# *Gendared*

## THE GENERIC DATA REDUCTION FRAMEWORK FOR SPACE SURVEILLANCE

GMV's *Gendared* COTS software is a software application for the **astrometric reduction** of images taken by optical telescopes of objects orbiting the Earth. *Gendared* is intended to process the large amount of observational data to be acquired by autonomous robotic telescopes focused on the surveillance, cataloguing and monitoring of space objects. This Generic Data Processing Framework for Space Surveillance receives as input the raw images taken by the telescope (both observation and calibration images) together with all required additional information (list of images corresponding to the same observation session, star catalogue), and generates as output astrometric and photometric data for the target objects detected in the observation images.

The software provides the following functionalities:

- Autonomously control and monitor the astrometric processing of data acquired fromSST telescopes
- Image Reduction algorithms to cope with different acquisition schemas
- Modular design allows for an easy integration of new algorithms
- Can be deployed on a distributed network exploiting its capabilities
- Correlated detections of the same object identified in a sequence of images (tracklet)are provided in CCSDS TDM format (ASCII JSON and KVN)
- User interaction via web interface

A high-level view of *Gendared*'s structure is depicted in Figure 1. *Gendared*'s main components are:

- The processing framework (orchestrator), in charge of controlling and monitoring how the different components of *Gendared* run from the SW point of view, and driving the overall processing.

- The data processing facility, which is the component implementing the image reduction process. This component is composed by atomic and self-contained elements each implementing a specific step in the reduction process. The execution of these elements is driven by the orchestrator in order to build the required pipeline processing.

- The web interface, through which the users can upload the data, configure the processing pipelines, and view the results.

The modular design (pipeline implemented as independent, atomic processing steps) allowsfor the easy definition/integration of pipelines/processors capable of covering additional functionalities.
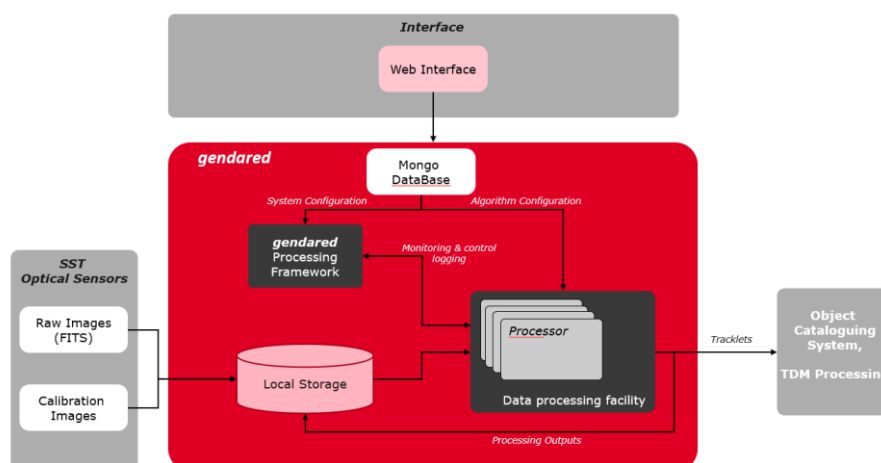


