

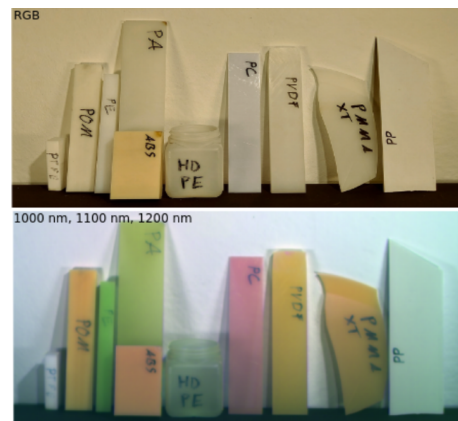
Possible topics for bachelor/master thesis, research internships/projects

Topic: Multispectral Imaging in the Recycling Process

Description: The majority of plastic waste is thermally recycled, since it is often not possible to separate it by type using conventional methods. Multispectral imaging however allows a clear recognition and identification. By using a 3x3 camera array (Fig. 1a) with different filters in the infrared region, multiple images of the same scene are recorded simultaneously. This image information is used to reconstruct so called "spectral fingerprints" of different sorts of plastic material, since the carbon chains of plastic reflect and absorb light at specific wavelengths in the infrared range to different extents, resulting in various colors for characteristic plastics (Fig. 1b).



(a) Camera array for multispectral imaging (CAMSI).



(b) original (top) and false color image (bottom)

Figure 1: Basics for multispectral imaging in the recycling process

Possible topics for student thesis can be:

- Recording and creation of a multispectral plastic material dataset
- Development of a multispectral plastic classification algorithm using deep learning/neural networks
- Generation of spectral fingerprints of plastic material
- Evaluation of spectral variances of the same materials
- Evaluation of influence of additives and recycle on plastic material classification and quality

Prerequisites: Experience with python programming and signal processing. Depending on the topic knowledge in Deep Learning (PyTorch/TF).

Supervisor: Katja Kossira, M.Sc., room 06.022, e-mail: katja.kossira@fau.de

Professor: Prof. Dr.-Ing. André Kaup

Available: Immediately