Complex Task Allocation for Delegation: From Theory to Practice

David Landen

Linköping Studies in Science and Technology
Thesis No. 1506
Department of Computer and Informations Science
2011
http://liu.diva-portal.org/smash/record.jsf?searchId=1&pid=diva2:444066

The thesis studies the problem of deciding who should do what among a group of agents given a set of tasks. This is called the task allocation problem. This is a common problem in many multi-agent system applications. In this work we study the task allocation problem that occurs as an integral part of a larger problem of determining if a complex task can be delegated to one or more agents. Delegation is the act of handing over the responsibility for something to someone. Previously, a theory for delegation including a delegation speech act has been specified. The speech act specifies the preconditions that must be fulfilled before the delegation can be carried out, and the postconditions that will be true afterward. To actually use the speech act in a multi-agent system, there must be a practical way of determining if the preconditions are true. This can be done by a process that includes solving a complex task allocation problem by the agents involved in the delegation. The contributions of this thesis are a constraint-based task specification formalism, a complex task allocation algorithm for allocating tasks to unmanned aerial vehicles, and a generic collaborative system shell for robotic systems. The three components are used as the basis for a collaborative unmanned aircraft system that uses delegation for distributing and coordinating the agents' execution of complex tasks.