Figure 1: *Gendared* high-level structure

The software processes images obtained by telescopes and compares them with abackground star map in order to identify space debris objects and generate astrometric measurements corresponding to the line of sight of the object. A schematic of the **Gendared** workflow and an example of image processing by **Gendared** are shown in Figure 2.
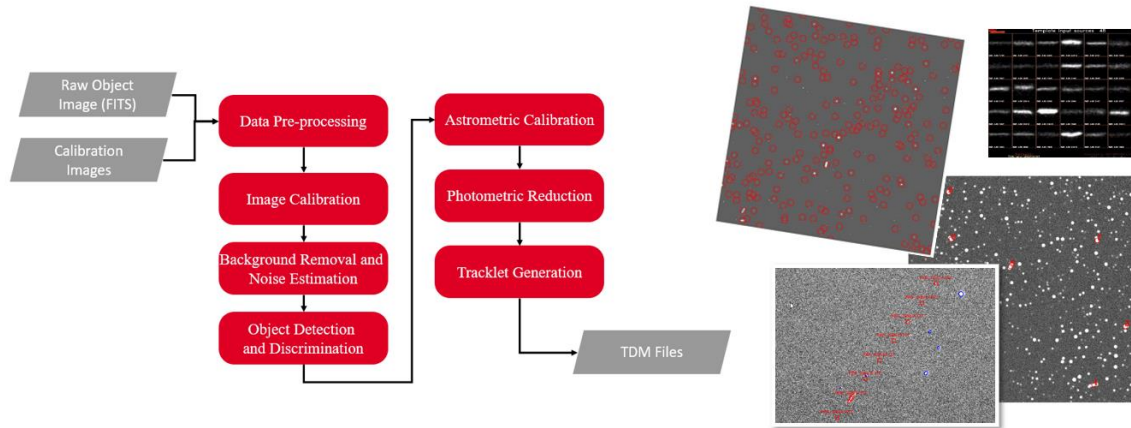


Figure 2: *Gendared* pipeline and example image processing

The **Gendared** product can be accessed via a web interface. Figure 3 shows the login page for the interface. The interface home/status page, as well as its main functionalities, are presented in Figure 4. A snapshot example of the visualization of the processing results for a particular dataset is show in Figure 5.
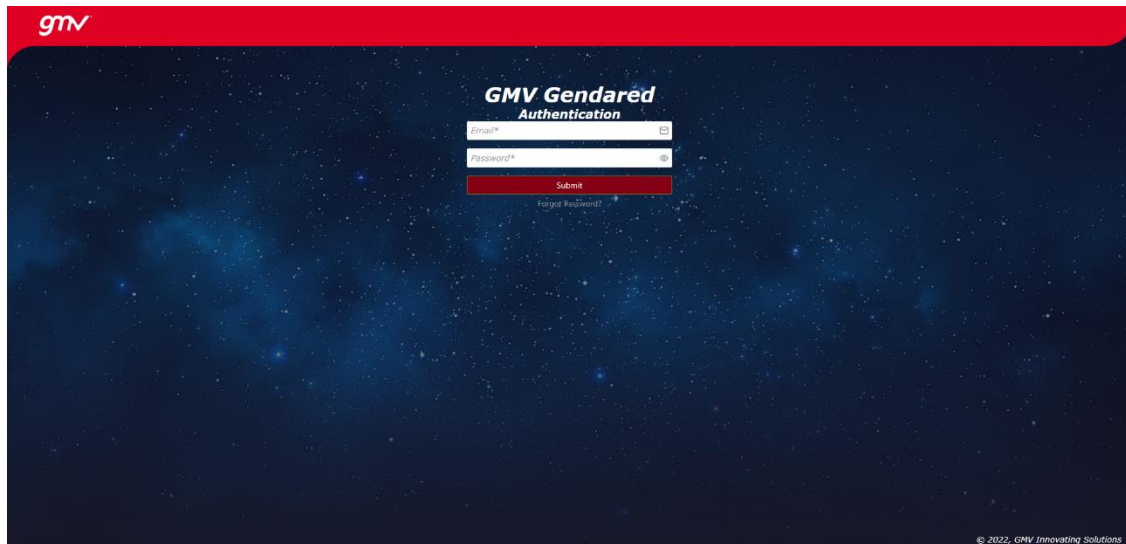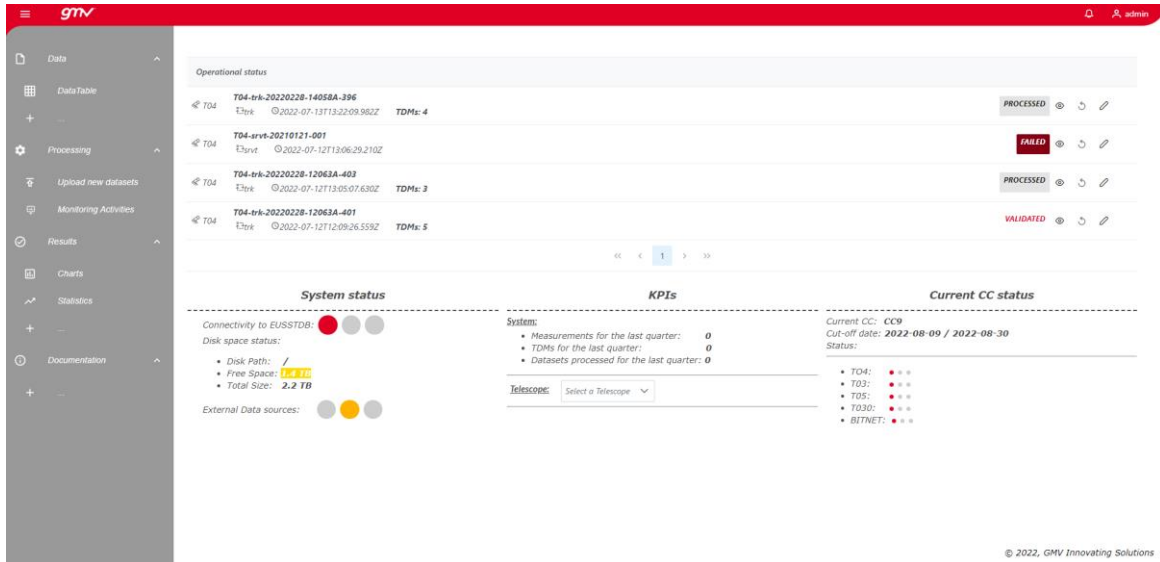


