NASA GSRP TRAINING GRANT
FINAL SUMMARY OF RESEARCH

Grant Title:
A Decision-Theoretic Approach to Autonomous Planetary Rover Control

#NGT 2-52276

Principal Investigator:
Shlomo Zilberstein

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Period Covered:
July 1, 2001 – July 30, 2004
This is a final report for the NASA GSRP Fellowship that supported my graduate studies from June 2001 to June 2004. I plan to graduate in 2005 from the University of Massachusetts with my Ph.D. in computer science. The tentative title for my thesis is “Decentralized Control of Markov Decision Processes,” and my advisor is Shlomo Zilberstein. I am currently seeking employment as a professor at a research-oriented university. My achievements for the period during which I held the fellowship are listed below. I accomplished the objectives stated in my original and renewal proposals, in addition to completing other projects.

Research Projects

- **Decentralized Control of Markov Decision Processes**, University of Massachusetts Amherst, 2000-present.
  
  We studied the complexity of decentralized control of Markov decision processes, and developed algorithms for finding optimal control policies.

- **Scheduling Contract Algorithms**, University of Massachusetts Amherst, 2001-present.

  We developed an optimal method for scheduling runs of a contract anytime algorithm (one that takes the deadline as input) in situations where the deadline is unknown, multiple problem instances must be solved, and a multi-processor machine is available.

- **Planetary Rover Control as a Markov Decision Process**, University of Massachusetts Amherst and NASA Ames Research Center, 2000-present.

  We used the Markov decision process framework to formalize and solve problems in planetary rover control.

- **Adaptive Peer Selection**, University of Massachusetts Amherst, 2001-present.

  We used reinforcement learning to maximize the expected download speed for a client in a peer-to-peer file sharing system.
Publications

REFEREED JOURNAL PUBLICATIONS


REFEREED CONFERENCES


REFEREED WORKSHOPS AND SYMPOSIA


Intelligence, Robotics, and Automation in Space, Montreal, Canada, 2001.


Presentations

INVITED TALKS

- Coordination and Control of Collaborative Agents Using Decentralized POMDPs. INFORMS Annual Meeting, Atlanta, Georgia, October 2003.

TALKS AT CONFERENCES AND WORKSHOPS

- Contract Algorithms and Robots on Rays: Unifying Two Scheduling Problems. 18th International Joint Conference on Artificial Intelligence, Acapulco, Mexico, August 2003.
POSTER PRESENTATIONS AT CONFERENCES AND WORKSHOPS


PROFESSIONAL ACTIVITIES


