CORRAL Stage 2a Development

Contractors: TU Dresden (DE), Jena Optronik (DE)		**ESA Budget:**	**100 k€**
		Co-funded Budget:	**n/a**
GSTP 4000122036/17/NL/PS/gp	**YoC: 2019**	**TO: Dr. Alessandro Zuccaro Marchi (TEC-MMO)**	
TRL **Initial: 3**	**Achieved: 3**	**Target TRL: 6 Date: Q2 2024**	

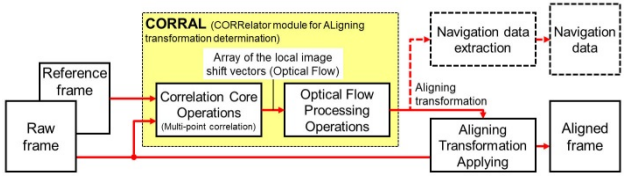
Background and justification:
CORRAL image registration technology developed by TU Dresden provides registration of satellite images with subpixel accuracy also in presence of noise and distortions. In a precursor CORRAL Stage 1 project the CORRAL algorithms have been demonstrated successfully for the processing of the LVF-coded hyperspectral images. To prove the possibility of achieving real time processing capabilities with the compact / space compatible hardware an Engineering Model of the CORRAL Processor is planned to be produced within the following Stage 3 study. As the algorithms available as a result of CORRAL Stage 1 were not optimized for real time performance, CORRAL Stage 2a Development has been started as an intermediate de-risk activity

Objective(s):
- Optimization of the CORRAL algorithms to minimize the computational complexity while preserving the required registration accuracy (to enable real time processing with the limited computational resources).
- Selection of the CORRAL implementation strategy and top-level system design of the real time Engineering Model
- Estimation of the expected image processing performances

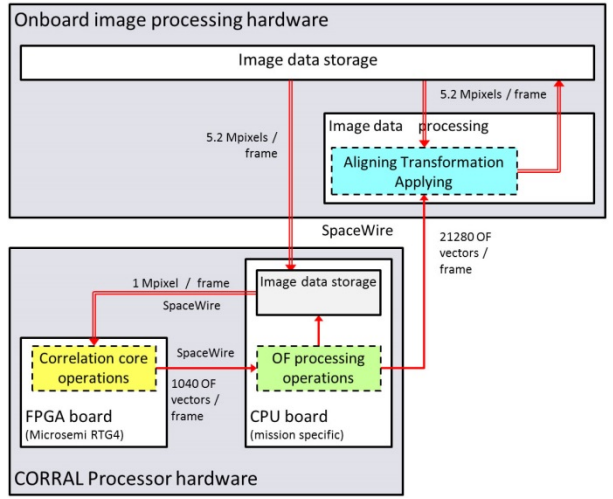
Achievements and status:
- CORRAL algorithms have been optimized to enable real time processing for the reference mission (hyperspectral imaging with LVF filter) with the limited computational resources
- CORRAL implementation strategy has been selected and top-level system design of the real time Engineering Model has been developed
- As a result of the final performance test, successful registration of the sequence of the simulated LVF-coded images have been demonstrated with the optimised CORRAL algorithms
- In that way the risk of not reaching the required real time performance during the planned CORRAL Stage 3 activity (Real – Time CORRAL Engineering Model) has been minimized

Benefits:
Hyperspectral imaging with Linear Variable Filter (LVF) makes possible to reduce significantly the dimension and mass of the imager at a cost of increasing the image processing complexity. CORRAL algorithms application makes possible real time raw images registration and hyperspectral information extraction on board a micro satellite.

Next steps:
Follow-on CORRAL Stage 3 (hardware Engineering Model of the CORRAL processor) and Stage 4 (Qualification Model of CORRAL Processor) activities are planned to reach TRL 6 by mid-2024. Foreseen applications for CORRAL technology are hyperspectral imaging with LVF filter, LoS instability correction for the high resolution imaging missions, visual navigation for landing or R&D missions.



CORRAL image registration principle



CORRAL implementation concept