

Commentary on "From Rovers to Orbiters: Continuous task distribution based coordination"

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Paper scope:

Expand 4 components of "remote agent" to a distributed/constellation environment. The remote agent module has 4 components: Mission manager, Planner/scheduler, Executive/diagnostician, implement activity on spacecraft. The paper looks at 3 modules, where in each module we progressively distribute more functionality. Module a: centralized planning ; distributed executive and implementation; Module b: Distribute planning; Module c: Goal setting by bidding.

Comment on range of planning options

The paper presents the range of planning options available to support rovers. It is a good high level overview of the available options, and which variables should be addressed in each option. Moving from centralized planning through distributed planning to goal distribution.

"contractor" class for the autonomy module

Previous papers discussing Autonomy Architecture had a slave, follower and leader classes. This paper adds the new class of contractors. This class and the use of using contract networks with goal settings is the "new" interesting point of the paper.

Comment on Planning

The main objective of the paper is planning. It takes two and half pages until we reach the planning discussion. And then the more complicated topics such as distributed planning and contract networks are discussed in one short section. As this audience is familiar with planning, I would skip the background and get have a more detailed discussion about the distributed planning and contract networks. We need to show how the MTSP theory is applicable to space application.

Performance metrics

The paper mentions 8 performance metrics. The metrics are: the amount of explicit control an operator has, feasible accuracy of modeling on the ground, software

testability, onboard computing power, platform event response time, bandwidth, quality of downlink data, redundancy. These are important Metrics however, the use of these metrics to compare between various planning modules is not detailed. For example Contract networks section has no discussion about these variables.

No details in Discussion

The paper is high level, therefore it is difficult to find anything "wrong" with it. Being high level the paper does not give specifics when and how to use each planning module.

Conclusion

The background of this commentator is operability and dealing with spacecraft autonomy. I am used to dealing with specific problems and solving them. This paper is high level and is not detailed enough to understand the implementation of the various planning options. In goal setting contract network option it does not show how this can be done in space.