GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Sensors and Sensor Networks, PG_00047920		
Field of study	Electronics and Telecommunications		
Date of commencement of studies	October 2021	Academic year of realisation of subject	2022/2023
Education level	first-cycle studies	Subject group	Obligatory subject group in the field of study 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	2	Language of instruction	Polish
Semester of study	4	ECTS credits	3.0
Learning profile	general academic profile	Assessment form	assessment
Conducting unit	Department of Biomedical Engineering -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Piotr Jasiński	
	Teachers	prof. dr hab. inż. Piotr Jasiński dr inż. Paweł Kalinowski mgr inż. Kamil Osiński dr inż. Grzegorz Jasiński	

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	3.0	27.0	75

Subject objectives	The aim of the course is to familiarize students with the basic types and parameters, sensors and data standards between systems equipped with sensors.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_U08] while identifying and formulating specifications of engineering tasks related to the field of study and solving these tasks, can:n- apply analytical, simulation and experimental methods,n- notice their systemic and non-technical aspects,n- make a preliminary economic assessment of suggested solutions and engineering work n	Knowledge of the selection, use and application of sensors and sensor networks.	[SU3] Assessment of ability to use knowledge gained from the subject
[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	Knowledge about the construction and operation of sensors and sensor networks	[SW1] Assessment of factual knowledge
[K6_U09] can carry out a critical analysis of the functioning of existing technical solutions and assess these solutions, as well as apply experience related to the maintenance of technical systems, devices and facilities typical for the field of studies, gained in the professional engineering environment	Knowledge about the functioning of sensors and sensor networks	[SU3] Assessment of ability to use knowledge gained from the subject
[K6_U07] can apply methods of process and function support, specific to the field of study	Knowledge about the possibility of connecting sensors to microprocessor systems	[SU3] Assessment of ability to use knowledge gained from the subject

Subject contents

Basic concepts and properties of the sensors. Static parameters. Dynamic parameters. Basic types of electronic sensors on example temperature sensors. Other selected sensor signal output to the specific. Measuring systems for sensors: DC and AC bridges, transducers I / U. Specialized electronics. Technologies of sensors. MEMS. Smart Sensors. IEEE 1451. Analog and digital transmission of sensor signals. Sensor networks. 4-20mA loop. RS232, RS485. Interface ICs - 1-wire, I2C. Extensive measurement network - Ethernet. Wireless Systems: GSM, iRDA, Bluetooth. Sensor networks architecture and protocols - ZigBee. Projects sensor networks.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Test	50.0%	35.0%
Test	50.0%	35.0%
Laboratory	50.0%	30.0%

Recommended reading

Basic literature	J. Piotrowski, Pomiary. Czujniki i metody pomiarowe wybranych wielkości fizycznych i składu chemicznego. WNT Warszawa 2009. T. Sidor, Elektroniczne przetworniki pomiarowe, UWN-D, Kraków 2006 I.Kurytnik, M. Karpiński, Bezprzewodowa transmisja informacji, Wydawnictwo PAK, 2008 W. Nawrocki, Rozproszone systemy pomiarowe, WKŁ Warszawa 2006
Supplementary literature	J. Fraden, Handbook of modern sensors, Springer 2010
eResources addresses	Adresy na platformie eNauczanie: Sensory i sieci sensorowe 2023 - Moodle ID: 29997 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=29997

Example issues/ example questions/ tasks being completed

What are the differences and similarities between the metal and the thermistor resistive temperature sensors.

Work placement

Not applicable