



Virtual Relations in Multiple Robots

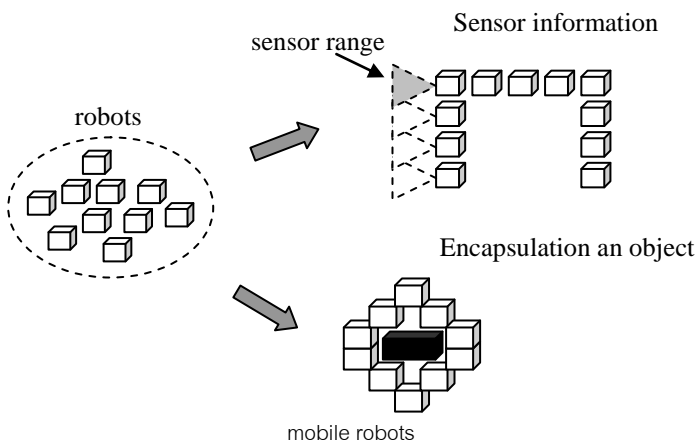
Investigator: Panrasee Ritthipravat

Nowadays, a robot has been developed to support humans in many applications. The more complex robot is, the more it costs. Due to flexibility and fault-tolerance properties of multiple robots, they have been employed instead of a complex robot. Not only a cost reduction but using the multiple robots also appropriates for an application in an open area. However it is difficult to coordinate these robots to achieve a required task. A group behavior must be studied and controlled.

In this research, a formation of virtual relation in multiple robots has been studied. The virtual relation implies unreal connection among the multiple robots. It can be classified into two types, i.e. virtual constraint and virtual relationship.

1. Virtual constraint is a transformation of no connection modules into virtual connection modules by imitating physical constraint behaviors such as geometrical constraints, chain forming, line of sight etc. Fig. 1 show examples of the virtual constraint concept. Robots share sensor information with another robots and encapsulate an object in transferring task.

Fig.1 shows examples of virtual constraint forming in a group of



2. Virtual relationship is a transformation of homogeneous modules into heterogeneous modules such as imposing a mother-child relation or leader follower etc. Fig.2 shows the mother-child relation which child robots will act as same as the mother robot when they are moving through a narrow channel. Once they meet the intersection their relations have been switched to leader-follower relation. Two sub-leaders lead their followers to different paths for surveying purpose while a main leader wait at the intersection point for receiving their sub-leader survey report.

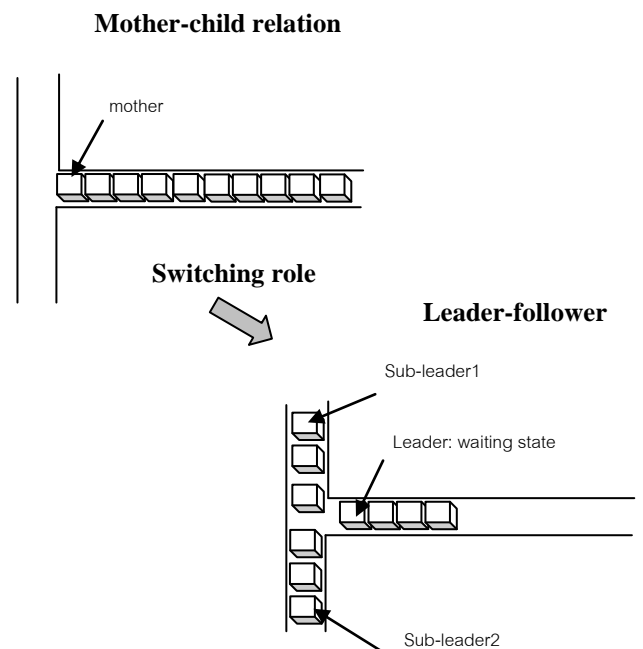


Fig. 2 shows examples of virtual relationship forming in a group of robots

This research aims to impose these relations in the robots by describing robot behaviors instead of using complex mathematics modeling in order to reduce the difficulty of coordination multiple robots and increase a group capability for achieving a task.