



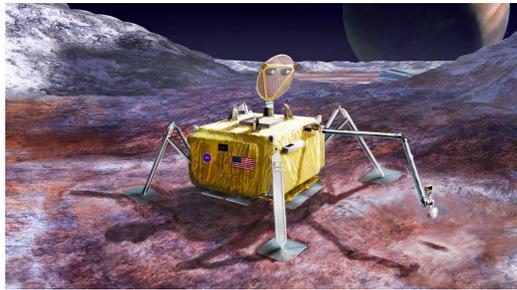
Special Seminar

The Europa Lander Mission: A Space Exploration Challenge for Autonomous Operations

Jeremy Frank, NASA Ames Research Center

4:30 – 5:30 pm Tuesday, Oct. 16, 2018

MIT 33-206, light refreshments



Abstract: NASA has proposed a Europa Lander Mission, with a notional launch date in the 2025 timeframe. Key features of the mission are: (1) Take 5 samples from 10 cm under the Europa surface (2) Last 20 (Earth) days (3) Send data back to Earth via a dedicated Carrier Relay Orbiter (CRO) spacecraft. Info about the Europa surface from Cassini Galileo is only at 6 m per pixel resolution. With exceedingly cold temperatures (-120 C at equator), the small-scale icy surface properties are unknown. Small grain features (snow-like), penitentes (inverse-icicles), plumes, and other complex terrain features will complicate operations.

The operational time delay is 30-60 minutes. The CRO is in view of the Lander for roughly 8 hours, and in view of Earth for roughly 10 hours. **Significant autonomy will be needed**, possibly for the **entire mission**. This talk covers the Europa lander mission objectives and the autonomy challenges, using past examples of similar missions and specific autonomy, making the case that the Europa lander presents a unique and unaddressed challenge for autonomy.

Bio: Dr. Jeremy Frank is the Group Lead of Planning and Scheduling Group in the Intelligent Systems Division, at NASA Ames Research Center. His Ph. D. is in Computer Science from UC Davis in June 1997, and B.A. in Mathematics from Pomona College. Dr. Frank's work involves space mission automated planning and scheduling systems, with integration of technologies for planning, plan execution, and fault detection as well as technology to enable astronauts to autonomously operate spacecraft. Dr. Frank has published over 50 conference papers, nine journal papers, and three book chapters, and received over 40 NASA awards, including the Exceptional Achievement Medal, the Silver Snoopy, and the NASA Engineering and Safety Center Award.