feedback Control of Dynamic Systems," Prentice Hall, 4th edition (2002)
2-K. Ogata. Discrete-time control systems. Prentice Hall, Upper Saddle River, New Jersey, 1995.
3-K. Ogata. Modern Control Engineering. Prentice Hall, Upper Saddle River, New Jersey, 1997.
4-R. C. Dorf and R. H. Bishop. Modern control systems. Prentice Hall, Upper Saddle River, New Jersey.

Évaluation(s)			
N°	**Nature**	**Coefficient**	**Objectifs**
1		2	Written exam
2		1	Practical work

- General Engineering Program
- A&M - Year 4
- Semester 8
- Advanced Software & Hardware 2
- Embedded Software

Embedded Software

Données Générales

Programme Académique	**General Engineering Program**		
Type d'EC : Cours	**Embedded Software** (LIIAem08ESystEmbCon)		
TP : 16h00 Cours : 4h00 Travail personnel : 8h00 Durée totale: 28h00	Statut	Periode Semester 8	Langue d'enseignement : French

Acquis d'apprentissage

-Practical approach to connected IoT (Internet of Things) systems for various embedded applications
-Developing a connected IoT application: video games, automobile, electricity and energy consumption metering, RFID, etc.
- Using BASYS 3 FPGA board to make applications, like: full adder, multiplier, counter, shift register, LED chain, temperature sensor

"

Contenu

- Lectures:
- Programmable Logic
- VHDL

- 4 labs (4 hours):

- The first two sessions are dedicated to the development of one or more applications on C:
- Using a Nintendo Nunchuck grip
- ERDF remote information and energy metering
- Reading RFID tags
- Scan of a CAN network and site manipulators

- The other two sessions are dedicated to development on the Bays 3 FPGA board using VHDL:
- Full adder
- Multiplier
- Counter
- Shift register
- LED chain
- Temperature sensor

Prérequis

"Knowledge of programming languages in C and C ++.
- Scientific and technical knowledge on discontinuous logic systems (semester 5).
- Knowledge of asynchronous and synchronous systems analysis approaches (semester 5)."

Bibliographie

Toulson, R., & Wilmshurst, T. (2016). Fast and effective embedded systems design: applying the ARM mbed. Newnes.
Gunther Gridling, Bettina Weiss : Introduction to Microcontrollers, Courses 182.064 & 182.074, Vienna University of Technology
X. Fenard : Le Bus USB, Guide du concepteur - Dunod
M. Nelson : Communications série - Dunod
Bert Van Dam : Microcontrôleurs RISC 32 bits à architecture ARM - Elektor-Publitronic

Évaluation(s)

N°	Nature	Coefficient	Objectifs
1		1	Lab

- General Engineering Program
- A&M - Year 4
- Semester 8
- Advanced Software & Hardware 2
- Introduction To Data Science

Introduction To Data Science

Données Générales

Programme Académique	**General Engineering Program**
Type d'EC : Cours	**Introduction To Data Science** (LIIAem08EMachineLearning)

Cours : 8h00 Projet : 10h00 Travail personnel : 8h00 Durée totale: 26h00	Statut	Periode Semester 8	Langue d'enseignement : French

Acquis d'apprentissage

The theme of the DATA course in digital coloring is machine learning.
The goal is to understand the issues and initial concepts of machine learning.
Skills:
- Understand conceptual definitions
- Understand mathematical definitions
- Implement these definitions on simple examples
- Implement on a complex example
- Analyze the results and suggest improvements
- Team working

Contenu

The course plan is as follows:
- Linear regression and Gradient Descent
- Logistic regression
- Data: learning base vs test base
- Over and under learning
- Meta parameters
- Perceptron
- Neural networks

The course will be enhanced with many exercises.

The second part of the course is carried out in the form of a project whose objective is to implement the concepts seen in the first part. It is about carrying out a machine learning process on a real basis and studying the avenues for improvement.

Prérequis

- Basics of algorithms.
- Python basics

Bibliographie

Machine Learning course - Andrew Ng - Coursera - Stanford - 2021. Online : https://fr.coursera.org/learn/machine-learning
Vidéos 3Blue1Brown series - Saison 3 - 2021 : Online ; https://www.youtube.com/playlist?list=PLZHQObOWTQDNU6R1_67000Dx_ZCJB-3pi
Deep Learning With Python, François Chollet, Edition Manning, 2022

Évaluation(s)

N°	Nature	Coefficient	Objectifs
1		1	Project
2		1	Continuous Assessment