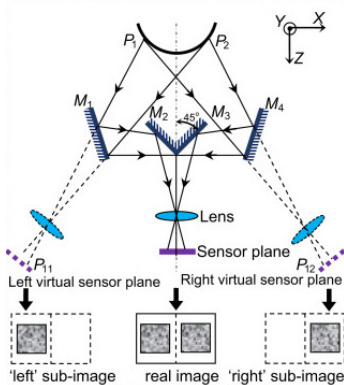


## Project work (6CP)

### Assembly, commissioning and test of a mirror-based stereo gas camera system for gaining spatial information of gas structures

Juan Camilo Dueñas

Infrared cameras for gas visualization, also called gas cameras, allow spotting fugitive emissions of hydrocarbons in an image. Such cameras are used e. g. in the Oil and Gas industry for the detection and localization of gas leaks by means of manual or automatic inspections. Among others, methods for gaining spatial information of gas structures by using two gas cameras in a stereo setup have been developed at the Department of Measurement and Control. The high costs and complexity of a stereo gas camera system motivate to study alternative approaches that require only one gas camera for generating stereo images and computing spatial information of gas structures. In that regard, using a gas camera with a multi-mirror setup represents a promising alternative.



Example of a multi-mirror setup for generating stereo images with a single camera [Yu 2016]

In this work, an adjustable multi-mirror setup for generating stereo images from a single gas camera has to be assembled, commissioned, calibrated and tested. During the first stage, the mirrors and the gas camera have to be assembled to the given mounting frame. In a next step, the mirror-based stereo gas camera has to be geometrically calibrated. The reliable acquisition and visualization of the camera data within the framework ROS (Robot Operative System) has to be implemented as well. Different test scenarios should be designed for demonstrating the performance of the mirror-based stereo gas camera under laboratory conditions. Advantages and disadvantages of the system compared to two-camera-based stereo systems have to be discussed.

#### The following tasks have to be addressed in this practical work:

- Familiarization with the topic of computer stereo vision
- Assembly of the different components and geometric calibration of the system
- Implementation and commissioning of the mirror-based stereo gas camera in ROS with data visualization (Graphical User Interface)
- Test and evaluation of the acquired data for different measurement scenarios under laboratory conditions
- Documentation and presentation of the results

**Supervisor:** M. Sc. J. Rangel, Dr.-Ing. R. Schmoll, Prof. Dr.-Ing. A. Kroll  
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