COURSE DESCRIPTION CARD - SYLLABUS

Course name
Automated identification systems [S2Inf1-IP>SAI]

Course

Field of study
Computing

Year/Semester
2/3

Area of study (specialization)
Internet of Things

Profile of study
general academic

Level of study
second-cycle

Course offered in
polish

Form of study
full-time

Requirements
compulsory

Number of hours

Lecture
30

Laboratory classes
30

Other (e.g. online)
0

Tutorials
0

Projects/seminars
0

Number of credit points

3,00

Coordinators

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Lecturers

Prerequisites

The student should have basic knowledge of electronics, operating systems and cryptography. She/he should also have the skills to: solve basic problems in the field of application design, programming in high-level languages and obtain information from the printed and/or online sources. Moreover she/he should understand the necessity to expand her/his competences.

Course objective

Provide students with the basic knowledge regarding automated identification systems used in logistics and for identifying objects in Internet of Things (standards, applications, designing and programming systems which use smart cards and/or automated identification systems). In addition, developing students" skills in designing and programming systems which use technologies related to automated identification.

Course-related learning outcomes

Knowledge:

1. the student has orderly, theory-based, general knowledge in the field of construction, principles of operation, programming and applications of devices which use rfid, nfc, barcode and smat card standards.
2. the student has knowledge of: design of rfid readers and tags, smart cards, transmission protocols used in smart cards, smard cards operating systems, communication of the card or tag with the reader, programming and applications of smart cards.
3. the student has knowledge in the field of automated object identification systems in internet of things including applications of gs1 standards
4.the student knows the areas and examples of practical applications of automated identification systems.

Skills:
1. the student is able to design the software for the selected automated identification system, according to a predefined specification which takes into account non-technical aspects, and carry out this project at least in part using appropriate methods, techniques and tools
2. the student is aware that during designing software for automated identification system, sometimes there is a need to reach for the right standard or specification and apply them in practice.

Social competences:
1. the student understands that in the field of automated identification systems knowledge and skills can quickly become obsolete.
2. she/he understands the importance of standards and specifications in the field.

Methods for verifying learning outcomes and assessment criteria

Learning outcomes presented above are verified as follows:

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Assessment of knowledge acquired during the lecture is based on a written colloquium in the form of a test, which may include 20 to 50 open and closed questions. In case of closed questions it is a multiple-choice test. The score of individual questions is given in the content of the question. The form of the test and the issues to which it applies are discussed during one of the last lectures. For a score of 3.0 the student should get at least 50% of points, 3.5 at least 60% of points, 4.0 for at least 70% of points, etc.
In terms of laboratories, the verification of the assumed educational results is carried out by:
1. the assessment of the tasks carried out within the framework of subsequent laboratory classes, for each correctly performed task a maximum of 1 point can be obtained; on the basis of the number of points scored, a partial assessment is given.
2. the final test covering the issues practiced within the laboratory classes, the test consists of randomly selected questions concerning each of the exercise topics; for each correct answer 1 point can be obtained; on the basis of the number of points scored, a second partial assessment is given
3. execution and defense of the project, for which the third partial evaluation is given
4. the final grade is given on the basis of three partial grades, as a weighted average

Programme content

The lecture program includes the following issues:
The role and importance of identification systems used in Internet of Things. GS1 system: the role of a standard, identification of different types of objects, applications. Barcodes: operating principle, barcode parameters, barcode types, printing and quality verification, barcode reading. RFID: operating principle, tag categories, writing and reading. EPC: standard, principles, application benefits. GDSN - global data synchronisation network. The construction and operating principles of smard cards and terminals. An overview of basic applications of smart cards. Communication between the smart card and the terminal. Programming of smart cards and automated identification systems.
Laboratory classes are conducted in the form of 2-hour exercises, taking place in the laboratory. The exercises are divided into two parts. In the first part, students perform subsequent practical exercises concerning various technologies. This part ends with a test that checks the acquired knowledge. The second part is related to the practical or theoretical project. The laboratory program includes the following issues:
Operating the following types of smart cards: JavaCard, SIM, BasicCard, .NET and student ID card. Encryption. Handling and storage of encryption keys and digital signature on the card. Languages and techniques of electronic card programming. Applications of smart cards. Handling of barcodes: coding,

printing, reading. RFID technology reading and writing of RFID tags. Exercises in NFC technology.

Teaching methods

1.Lecture: multimedia presentation.
2. Laboratory exercises: task solving, practical exercises, project.

Bibliography

Basic
1. E. Hałas (ed.): Kody kreskowe i inne globalne standardy w biznesie. Instytut Logistyki I Magazynowania 2012.
2. B. Gładysz, M. Grabia, K. Santarek: RFID od koncepcji do wdrożenia : polska perspektywa, PWN, 2017.
3. K. Mayes, K. Markantonakis (ed.), Smart cards, tokens, security and applications (2-nd edition), Springer, 2017 (https://link.springer.com/content/pdf/10.1007%2F978-3-319-50500-8.pdf)
4. M. Kubas, M. Molski: Karta elektroniczna : bezpieczny nośnik informacji, Mikom, 2002
5. W. Rankl, W. Effing: Smart card handbook (4-th edition), Wiley, 2010
6. S. A. Ahson, M Ilyas: Near Field Communications Handbook, Taylor & Francis, 2016 (http://library.put.poznan.pl/do/access?TandFbooks9781420088151)
7. www.smartcardbasics.com
Additional
1. Kody kreskowe: rodzaje, standardy, sprzęt, zastosowania (2-nd edition). Instytut logistyki i magazynowania, 2000
2. K. Finkenzeller: RFID Handbook, (3-rd edition), Wiley, 2010
3. W. Wieczerzycki (red.) E-Logistyka.. Polskie Wydawnictwo Ekonomiczne, 2012
4.U. Chirico: Smart Card Programming, (2-nd edition), Lulu.com, 2015.

Breakdown of average student's workload

	Hours	ECTS
Total workload	75	3,00
Classes requiring direct contact with the teacher	60	2,00
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	15	1,00