UNIKASSEL
VERSITÄT

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Mess- und Regelungstechnik
Univ.-Prof. Dr.-Ing. Andreas Kroll

Internship

Integration of a Novel 3D Camera into a 3D Thermal Imaging System
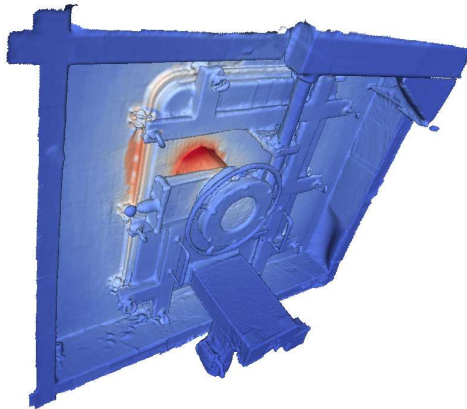
Miguel David Méndez Bohórquez

Figure 1: 3D thermal image.

Rising energy costs and growing environmental awareness are driving industrial companies to save energy. In order to identify possible potentials, sensor systems are needed that can be used to inspect corresponding objects quickly and precisely. The 3D thermal imaging measurement system developed at the *Department of Measurement and Control* enables the reliable observation of large objects with the aid of the complex geometries in real time[1] (see Figure 1). This opens up new possibilities for the visualization, detection and analysis of energetic weak spots. Currently, the 3D data is captured with a sensor for the consumer market (Intel RealSense D415). After the successful procurement of a novel, industrial 3D camera (Photoneo MotionCam-3D) with sub-millimeter accuracy, this camera should now be integrated into the system.

For this purpose, a rigid frame must first be constructed to connect the new 3D sensor to the infrared camera must be calibrated in- and extrinsically. Afterwards, the camera has to be integrated into the 3D thermal imaging software. Furthermore, an algorithm should be written, which records the cameras raw data and feed it into the algorithm in a time-shifted manner (similar to ROS bags). An experimental comparison between the old and new camera will conclude the work.

The following subtasks are planned during the internship:

1. Familiarization with 3D sensing and thermal imaging
2. Construction of a plexiglass frame for the sensor system mounting
3. Geometric system calibration using a calibration target and algorithms of the department[2]
4. Extension of the 3D thermal imaging software system to integrate the data of a new 3D sensor
5. Design and programming of a system for repeatable data evaluation for 3D thermograms
6. Comparative evaluation of the cameras with regard to 3D accuracy
7. Documentation of the work in a report and a presentation

Experience in C++, cmake and Python as well as Linux knowledge is mandatory. Experience in CUDA would be an advantage. The internship can be completed in English or German language.

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[1] https://www.doi.org/10.21611/qirt.2020.008
[2] https://www.doi.org/10.1109/JSEN.2020.3019959