

Course

KAT1 - Image Sensor Technology

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^ General information

Long name	Image Sensor Technology
Approving CModule	KAT1_BaMT
Responsible	Prof. Dr.-Ing. Dirk Poggemann Professor Fakultät IME
Level	Bachelor
Semester in the year	summer semester
Duration	Semester
Hours in self-study	60
ECTS	5
Professors	Prof. Dr.-Ing. Dirk Poggemann Professor Fakultät IME
Requirements	Basic Knowledge in Electronics (Module "Electronics") and Optics and Sensors (Modules "Phototechnology 1", "Phototechnology 2" and "Phototechnology 3")
Language	German, English if necessary
Separate final exam	Yes

Final exam

Details

Written exam with arithmetic and comprehension exercises

Minimum standard

50% of maximum points

Exam Type

^ Lecture

Learning goals

Knowledge

Electronic Characteristics of Image Sensors

- Pixelfunction (Semiconductors / Photoelectric Effect, Photo-/Darkcurrent, Electrontransfer, Charge-/Voltage Conversion)
- CCD-Function (Chargetransfer, Binning, Multiple Output, CCD-Architectures)
- CMOS-Function (Read-Out, Exposurecontrol / Rolling Shutter, HDR-Sensors, Live-View)
- Comparison CCD-CMOS
- Modelling and Measurement of Electronic Characteristics (Linearization, Offset and Gain, Defectpixel, Determined Signalartifacts (FPN, DSNU, PRNU), Random Signalartifacts (real Noise), Influence of Temperature)

Optical Characteristics of Image Sensors

- Optical Stack (Antialiasing-Filter, Microlenses, IR-Filter, Color-Filter, Semiconductor-Topography)
- Modelling and Measurement of Optical Characteristics (Pixel-MTF, Vignetting, Spectral Sensitivity)

Image Correction

- Linearization/Gain- and Offset-Correction, Dark Image Subtraction (DSNU) Flatfielding (PRNU, Vignetting)
- Multiple-Output-Correction

Defectpixel- and Defectcluster-Correction

Expenditure classroom teaching

Type	Attendance (h/Wk.)
Lecture	3
Tutorial (voluntary)	0

Separate exam

none

^ Practical training

Learning goals

Skills

Measurement and Simulation of Characteristic Curve (Photodiode)

Measurement of Electronic Characteristics of Image Sensors

Measurement of Optical Characteristics of Image Sensors

Description and Documentation of 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

short technical discussion during lab exercise

Reports about lab excercises

Minimum standard

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