

## **Module Name: (A.1) Embedded Systems**

### **Aim**

This module aims at providing students with advanced knowledge and skills of embedded systems. Students will be able to model, design and implement complex systems for the Internet of Things (IoT). They will be able to understand the operation and maintain of many embedded systems in manufacturing and commercial applications. During the semester students will have a project assignment to design and implement an embedded system and should be carried out by groups.

### **Learning Objectives**

The learning objectives include the critical review and analysis of many embedded systems. The module will focus on the design and implementation of embedded systems, e.g. complex system modeling with SysML, system validation, quantitative evaluation of embedded systems, electronics, mathematics, embedded computer architecture, wireless communication systems and “system on a chip” technologies. In meeting the above many scientific and engineering topics, ranging from control engineering, integrated circuit design, computer architecture, communication networks, real-time operating systems, and software engineering, will be considered.

### **Learning Outcomes**

An embedded system is a combination of hardware systems (electrical engineering) and software systems (computer science) built into equipment that one doesn't always recognize as being computerized, such as the system that controls the anti-lock brakes of a car, the automatic pilot of an aircraft or the sensors and filters used in processing plants. Embedded systems call for real-time operation, reliability, maintainability, and cost-effectiveness, which place heavy demands on software (user interfaces, data processing and machine control) and hardware (I/O, Asics, DSP, FPGA).

Therefore, on successful completion of this module, students should be able to develop skills in building, programming, and maintaining an embedded system to meet the above-mentioned specifications and characteristics.

They will also be able to develop skills required to carry out academic or industrial research and development.

### **Bibliography**

- [1] D. Pogaridis, “Embedded Systems”, DISIGMA publications, 2015.
- [2] Fabrice Kordon Jérôme Hugues Agusti Canals Alain DohetR. Barnet, L. O’Cull, S. Cox , “Embedded Systems- Analysis and Modeling with SysML, UML and AADL”, Wiley-ISTE, 2013.
- [3] M. Dasygenis and D.Sountris, “Embedded Systems”, KALLIPOS, 2015.
- [4] Peter Marwedel, “Embedded System Design”, EYDOXOS, Springer, 2018.