Meeting notes – Topic: market-based task allocation

For MAS/MRS Reading Group Meeting on 10/29/04

• Readings:
  – Additional notes on task allocation

• When is task allocation appropriate in a multirobot system?

• Is there a difference between task and role allocation?

• How does this work differ from the task allocation paper we covered last week (Gerkey 03)?

• How do constraints on the tasks fit in to the common market-based allocation frameworks?

• Utility / cost / reward functions – How dependent is the system on the accuracy of task valuation? What about utility/cost dependencies between robots?

• What are the implications of using the “single-task-per-robot” (OAP) formulation of the problem?

• Single-item auctions vs combinatorial auctions
  – Single-task auctions: simpler, but can hit local minima pretty easily
  – Combinatorial auctions: valuation problem is hard (heuristic clusterings often used); clearing is hard; high communication complexity; but can arrive at optimal solutions (depending on the starting conditions) or avoid some local minima that single-task auctions hit
  – Other types of auctions / contracts / negotiation mechanisms

• Centralized vs peer-to-peer allocation mechanisms
  – Peer-to-peer mechanisms allows reallocation which is nice when there is uncertainty, failures, or bad initial allocations
  – Centralized mechanisms can make the system vulnerable to failures of the centralized agent or the communications system

• Can a market-based approach (as they are currently defined) be used effectively for “persistent”-type tasks?

• “Continuous vs discrete” allocation

• What can’t current market-based approaches currently/ever do?

• Other features of market-based: handling online tasks, recovering from robot failures

• How can we handle breaking contracts / failing tasks?

• Complex task allocation – how can you decompose a task before you know to whom it will be allocated, and how can you allocate a task before you know how best to decompose it?

• Learning and adaptation (e.g. for cost/reward calculations)

• Tight coordination: next week