Searching for the Target Objects and Cooperative Conveyance in Super-Mechano Colony

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The purpose of this research

Child robots in SMC
Mission :Gathering unknown objects
Specification:Basic functions to collect objects

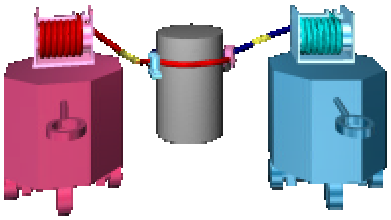
Effective collection of various kinds of objects

Cooperative conveyance with tether

Cooperative conveyance
- conveying heavy object

Utilizing tether
- capturing objects of various shapes
- compact equipment

Available for collecting unknown objects



Cooperative conveyance

Course-select algorithm

Specifications of the child robots
sharing information with LAN
checking obstacles with a CCD camera

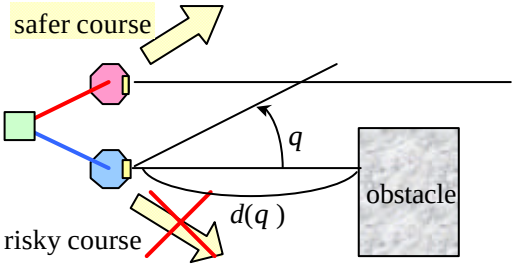
Selecting safer course to the destination cooperatively

The one near the obstacle — priority of determination

considering the other course

for partner's side

1. Basic Algorithm



2. q decision

Direction safety index

$$I(q) = \frac{1}{d(q)}$$

minimize $I(q)$ → q :desirable direction

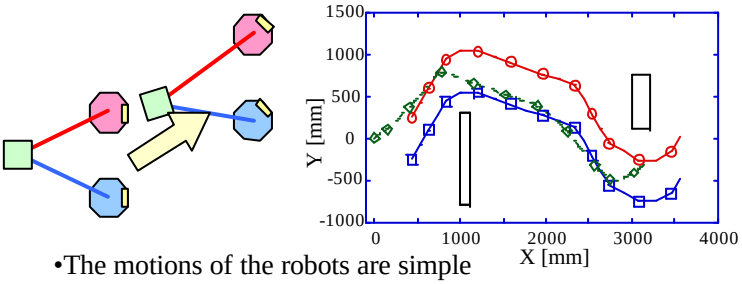
Cooperative motion rules

Executing cooperative conveyance

Necessity to find effective motion rules

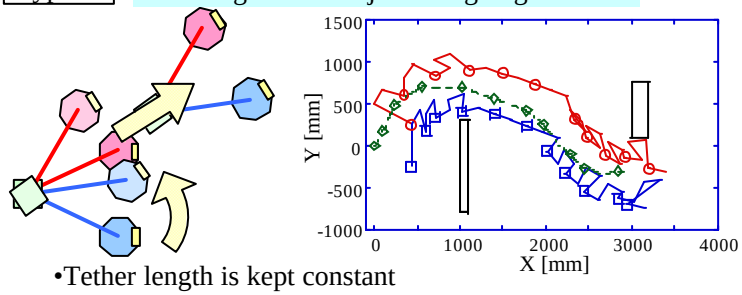
Checking rules with computer simulations

Type **A** Going forward the same direction



- The motions of the robots are simple
- Either tether is too extended

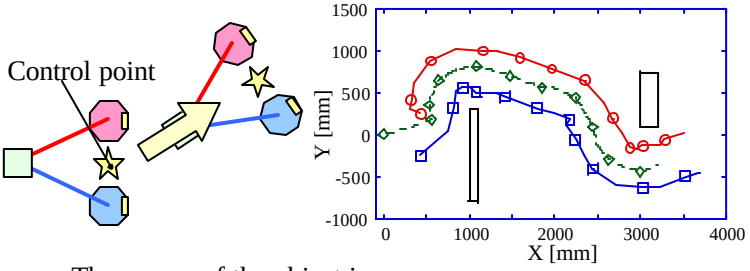
Type **B** Rounding around object and going forward



- Tether length is kept constant
- The motions of the robots are complex and wasteful

Type **C** Motion with using control point

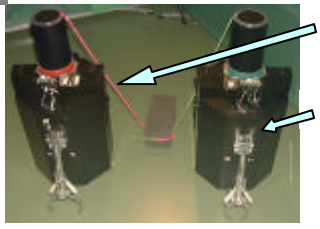
Keeping configuration around control point



- The course of the object is proper
- Tether is stretched a little

Demonstration

- Adoption "type C"



Conclusions

- It was proposed that course-select algorithm and cooperative action for cooperative carrying.
- Computer simulations showed the availability of the suggested algorithm.