



Blockseminar

Di. - Do., 17. - 19.03.2015, 10:15 - 11.45 Uhr, IG1, R 619

Di. - Do., 24. - 26.03.2015, 10:15 - 11.45 Uhr, IG1, R 619



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Photon detection in CMOS technology: from photodiode physics to vision chips

Silicon is a great material for electronics but not so good in photonics, lagging behind III-V semiconductors due to its indirect bandgap. However, its ability to sense photons in the visible and NIR ranges, and the possibility to integrate signal processing circuits concurrently with sensing structures in CMOS technology, have allowed the development of the camera-on-a-chip concept and its pervasive presence in consumer electronics.

In this seminar we will start by explaining how photons are captured by a CMOS-compatible photodiode. We will then review the different interface circuits employed to operate them and analyze their limitations and possible sources of noise. We will describe different architectures for CMOS image sensors. We will contemplate alternatives at device level, like the single-photon avalanche diode, to implement 3D imaging. Finally, we will describe how CMOS technology enables embedded artificial vision, leading to real-time scene understanding and decision making. Different system architectures will be reviewed and state-of-the-art hardware and software tools will be outlined.