Commentry on:

Optimizing Resource Utilization in Planetary Rovers by Shlomo Zilberstein and Abdel-Illah Mouaddib

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The reactive meta-level controller being developed by Zilberstein and Mouaddib is novel in borrowing techniques previously used on pure computational tasks to physical rover mission tasks. One of the methods key ideas is to apply cost/benefit metrics to every activity level to be executed on the path to accomplish a given mission goal. This is a potentially powerful method to assess alternate paths from which an optimum solution can be selected for overall mission effectiveness.

As noted by the authors the additional problems in applying this approach to space missions are:

- instead of a single metric for a given step there are multiple metrics that govern the cost/benefit of space mission activities,
- the determination of the metrics value is imprecise,
- activity levels may include several alternate steps and
- identifying the optimum solution in a dynamic complex system.

I recommend that the authors also consider two other important aspects of space missions:

- the time required by the method to both make predictions of the mission states and to decide what path to recommend, and
- the identified alternate steps are likely to be quite complex and invoke additional set of constraints and resource needs that must be satisfied before execution.

It is in the addressing of all the above problems that the potentials of their method can be reached. A prototyping approach using a segment of a rover mission scenario will both mature the method and showcase its potential benefits. This requires detailed models of the components of the system, the mission rules and constraints. Additionally a real-time simulation allowing closing the loop will reduce the uncertainties associated with the cost/benefit metrics.