Course Manual AKAT

Project Camera Technology Applications

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– General information

Long name	Project Camera Technology Applications
Approving CModule	AKAT_BaMT
Responsible	Prof. Dr. Gregor Fischer Professor Fakultät IME
Valid from	summer semester 2023
Level	Bachelor
Semester in the year	summer semester
Duration	Semester
Hours in self-study	72
ECTS	6
Professors	Prof. Dr. Gregor Fischer Professor Fakultät IME
Requirements	Attending the courses Image Sensor Technology, Camera Technology
Language	German and English
Separate final exam	Yes

Literature

E.A. Weber, Foto Praktikum, Birkhäuser

A. J. Theuwissen, Solid-State Imaging with Charge-Coupled Devices, Kluwer 1995

G. R. Hopkinson, T. M. Goodman, S. R. Prince, A Guide to the Use and Calibration of Detector Array Equipment, SPIE 2004

G. C. Holst, T. S. Lomheim, CMOS/CCD Sensors and Camera Systems, SPIE

J. Nakamura, Image Sensors and Signal Processing for Digital Still Cameras, Taylor & Francis

Reinhard/Ward/Pattanaik/Debevec, High Dynamic Range Imaging, Elsevier 2010

Final exam

Details	written result report, presentation both in english language
Minimum standard	written and oral presentation of the project objectives, the project organisation and the project results
Exam Type	EN mündliche Prüfung, strukturierte Befragung

Lecture / Exercises

Learning goals

Goal type	Description
Knowledge	multiple image methods HDR (still picture and video) image stacking (focus bracketing) -> 3D, depth of field extension panorama stitching 3D-imaging
Knowledge	test proceedures OECF, SNR, MTF, color reproduction investigation and comparison of quality
Knowledge	processing methods raw data conversion HDR-tonemapping noise suppression and dynamic optimization
Knowledge	industrial imaging applications surface inspection metallic/nonmetallic (bright field/dark field, polarization, raw image processing) optical measurement (measurement of distribution of luminous intensity with a camera, BRDF measurement, ...) thermography with IR-camera surveillance cameras
Skills	designing and modelling of a procedure in a digital camera
Skills	balancing chances and risks for different problem-solving approaches
Skills	comprehend and understand scientific texts in English
Skills	presentation of project results in English
Skills	solve a problem by application of knowledges and skills from image sensor- and camera technology
Skills	determination of basic requirements on interface, hardware and software for a specific problem

Special requirements

Accompanying material	electronic developing tools for: access to raw data (Matlab) image processing (Matlab) digital camera simulation (Stanford's Imageval in Matlab), electronic tutorials thematic scripts additional papers videos
Separate exam	Yes

Separate exam

Exam Type	EN Projektaufgabe im Team bearbeiten (z.B. im Praktikum)
Details	6 attendance appointments of 4h each per project group, final presentation, project documentation in English
Minimum standard	written and oral presentation of the project objectives, project organisation and project results

Skills	inquireries on scientific publications in the field of image sensor- and camera technology
	feasibility-check of common procedures to solve problems from the task definition
	implementation of procedures in own programs
	combination of procedures in own programs
Skills	accomplish project task in a team
	plan and manage projects
	stick to agreements and deadlines
	achieve a solution in a team
	plan and execute reviews

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Project	6
Tutorial (voluntary)	0