

Proposal for a Bachelor/Master Thesis

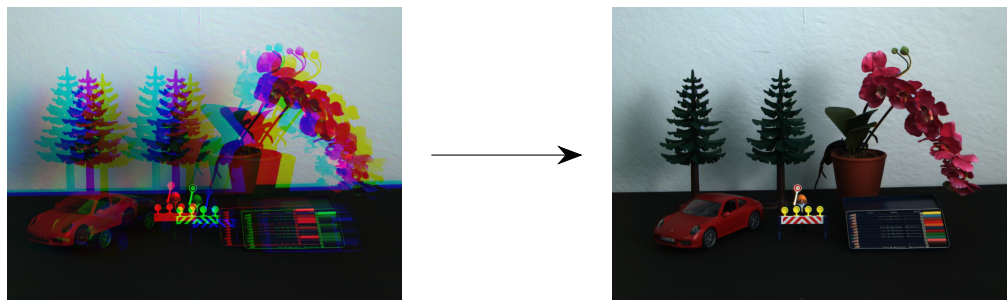
Topic: Image Processing for Camera Arrays for Multi/Hyperspectral Imaging

Description: The chair developed a camera array for multispectral imaging (CAMSI) that consists of nine cameras arranged in a three times three grid as well as a hexagonal array for hyperspectral imaging (HAHSI) with 37 cameras:



While the sensor and the lens stays the same for all cameras, the filter changes to record different parts of the light spectrum. For example, there are filters in the visible wavelength area to record an RGB image, but also in the infrared, which is often very helpful for classification of materials, since many materials have specific spectral absorption bands and therefore spectral fingerprints, which can be exploited to discriminate them.

Since the cameras are placed at different positions, an image processing pipeline is necessary to reconstruct a consistent multispectral/hyperspectral datacube, i.e., it should look like as if every camera recorded the scene from the center camera.



Within this pipeline diverse thesis are possible ranging from synthesizing hyperspectral data to neural networks for cross spectral depth estimation. Also on the hardware side, possible thesis include optimizing the filter arrangement to a proper camera calibration.

Prerequisites:

- Image Processing
- Experience with Python

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