Universitat Autònoma de Barcelona

Radiofrequency Identification Systems (RFID) 2016/2017

Code: 42848
ECTS Credits: 6

Degree	Type	Year	Semester
4313797 Telecommunications Engineering	OT	2	1

Contact

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Use of languages

Principal working language: english (eng)

Prerequisites

Plannar Antennas for Wireless Systems and other modules related to RF and Microwave circuits

Objectives and Contextualisation

Tha main aim of the module is to acquire advanced knowledge related to Radio Frequency Identification systems (RFID) with an special emphasis on the design of high performance RFID Tags. It is also the aim of the module an introduction to commercial electromagnetic simulators for the design of RFID devices and also the use specific instrumentation for its characterization.

Skills

- Capacity for critical reasoning and thought as means for originality in the generation, development and/or application of ideas in a research or professional context.
- Capacity for developing radio communications systems: design of antennas, equipment and subsystems, channel modelling, calculation of links and planning.
- Capacity to apply advanced photonic and optoelectronic knowledge , as well as high frequency electronics
- Maintain proactive and dynamic activity for continual improvement
- Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
- Students should be capable of integrating knowledge and facing the complexity of making judgements using information that may be incomplete or limited, including reflections on the social and ethical responsibilities linked to that knowledge and those judgements
- Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
- Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Learning outcomes

1. Capacity for critical reasoning and thought as means for originality in the generation, development and/or application of ideas in a research or professional context.
2. Define the characteristics of the RFID system to be used according to the characteristics of the product you want to identify.
3. Design antennas for use in RFID readers depending on the final application for which it is required.

4. Design microwave components using equivalent circuits and simulation tools.
5. Design RFID label with appropriate performance for each application taking into account parameters of cost, bandwidth, size and detection distance.
6. Maintain proactive and dynamic activity for continual improvement
7. Possess and understand knowledge that provides a basis or opportunity for originality in the development and/or application of ideas, often in a research context
8. Students should be capable of integrating knowledge and facing the complexity of making judgements using information that may be incomplete or limited, including reflections on the social and ethical responsibilities linked to that knowledge and those judgements
9. Students should know how to apply the knowledge they have acquired and their capacity for problem solving in new or little known fields within wider (or multidisciplinary) contexts related to the area of study
10. Students should know how to communicate their conclusions, knowledge and final reasoning that they hold in front of specialist and non-specialist audiences clearly and unambiguously

Content

• Introduction to RFID systems. Components and operation of an RFID system. Bands and regulated emission power. Types of RFID systems (passive vs active and near field vs far field).
• Modulation and coding. Communication protocol.
• RFID tags. Fundamental parameters (read range, EIRP, gain and power transmission coefficient)
• Design of RFID tags. Antennas for RFID, conjugate matching. Tags for metal products. "Global band" tags.
• RFID Readers
• Measurement and characterization of RFID tags
• Applications

Methodology

The methodology will combine in-situ classes, problem resolution, work in the laboratory, the realization of supplemental works from recommended lectures and autonomous work as well. Virtual platforms will be used.

Activities

Title	Hours	ECTS	Learning outcomes
Type: Directed			
Magistral Classes	30	1.2	1, 2, 9, 10, 8, 7
Problem Resolution	5	0.2	1, 2, 9, 10, 8, 7
Supplemental work	10	0.4	1, 2, 6, 9, 10, 8
Type: Supervised			
work in the laboratory	15	0.6	1, 2, 6, 9, 10, 8, 7
Type: Autonomous			
Home study and preparation of laboratory sessions	88	3.52	1, 2, 6, 9, 10, 8, 7

Evaluation

Final Exam + partial exams (75%)

Deliverables from lab. and exercises (25%)

The lack in qualifications in the Exams or the absence in any of the lab sessions will define the student as non qualified

Changes to this evaluation method are possible if considered by the teacher.

Evaluation activities

Title	Weighting	Hours	ECTS	Learning outcomes
Exams	60	2	0.08	1, 2, 3, 5, 6, 9, 10, 8, 7
Lab reports	20	0	0	1, 2, 4, 6, 9, 10, 8, 7
Supplemental work	20	0	0	1, 2, 3, 5, 6, 9, 10, 8, 7

Bibliography

1. V.D. Hunt, A. Puglia and M. Puglia. RFID. A guide to Radio Frequency Identification. John Wiley & Sons, New Jersey 2007.

2. H. Lehpamer. RFID design principles. Artech House, Norwood 2008.

3. D. M. Dobkin. The RF in RFID. Passive UHF RFID in Practice. Elsevier 2008.