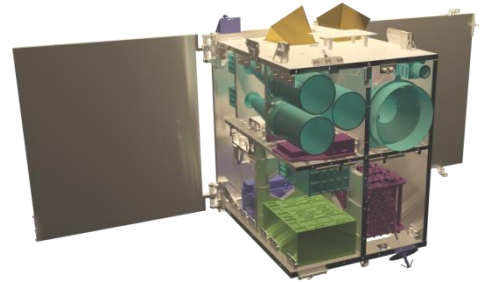


## Bachelor / Master Thesis

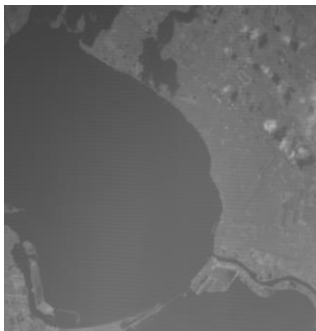
### Satellite image processing for the *Flying Laptop* Project

#### Motivation:

The small satellite *Flying Laptop* is built at the Institute of Space Systems at the University of Stuttgart and was launched July 2017 using a Russian Soyuz rocket. As scientific payload the satellite includes multiple camera systems for earth observation. The multispectral camera system (MICS) is taking pictures in three channels: green, red and near infrared. The panoramic camera (PAMCAM) is utilizing a color filter array to take colored images. Both systems deliver raw data, which is transmitted from orbit to ground without further processing.



#### Goal:



To use the data scientifically, the images have to be calibrated using flatfields and darkframes. Their overall quality also has to be improved by sharpening the images and improving their dynamic range. Several frequencies show up in the current images for which a cause and a removal has to be found using Fourier analysis. Furthermore the PAMCAM wide field images, using a bayer pattern to receive color information, have to be demosaiced and their color has to be adjusted and white balanced. The cause of unfocussed images and brightness gradient effects has to be found, taking test images with the engineering model of the cameras and the actual satellite.

#### Implementation:

Currently the raw images are stored in a NoSQL database to be fetched for further processing. This processing chain, including the image reception and the storing in the database, is implemented in a java application. All mentioned future measures should be embedded in this environment using suitable algorithms resulting in an image processing toolbox.



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