

Master 2012

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Development of an Antenna System for Satellite Tracking

ABSTRACT - Masterthesis

As micro satellite missions cannot rely on large down-link stations, smaller and inexpensive antennas must be used to receive the collected data.

For the establishment of such a small ground station, a two-axis rotator with an attached antenna and an appropriate control system is required. It must be able to point the antenna towards a passing satellite such that a connected receiver is able to decode the data signals from spacecraft.

To enable a good network, the data down-link operation should be realized in an autonomous way. So a computer can carry out the antenna pointing and data collection based on a predefined script that contains the orbital parameters that shall be observed.

The task is to setup of a ground station that is point an antenna towards a satellite during its pass over the station. The system shall be controllable from a computer via state-of-the-art connection (eg. USB).

Hence, an electronic must be developed, to transform all computer commands into rotor commands/impulses and software to provide a user interface for the satellite tracking. Following steps have to be accomplished

- Literature survey for the electronic control interface of the existing rotor hardware.
- Development of a microcontroller test system to operate the two rotors in two axes.
- Realization of a USB interface for the drive electronic.
- Programming of a user interface to operate the controller and rotor from PC.
- Proof of concept by tracking a Low Earth Orbit satellite using Gnu Predict.