UNIVERSITY OF STUTTGART
INSTITUTE OF SPACE SYSTEMS
Space Center Baden-Württemberg (RZBW)

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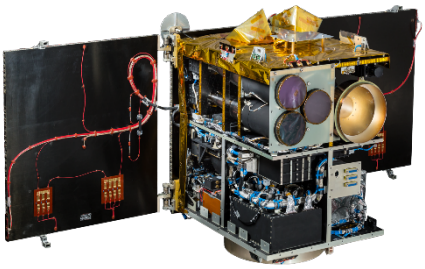
Bachelor Thesis

AIS Decoding and Ship Detection

Python Programming · Data Science · Automation · Satellite Ground Software

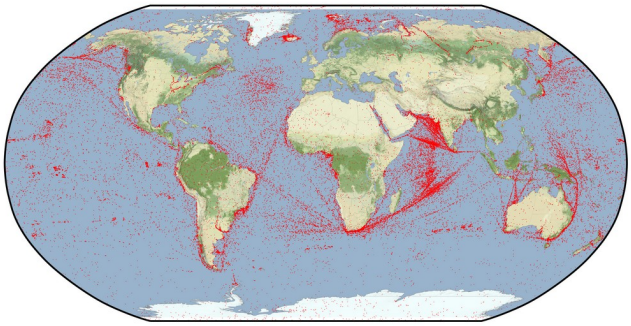
Motivation:

The Flying Laptop Satellite



The small satellite *Flying Laptop* was built at the Institute of Space Systems at the University of Stuttgart and was launched in July 2017 using a Russian Soyuz rocket. As scientific payload the satellite includes multiple cameras for earth observation as well as an AIS receiver. Most vessels over 300 GT are obliged to equip a AIS transceiver resulting in hundreds of thousand signals per day. The messages send by the vessels are encoded and information might be spread over multiple messages. This raises the need for further processing which should done on ground using the payload-handling-pipeline of the IRS satellite department. The stream of messages is currently received and stored in a database without further processing.

AIS messages received by Flying Laptop



Goal:

As the single AIS messages are received as a encoded stream, the messages have to be decoded to be further processed. This processing is the main goal of this thesis. A main challenge hereby is the handling of a stream based input with single messages depending on each other. Several methods and external decoding libraries should be examined and discussed in terms of usability for the given task.

Implementation:

The current processing pipeline consists of Java and Python code using a JavaScript API to access the payload data, stored to a MongoDB. The implementation of the AIS decoding in this thesis will be done in Python. The framework to include the decoding to the processing pipeline is already running and can be used as is.

Requirements:

- Bachelor student
- Basic programming knowledge

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