Bachelor-/ Master Thesis
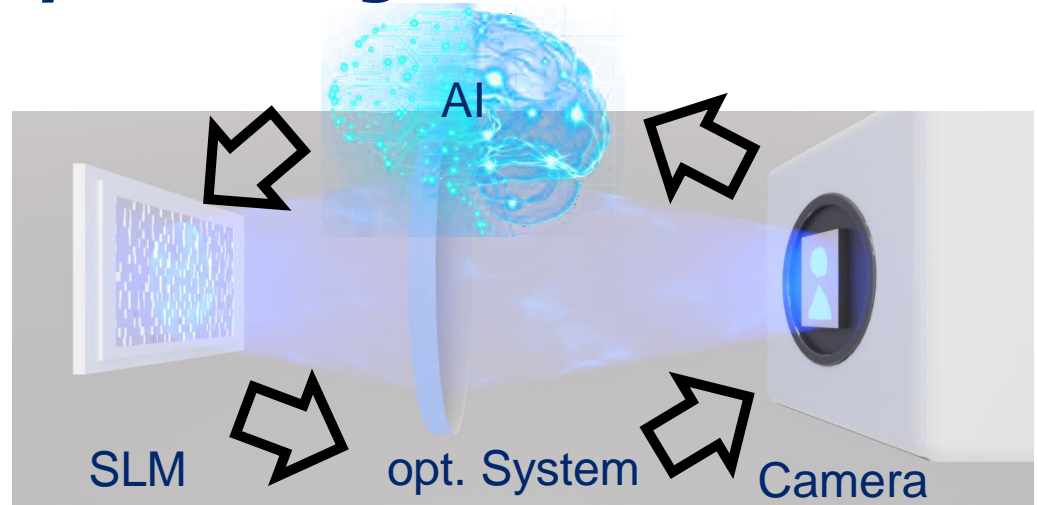# *Fast generation of binary holograms with deep learning*

Motivation

Background:

Modern spatial light modulators (SLM) displaying computer-generated holograms enable new possiblities in many applications such as the increase of data transfer rates in information systems or the structured illumination of tissue in biomedical research. For these, high pattern frame rates are often a requirement for closed-loop control. Modulators meeting the frame rate demands, however, often only allow a binary modulation and therefore require the fast calculation of high quality binary holograms.

Tasks:

As a consequence, the goal of this work is to investigate the suitability of deep learning approaches to the task of fast binary hologram generation. As a starting point, a Matlab–based artificial neuronal network architecture for non-binary holograms exists which can be built upon as well as several approaches reported in recent literature. Created networks will be evaluated with repect to speed and quality of the reconstructed images both in simulation and optics laboratory.

AI

SLM   opt. System   Camera

Range of Tasks

- Expansion/ Creation of artificial neural networks for the generation of binary holograms
- Creation of a suitable training/test dataset and training of the network
- Evaluation of the quality of reconstructed images and calculation speed

Related Topics

Deep Learning, Simulation, Computer-generated holograms, Image processing

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