GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Microprocessor Technology, PG_00047698		
Field of study	Automatic Control, Cybernetics and Robotics		
Date of commencement of studies	October 2024	Academic year of realisation of subject	2026/2027
Education level	first-cycle studies	Subject group	Optional 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	3	Language of instruction	Polish
Semester of study	6	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Decision Systems and Robotics -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Janusz Kozłowski	
	Teachers	dr inż. Janusz Kozłowski	

Lesson types and methods of instruction

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	30.0	0.0	15.0	0.0	0.0	45
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	45	4.0	51.0	100

Subject objectives

Getting familiar with architectures of the selected microprocessors and microcontrollers.

Implementation of simple microprocessors-based control circuits.

Learning techniques of assembly language programming.

Learning outcomes	Course outcome	Subject outcome	Method of verification
	[K6_W03] knows and understands, to an advanced 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	Student got practical knowledge on architectures of microprocessor systems and learned about basic communication protocols. Yet, student got familiar with technical hints behind connecting peripheral devices to microprocessor systems.	[SW1] Assessment of factual knowledge
	[K6_U03] can design, according to required specifications, and make a simple device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment	Student learned about implementation of dedicated logic circuits. Yet, student got prepared for using the 8051 one-chip microcomputer to control physical models.	[SU1] Assessment of task fulfilment
	[K6_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	Student learned the assembly language programming of microprocessors and microcontrollers. Yet, student got familiar with practical applications of programmable circuits (e.g. in diagnostics).	[SU1] Assessment of task fulfilment
Subject contents	The von Neumann and Harvard architectures of microprocessor systems. Separated input-output and memory-mapped input-output addressing. Architecture and principle of operation of the 8-bit Intel I-8080/85 and Zilog Z-80 microprocessors. Instruction set of the I-8080/85 microprocessor and addressing modes. One-chip microcomputer I-8051: architecture, control signals and instruction set. Interrupt system of I-8051. Programming the internal counters and controlling the serial transmission. Specification of static and dynamic Random Access Memory chips (RAM). Selected types of Read Only Memory chips (ROM, PROM, EPROM). Dynamically exposing the binary information on 7-segment displays. Exposing the ASCII characters on the Liquid Crystal Display (LCD). Connecting a keyboard to the microprocessor system: dynamic detection of keystrokes and elimination of bouncing. Specifications of 8251, 8253, 8255 and 8259 circuits: programming and operating modes.		
Prerequisites and co-requisites			

<table>
<tr><td>Assessment methods and criteria</td><td colspan="2"><table>
<tr><th>Subject passing criteria</th><th>Passing threshold</th><th>Percentage of the final grade</th></tr>
<tr><td>Written exam. It is necessary to score at least 35 out of total amount of 70 pts. Time for the exam: 90 minutes.</td><td>50.0%</td><td>70.0%</td></tr>
<tr><td>Laboratory tasks. It is necessary to score at least 15 out of total amount of 30 pts. Number of tasks: 5.</td><td>50.0%</td><td>30.0%</td></tr>
</table></td></tr>
<tr><td rowspan="3">Recommended reading</td><td>Basic literature</td><td>Misiurewicz P.: Układy mikroprocesorowe. WNT, Warszawa 1983.

Niederliński A.: Mikroprocesory, mikrokomputery, mikrosystemy. Wyd. Szkolne i Pedagogiczne, Warszawa 1984.

Gałka P., Gałka P.: Podstawy programowania mikrokontrolera 8051. Wyd. Naukowe PWN SA, Warszawa 2006.</td></tr>
<tr><td>Supplementary literature</td><td>Mroczek H.: Technika mikroprocesorowa. Wyd. Politechniki Łódzkiej 2007.</td></tr>
<tr><td>eResources addresses</td><td>Adresy na platformie eNauczanie:</td></tr>
<tr><td>Example issues/ example questions/ tasks being completed</td><td colspan="2">1. Compare the Harvard and von Neumann architectures of microprocessors.

2. Specify organisation of the internal RAM of the 8051 microcontroller.

3. Enumerate and describe addressing modes of the 8051 microcontroller.

4. Describe modes of serial transmission of the 8051 microcontroller.

5. Describe structures and properties of the read-only memory circuits: PROM, EPROM and EEPROM.</td></tr>
<tr><td>Work placement</td><td colspan="2">Not applicable</td></tr>
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