Special AI/DB Seminar—March 11th 3:15pm GWC 487

Move Over Hal... Autonomous Spacecraft in the New Millennium



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Beginning in 2003 and continuing through 2007 several space missions will be carrying artificial intelligence (AI) software to perform decision-making onboard based on science goals. The EO-1 Spacecraft (eo1.gsfc.nasa.gov) will use onboard image analysis, mission planning, and robust execution software to autonomously perform science. It will use this AI software to detect and track science phenomena including: volcanic activity, breakup of glacier ice, and Aeolian features (wind-influences sand features). The Three Corner Sat constellation of three spacecraft, originally scheduled launches in August 2003 and will use 6 cameras to capture stereoscopic images of high altitude clouds (threecornersat.jpl.nasa.gov). The Techsat-21 mission (ase.jpl.nasa.gov) will use onboard autonomy software to conduct its mission.

This talk will describe how onboard AI software will dramatically increase the science return on these missions, with an emphasis on EO-1. Onboard science software will detect events (such as volcanic eruptions and floods) an enable onboard mission planning to enable autonomous decision-making and response. We will also briefly discuss how these technologies might be used in future missions such as an Io volcano observer or a cryobot to explore the subsurface oceans of Europa.



Dr. Steve Chien is a Principal Computer Scientist in the Exploration Systems Autonomy Section at the Jet Propulsion Laboratory, California Institute of Technology where he leads efforts in automated planning and scheduling for space exploration. He is currently the Principal Investigator for Onboard Autonomy on the EO-1 Mission (April 2003 upload), Three Corner Satellite Mission (August 2003 launch). Dr. Chien is also an Adjunct Associate Professor with the Department of Computer Science of the University of Southern California and a Visiting Scholat with the Computer Science Department at

UCLA. He holds a B.S. with Highest Honors in Computer Science, with minors in Mathematics and Economics, M.S., and Ph.D. degrees in <u>Computer Science</u>, all from the <u>University of Illinois</u>.

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. Dr. Chien's has been interviewed for and/or his work has appeared in a wide range of forums including Businessweek, Time, Newsweek, CNN, and The Discovery Channel.

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