GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Multimedia Interactive Systems, PG_00058856		
Field of study	Informatics		
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	3.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Department of Intelligent Interactive Systems -> Faculty of Electronics, Telecommunications and Informatics		
Name and surname of lecturer (lecturers)	Subject supervisor	dr inż. Mariusz Szwoch	
	Teachers	dr inż. Mariusz Szwoch	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	15.0	0.0	0.0	15.0	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	6.0	39.0	75

Subject objectives

Familiarizing students with the following topics:

- interactive multimedia applications;
- affective computing (emotions, emotion recognition based on physiological signals, creating affective games and games aware of the player's emotions, dynamic gameplay balance);
- augmented, enriched and mixed reality;
- depth sensors and methods of measuring scene depth (ultrasound, ToF, structured light, stereophotogrammetry).

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U12] is able, to an increased extent, to analyze the operation of components and systems related to the field of study, as well as to measure their parameters and study their technical characteristics, and to plan and carry out experiments related to the field of study, including computer simulations, interpret the obtained results and draw conclusions	The student is able to analyze the operation of scene depth measurement and three-dimensional scanning systems, design and implement emotion recognition systems based on various input data, and create interactive multimedia applications that process and present multimedia input data.	[SU1] Assessment of task fulfilment [SU3] Assessment of ability to use knowledge gained from the subject [SU4] Assessment of ability to use methods and tools
[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	The student describes methods of acquiring, processing and recognizing multimedia data obtained from various input channels, including methods of analyzing images acquired with digital cameras and camcorders, depth sensors and data from physiological sensors. Characterizes and describes different types of physiological data and depth sensors and examples of their applications.	[SW1] Assessment of factual knowledge
[K7_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study by: - appropriate selection of source information and its critical analysis, synthesis, creative interpretation and presentation, - application of appropriate methods and tools	The student presents problems and applications of analysis of multimedia data obtained from different input channels, methods of recognizing scene depth using different types of sensors, and emotion recognition based on different input signals. The student is able to create an application using algorithms of computer vision, affective computing, augmented reality and mixed reality. The student designs applications for mobile and stationary devices. The student uses various platforms for creating applications, including video game engines.	[SU3] Assessment of ability to use knowledge gained from the subject [SU2] Assessment of ability to analyse information [SU1] Assessment of task fulfilment
[K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices	The student describes methods of acquiring, processing and recognizing multimedia data obtained from different input channels, methods of recognizing scene depth using different types of depth sensors, as well as methods of recognizing emotions based on different input signals. Characterizes and describes different types of physiological data and examples of their applications for recognizing emotions.	[SW1] Assessment of factual knowledge

Subject contents

1. Introduction to the subject (scope of material, rules of assessment, literature, additional materials).
2. Multimedia, interactive multimedia, multimedia data and methods of their acquisition, selected algorithms of multimedia data compression.
3. Human emotions - types and representation.
4. Basics of affective computing and emotion recognition.
5. Basics of affective and affect-aware game design.
6. Depth sensors and methods of measuring scene depth (photogrammetry, ultrasonography, time of flight of sound, structured light).
7. Augmented, augmented and mixed reality.
8. Input interface for multimedia: recognition of musical notation - a case study.
9. Input interface for multimedia: recognition of flowcharts - a case study.

Prerequisites and co-requisites

Object-oriented programming skills, particularly in C++ and/or C#.Knowledge of video game development environments, such as Unity or Unreal Engine.

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Exam	51.0%	40.0%
Presence	51.0%	10.0%
Project	51.0%	50.0%

Recommended reading	Basic literature	1. R.Wang: Augmented Reality with Kinect, Packt Publishing, 2013. 2. J.R. López Benito, E.Artetxe González: Enterprise Augmented Reality Projects, Packt Publishing, 2019. 3. J.Glover, J.Linowes: Complete Virtual Reality and Augmented Reality Development with Unity, Packt Publishing, 2019. 4. D.Vroegop: Microsoft HoloLens Developer's Guide, Packt Publishing, 2017. 5. J.Howse, J.Minichino: Learning OpenCV 4 Computer Vision with Python 3 - Third Edition, Packt Publishing, 2020. 6. CBDAR'11: Proceedings of the 4th international conference on Camera-Based Document Analysis and Recognition, Internet: ACM Digital Library, https://dl.acm.org/doi/proceedings/10.5555/2238208.
	Supplementary literature	No requirements
	eResources addresses	Adresy na platformie eNauczanie:
Example issues/ example questions/ tasks being completed	The topics of the implemented projects include, among others, the design and implementation of: • an educational game for a selected ETI subject; • a hybrid board or card game; • a system for acquiring and processing stereophotographic data from modern smartphones; • a system for calibrating and color correcting photos using color patterns; • a system for assessing the quality of photos and/or improving the uniformity of lighting using color patterns; • a scanning system based on the iPhone Trudepth sensor; • an application for improving the quality of photos from modern smartphones using computational photography; • a system for recognizing player emotions based on various input data.	
Work placement	Not applicable	

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