



Department of Engineering  
Seminar Program  
Wednesday, October 22, 2014  
Shanahan Teaching and Learning Center  
Lecture Hall 1430, 4:10pm

## Activity-Based Scheduling of Science Campaigns for the Rosetta Orbiter: A Report on Operations

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### Summary:

In August 2014, Rosetta (<http://blogs.esa.int/rosetta/>) entered orbit around the comet Churyumov-Gerasimenko. Rosetta is a European Space Agency led mission to explore the comet Churyumov-Gerasimenko and will be the first mission to deploy a soft lander to a comet, and to escort a comet for an extended period (over one year).

I describe the revolutionary use of the ASPEN Artificial intelligence planning and scheduling software for science observation scheduling for Rosetta. I first outline the challenges of supporting a multi-disciplinary science planning process which must incorporate diverse science, geometric, engineering, and resource constraints. Throughout this process, AI scheduling techniques have much to offer not only in schedule generation, but in constraint enforcement, problem and constraint analysis, and in iterative schedule refinement. I will cover not only direct results achieved only through the use of AI technology, but also directions and challenges for future research.

### Bio:

Dr. Steve Chien is Head of the Artificial Intelligence Group and Senior Research Scientist at the Jet Propulsion Laboratory, California Institute of Technology where he leads efforts in autonomous systems for space exploration.

Dr. Chien was a recipient of the 1995 Lew Allen Award for Excellence, JPL's highest award recognizing outstanding technical achievements by JPL personnel in the early years of their careers. In 1997, he received the NASA Exceptional Achievement Medal for his work in research and development of [planning and scheduling systems for NASA](#). He is the Team Lead for the [ASPEN Planning System](#), which received Honorable Mention in the 1999 Software of the Year Competition and was a contributor to the Remote Agent System which was a co-winner in the same 1999 competition. In 2000, he received the [NASA Exceptional Service Medal](#) for service and leadership in research and deployment of [planning and scheduling systems for NASA](#). He is the Principal Investigator for the [Autonomous Sciencecraft Experiment](#) which is a [co-winner of the 2005 NASA Software of the Year Award](#). In 2007, he received the [NASA Exceptional Achievement Medal](#) for outstanding technical accomplishments in the development of the [Autonomous Sciencecraft](#) deployed on the Earth Observing One Mission and the development of the [Earth Observing Sensorweb](#). He also led the deployment of the WATCH software to operational use onboard the Mars rover Opportunity to autonomously detect dust devils and cloud formations. In 2011, he was awarded the inaugural AIAA Intelligent Systems Award, for his contributions to Spacecraft Autonomy. In 2011, he was the team co-lead for the Sensorweb Toolbox team, which was awarded Honorable mention in the 2011 NASA Software of the Year Competition. He is the principal investigator of the IPEX cubesat, which launched in December 2013, which uses onboard image processing and automated planning software. He is currently leading the deployment of ASPEN for scheduling science observations for the Rosetta mission, an ESA-led mission to explore the comet Churyumov-Gerasimenko.

For additional information please visit: <http://ai.jpl.nasa.gov/public/home/chien/>

*After the seminar there will be an informal dinner and conversation with the speaker in the Mitchell Room at Hoch-Shanahan Dining Hall. If you are not on the meal plan, we will have a signup sheet. If you are interested in attending, please RSVP with Sydney Torrey at [storrey@hmc.edu](mailto:storrey@hmc.edu).*