2. Overview Chart

Detection, Tracking, and Identification of Asteroids through On-board Image Analysis

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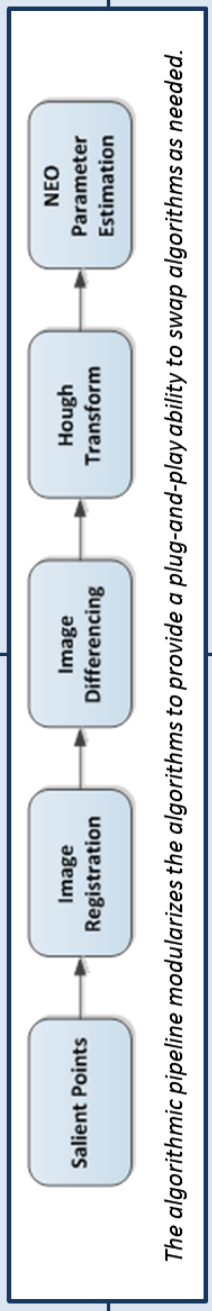
Research Objectives

- Define a spacecraft flight software data processing pipeline for asteroid detection, tracking and identification.
- Move software to the source of the observation to increase the probability of detection
- Increase spacecraft autonomy to more quickly make scientifically interesting observations
- Increase TRL level of software and algorithms from TRL-1 to TRL-3 by the end of the two-year effort.



The algorithmic pipeline modularizes the algorithms to provide a plug-and-play ability to swap algorithms as needed.

Approach

- Identify baseline mission designs using small spacecraft
- Define typical avionics and instrument for the mission design to constrain algorithms
- Develop suite of candidate algorithms for data pipeline
- Attain metrics on algorithm functional performance
- Attain metrics on algorithm processor/memory performance
- Select most suitable algorithms for further development
- Refine algorithms for a flight-like environment
- Operate algorithms on flight-like processors to ensure potential transition to TRL-4 and higher.

Potential Impact

- Reduce bandwidth requirements for small spacecraft
  - Correspondingly reduce mass and power constraints and margins
  - Broaden the range of spacecraft for this type of mission
- Improve turn-around time for follow-up observations
  - Increases probability of maintain asteroid orbit estimate
- Enhance flight software capabilities for "Smart Spacecraft"
  - Algorithms can be adapted for additional targeting use cases