Figure 3: *Gendared* interface login page

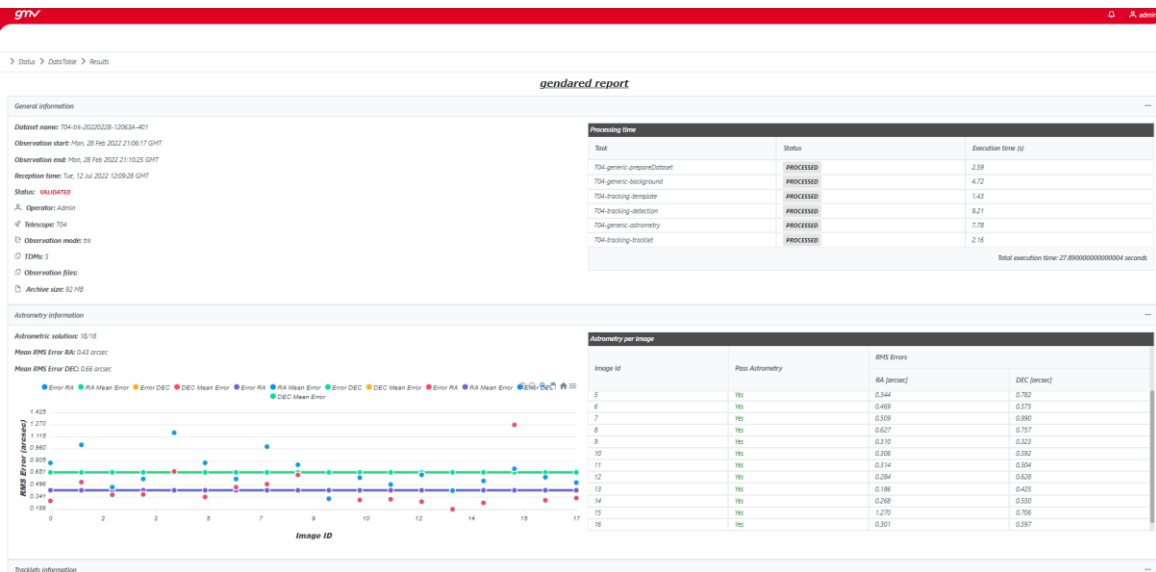Figure 4: *Gendared* interface status page and main functionalities (left menu)



Figure 5: *Gendared* interface processing results page example