

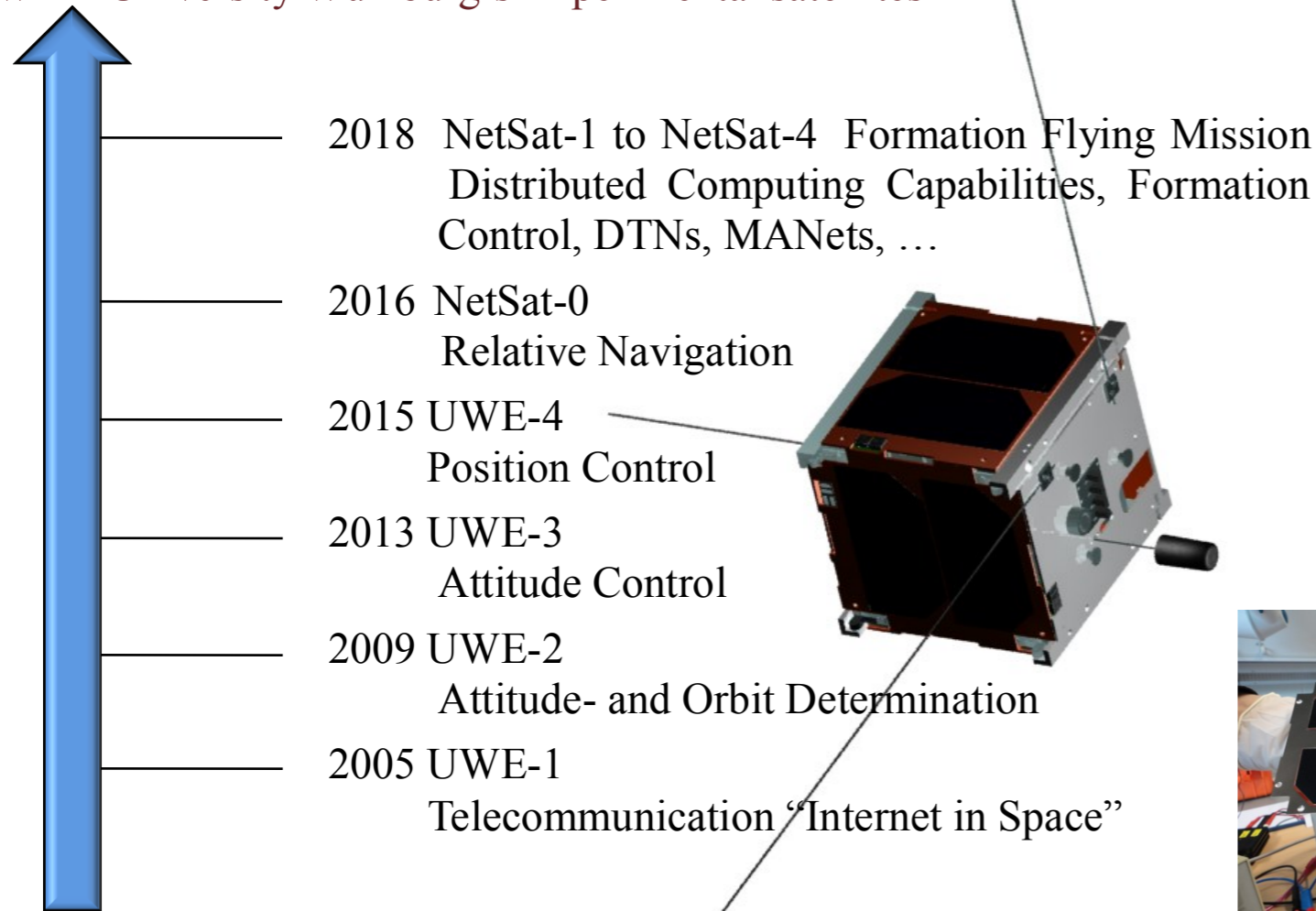
The UWE-Roadmap to Pico-Satellite Formation Flying: In-Orbit Experiences



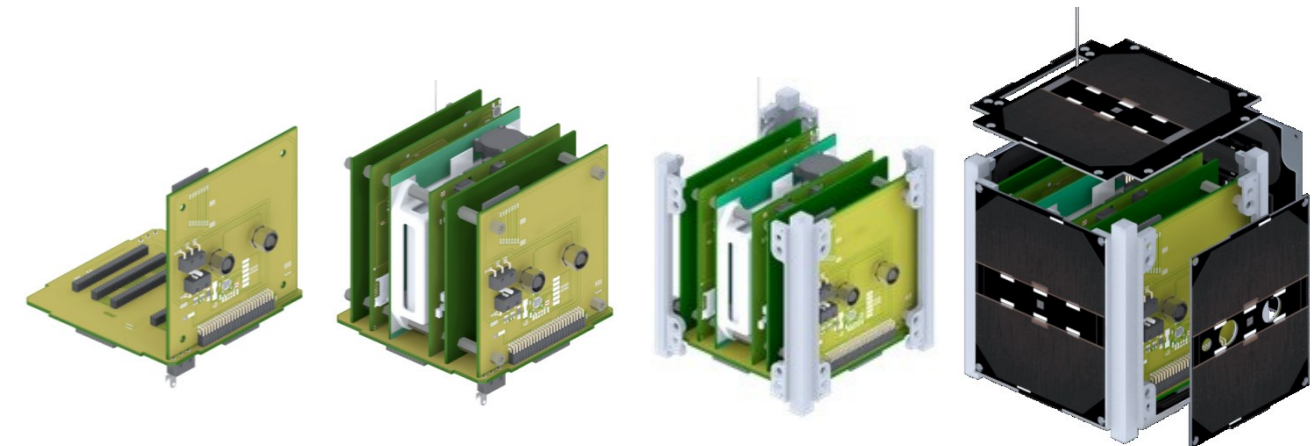
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Pico-Satellites from Würzburg

