Multimedia (E735025)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0	**Study time 180 h**	**Contact hrs 60.0h**

Course offerings and teaching methods in academic year 2021-2022

A (semester 1)	Dutch	Gent	lecture	36.0h
			practicum	8.0h
			group work	16.0h

Lecturers in academic year 2021-2022

Veelaert, Peter	TW07	lecturer-in-charge
Goossens, Bart	TW07	co-lecturer

Offered in the following programmes in 2021-2022	**crdts**	**offering**
Master of Science in Electronics and ICT Engineering Technology(main subject Electronics Engineering)	6	A
Master of Science in Electronics and ICT Engineering Technology(main subject Embedded Systems)	6	A
Master of Science in Electronics and ICT Engineering Technology(main subject ICT)	6	A

Teaching languages

Dutch

Keywords

Multimedia, audio, image processing, compression

Position of the course

The course provides a general overview of multimedia techniques and describes a some commonly used algorithms for image processing and audio processing. The course is focusing on the acquirement of theoretical and practical knowledge at an academic level. Less attention is paid to temporary trends and details about techniques that might soon be outdated.

Contents

1. Introduction to image processing. Application domains
2. Image acquisition: light, visual perception, image sensors, cameras and lenses
3. Image enhancement in the spatial domain: histograms, noise, grayscale transformations, spatial filters, edge detection, LoG and DoG, scale-space transforms
4. Image enhancement in the frequency domain: Fourier Series, Fourier Transform, DFT and widely used filters
5. Image restoration: noise models, image statistics, noise reduction, estimation of degradation, inverse filters
6. Colour models
7. Wavelets and multiresolution processing: short-time Fourier transformation, one- and two-dimensional wavelets, properties, problems and improvements of wavelets, applications: image enhancement, compression, estimation of edge orientations
8. Image Compression: lossy compression (JPEG,JPEG2000), lossless compression (Huffman coding, GIF), video compression (MPEG-1, MPEG-2, MPEG-4)
9. Multi-camera systems: epipolar geometry, fundamental matrix, image rectification, stereo vision, structured light, depth cameras
10. Image features: edge and corner detection, optical flow, SIFT, FAST, BRIEF,ORB, HOG
11: Audio processing and synthesis: audio perception, sound synthesis, frequently used filters

Initial competences

Familiarity with basic concepts in signal processing, Fourier Analysis and computer algorithms

Final competences

    1 To apply standard analysis techniques for image enhancement and image restoration

    2 To realize algorithms for digital video and audio compression and to evaluate software in terms of performance

    3 To have insight in auditory perception and practical synthesis of digital filters

    4 To develop new algorithms for multimedia applications

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Practicum, Group work, Lecture

Extra information on the teaching methods

Lectures and team work.

Learning materials and price

Course notes of theory and lab assignments available on the electronic learning environment.

References

Digital Image Processing, 3rd ed., Gonzalez and Woods, Prentice Hall, 2008

Course content-related study coaching

The lecturer is during and after the lectures available for further explanation. There is guidance during the exercises. Individual explanations are possible by appointment.

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Oral examination, Open book examination

Examination methods in case of periodic assessment during the second examination period

Oral examination, Open book examination

Examination methods in case of permanent assessment

Report, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

Oral exam with open book. The student explains 4 different topics with aid of the slides from the lessons. Students give a final presentation and a demonstration of their project assignment. Students who fail to achieve the first examination period can only retake the theoretical part in the second examination period.

Calculation of the examination mark

Theoretical part: 2/3
Practical part: 1/3