Technology
Arts Sciences
TH Köln

Course
DBT - Digital Imaging

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General information

Long name	Digital Imaging
Approving CModule	DBT_MaMT
Responsible	Prof. Dr. Gregor Fischer Professor Fakultät IME
Level	Master
Semester in the year	winter semester
Duration	Semester
Hours in self-study	78
ECTS	5
Professors	Prof. Dr. Gregor Fischer Professor Fakultät IME
Requirements	none
Language	German
Separate final exam	Yes

Final exam

Details

Short project with final oral exam

Minimum standard

Working Matlab program

Oral presentation of the project objectives and the project results

Exam Type

Short project with final oral exam

Lecture / Exercises

Learning goals

Knowledge

Color Imaging
Color capturing with electronic sensors
Color detectors
Demosaicking
Optical antialiasing filters
Color management for DSCs
ICC profiles computing with least squares fit
Testing color accuracy
Color appearance models
Multispectral Imaging
Spectral sensitivities estimation by means of a general method to stabilize an instable set of linear equations
Statistics of natural spectra (Principal Components Analysis)
Spectral stimulus estimation

HDR Imaging
HDR capturing technology
Contrast management
photo receptor model
unsharp masking
retinex algorithm
Automatic control

Imaging Methods
Automatic white balancing
Grey world approach
Color-by-Correlation
Dichromatic reflection model
MTF management
MTF measurement
filter design for MTF optimization and sharpening
Adaptive sharpening
Denoising
Modelling of sensor noise
Locally adaptive smoothing filter
Wiener filtering
Bilateral filtering
Non-Local-Means filtering
Defect pixel / cluster correction

Skills

Describe the function and effects of different imaging methods

derive correction models for the image processing from the optical and electronic mechanisms

explain the application of basic mathematical tools for modelling and optimization of imaging methods

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	2
Exercises (whole course)	0
Exercises (shared course)	0
Tutorial (voluntary)	0

Separate exam

none

Practical training

Learning goals

Skills

analyse optical and electronic imaging characteristics

recognize and assess imaging defects

realize imaging methods by software programmin according to a given specification or scientific paper

measure optical and electronic imaging characteristics or defects

implement new imaging methods according to a given specification or scientific paper

optimize imaging methods by basic mathematical optimization methods

compare image quality of different imaging methods

document results

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Practical training	2
Tutorial (voluntary)	0

Separate exam

Exam Type

working on practical scenarion (e.g. in a lab)

Details

Protocol reports about lab exercises

Minimum standard

Reports for all lab excercises must be delivered in correct form with correct results