

Coordinated Construction with Teams of Robots

Daniela Rus, Massachusetts Institute of Technology (MIT),
Electrical Eng. And Computer Science Department

Abstract

We wish to develop cooperative robot systems for complex assembly tasks. A typical assembly scenario requires that parts of different types get delivered at the location where they are needed and incorporated into the structure to be assembled. We abstract this process in two operations: tool and part delivery and assembly, and consider how a team of robots will coordinate to achieve assembling the desired object. Tool and part delivery requires robots capable of accurate navigation between the part cache and the assembly location. Assembly requires robots capable of complex grasping and manipulation operations, perhaps using tools.

We describe a decentralized control strategy for a team of robots with specialized as (1) tool and part delivering robots and (2) assembling robots. Different assembling robots work in parallel on different subcomponents of the desired object. The delivering robots deliver in parallel parts (of different types) according to the sequence in which they are needed at the different assembling stations. Present decentralized algorithm for the coordinated assembly of truss-like objects using rods and connectors, its stability and adaptation properties, as well as simulation and hardware results.