

Space Systems Engineering

Roberto Furfaro searches for delta-V while making gardeners of astronauts

The University of Arizona is the highest ranked research university for planetary exploration in terms of scientific literature citations. Professor Roberto Furfaro, of the departments of systems and industrial design, directs the Space Systems Engineering Laboratory in the Osiris-Rex Science and Processing Operations Center Run by the UA's Lunar and Planetary Laboratory, which leads the billion-dollar Osiris-Rex mission to launch in 2016 and bring back a pristine asteroid sample In 2023.



**Professor Roberto
Furfaro**

Myriad onboard systems plus structural and communications needs all translate into a space mission's delta-V budget, and Furfaro and his team construct "what-if" simulations to optimize mission plans and spacecraft designs, and search for the most efficient trajectory that uses the least propellant to reach the target planet or asteroid. Furfaro, in conjunction with Raytheon Missile Systems, is refining a tool to calculate delta-V called the Mission Design Trajectory Optimization Program, which analyzes complex one-way and round-trip missions that include gravity assists, deep space maneuvers, extended stays at intermediate bodies, orbit insertions and escapes, and asteroid landings.

Furfaro is also part of UA's Lunar Greenhouse Project, which aims to support astronauts by growing food while providing fresh water and oxygen, and he is working with Moon Express, a group of private investors and scientists who plan to send a lander to the moon in 2014.