Master Thesis – Automated imaging optimization through machine vision control parameter generation (1-2 Students)

About us

GKN Aerospace is the world's leading multi-technology tier 1 aerospace supplier. With 55 manufacturing locations in 15 countries, we serve over 90% of the world's aircraft and engine manufacturers. We design and manufacture innovative smart aerospace systems and components. Our technologies are used in aircraft ranging from the most used civil aircraft to the world's advanced 5th generation fighter aircraft and the Ariane orbital rockets used by ESA.

Problem Description

Machine Vision has strong potential to support and automate many inspection processes not only in high-volume manufacturing, but also for complex, low-volume and high-value products. The key to success is seen in the automation capability enabling acquisition of high-resolution images in spatially restricted situations. The aim of this task is to create an ML-based imaging parameter generator that takes any start image as an input, and then proposes imaging parameters as well as actuation for the camera-carrying robot to improve the quality of the captured image on that position. The student is expected to build a model that is integrated into the control system of an automated image acquisition machine:

- Understand an existing robotic image acquisition machine and the connected control system
- Identify relevant image quality parameters that can serve as optimization targets, as well as control parameters influencing the image quality (such as illumination, camera, or positioning parameters)
- Create a dataset to train, validate and test models that propose control parameter changes to improve the image quality
- Integrate the model into the image acquisition control system
- Validate the model on the image acquisition machine and report the results

Qualifications:

- Pursuing a M.Sc. in Automation, Production Technology, Complex Adaptive Systems, or similar. Other backgrounds can be suitable as well.
- Good theoretical and hands-on knowledge in automation control and machine learning.
- First experiences and an interest in imaging / photography
- Proficient in Python and ML frameworks such as PyTorch, TensorFlow.
- Curious, independent, and passionate about solving challenging problems.
- Knowledge in non-destructive testing is a plus.

Related Art:

- J. Roberg: OPT-IQA: Automated camera parameters tuning framework with IQA-guided optimization, Intelligent systems with applications, 2025, https://doi.org/10.1016/j.iswa.2025.200520

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