GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	IoT Hardware Platforms, PG_00064018		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	February 2025	Academic year of realisation of subject	2024/2025
Education level	second-cycle studies	Subject group	Optional subject group Specialty subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	2.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Metrology and Optoelectronics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Andrzej Kwiatkowski	
	Teachers	dr inż. Andrzej Kwiatkowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	15.0	0.0	15.0	0.0	0.0	30

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	30	2.0	18.0	50

Subject objectives

The aim of the course is to familiarize students with the structure of popular hardware platforms used in Internet of Things (IoT) systems, wired and wireless interfaces used in IoT devices, popular communication modules, data storage methods, issues of software minimization of energy consumption and hardware-assisted methods of information security.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum	He knows and distinguishes the architectures of IoT systems, he is able to choice them depending on the required computing power and available energy source. He understands the need to secure information. He knows the methods of storing data and how to use communication modules	[SW1] Assessment of factual knowledge
[K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it	He is able to select and configure a hardware platform depending on needs. Selects an appropriate interface and communication module depending on the required bandwidth and amount of data. Is able to configure a system that stores data locally and in the cloud. Is able to use design tools dedicated to the selected hardware platform.	[SU4] Assessment of ability to use methods and tools [SU1] Assessment of task fulfilment

<table>
<tr><td>Subject contents</td><td>1. Basic concepts and definitions.2. Classification of data processing units (microcontrollers, microprocessors, SoC, SBC).3. Wired communication interfaces in IoT.4. Wireless communication interfaces in IoT.5. Data storage.6. Overview of typical hardware platforms.7. Overview of selected communication modules; 8. Single board computers as an IoT platform.9. Minimizing energy consumption - special operating modes;10. Data security issues in IoT.</td></tr>
<tr><td>Prerequisites and co-requisites</td><td>Basic knowledge of digital circuit, microprocessors and microcontrollers, and programming in C.</td></tr>
<tr><td>Assessment methods and criteria</td><td>
<table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Semester test</td><td>50.0%</td><td>50.0%</td></tr>
<tr><td>Laboratory exercises</td><td>50.0%</td><td>50.0%</td></tr>
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<tr><td>Recommended reading</td><td>
<table>
<tr><td>Basic literature</td><td>1. Datasheet of modules and integrated circuits presented during the lecture
2. Aamir Riaz: Inter-communicating things - IoTs, Pacific RadiocommunicationWorkshop 2019
3. Stuart R. Ball, Embedded Microprocessor Systems: Real WorldDesign, Third Edition
4. Arnold S. Berger, Embedded Systems Design: An Introduction toProcesses, Tools and Techniques
5. John Catsoulis, Designing Embedded Hardware
6. Ken Arnold, Embedded Controller Hardware Design
7. Texas Instruments: Design a Cloud Connected IoT Gateway with Security Protection
8. D. Avelino (AWS): Connecting Buildings to a Smart World with IoT,Cloud Computing and Digital Ceiling
9. A. Karkare: Internet of Things: An Overview
10. S. Mielczarek: Szeregowe interfejsy cyfrowe
11. P. Metzger: Anatomia PC, wydanie XI
12. Philips Semiconductors: AN10216-01 I2C MANUAL, 2003
13. NXP: UM10204: I2C-bus specification and user manual, 2014
14. Analog Devices: Introduction to SPI Interface, Analogue Dialog 2018.
15. S. Mielczarek: USB. Uniwersalny interfejs szeregowy.</td></tr>
<tr><td>Supplementary literature</td><td>1. Ed Sutter, Embedded Systems Firmware Demystified
2. Michael Barr, Programming Embedded Systems in C and C ++
3. Stuart R. Ball; Debugging Embedded Microprocessor Systems,</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
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<tr><td>Example issues/ example questions/ tasks being completed</td><td></td></tr>
<tr><td>Work placement</td><td>Not applicable</td></tr>
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