2021 NSF CYBER-PHYSICAL SYSTEMS PRINCIPAL INVESTIGATORS' MEETING

Optimization-Based Planning and Control for Assured Autonomy

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Challenge:

- Developing a rigorous assured planning and control framework for autonomous systems.

Solution:

- Leverage insights from successful NASA planetary missions
- Develop optimization-based framework to merge these insights with rigorous problem formulations and solutions methods

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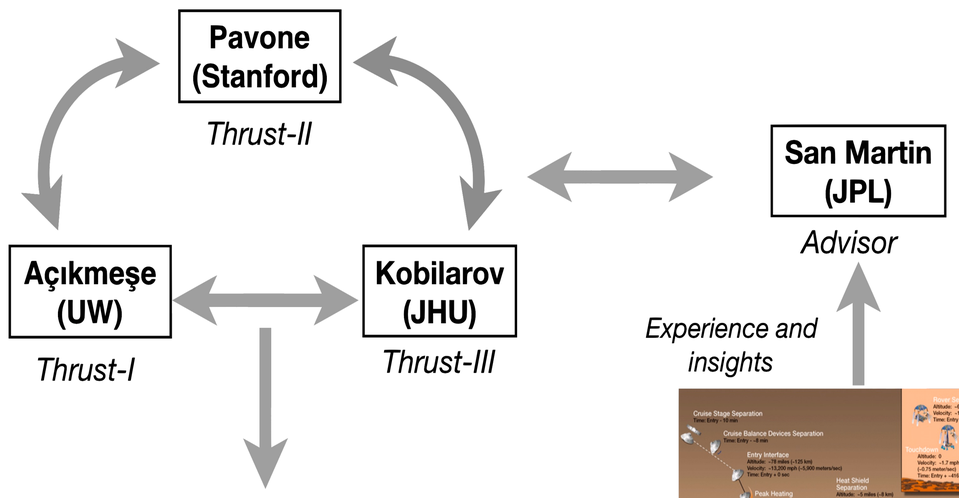
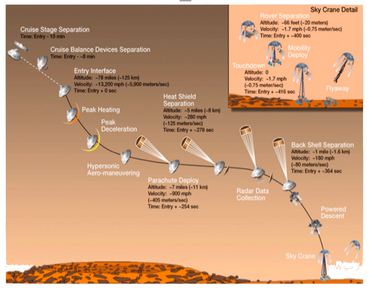


Optimization-based Assured Autonomous Planning and Control



Autonomous Planetary Landing

Tightly integrated research thrusts:

Thrust-1: Convexification for assured motion planning

Thrust-2: Resilient motion planning and control

Thrust-3: Real-world applications via autonomous underwater and aerial vehicle testbeds

Scientific Impact:

- New methods of convexification for trajectory planning
- New formulations and methods of resilient planning and control
- New real-time executable algorithms
- Development of unmanned underwater and aerial vehicle testbeds

Broader Impact:

- Develop broadly applicable assured autonomous control methods
- Applications of autonomy in space exploration, aerial transportation, arctic exploration
- Internships for K-12 and college students; public seminars on autonomy in planetary landing missions of NASA
- *Enable fundamentally new autonomous planning and control capabilities handling uncertainties*