UWE – University Würzburg's Experimental satellites



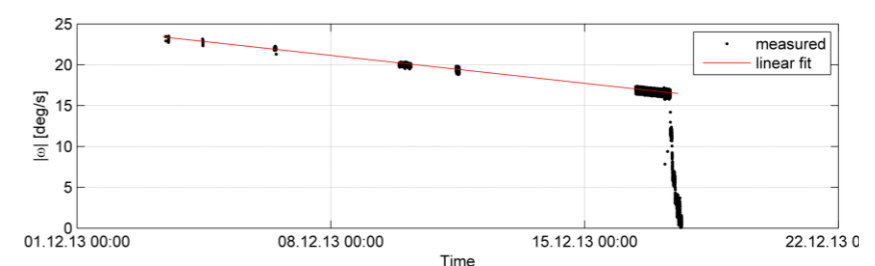
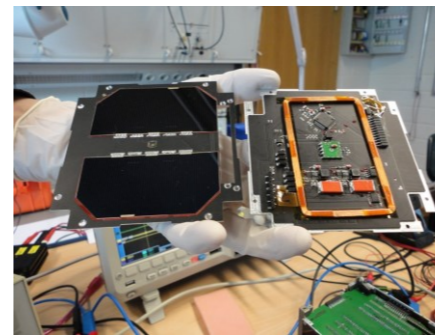
Standardization of Electrical Interfaces / Modular Bus



- Fast integration due to backplane approach
- Standardized electrical interfaces (by UNISEC Europe)

UWE-3 Attitude Determination and Control System

Integrated magnetic torquer, Sun sensor and magnetometer on the backside of each solar array

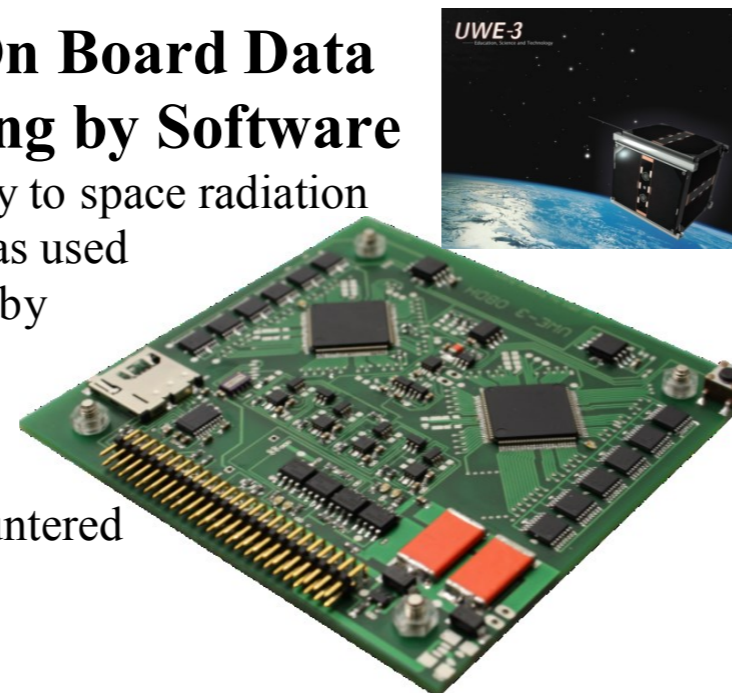


Using magnetic torquers: a rotation of 16.5 deg/s was cancelled within 7 minutes activation

UWE-3 Reliable Commercial On Board Data Handling Module, Using Shielding by Software

- Miniaturisation leads to higher susceptibility to space radiation
- Only commercial of the shelf electronics was used
- Fault detection, identification and recovery by software and watch-dog function

Despite significant radiation encountered, **UWE-3 provides uninterrupted service since launch for more than 20 months**, despite encountered SEUs and latch-ups



NetSat

- realization of distributed, cooperating multi-satellite systems using autonomous formation control for optimization of observation periods
- 4 small satellites in order to establish a three-dimensional formation
- challenges relate to closed-loop control via communication link



Research supported by an ERC Advanced Grant