An Environmental Support Method for Mobile Manipulators Using Visual Marks with Memory Storage

In this study we propose a methodology of environmental support for autonomous mobile manipulators using visual marks with memory storage.

Nowadays, more and more working women and elderly people needs robots working at home or office. In this case, the robots have to be able to recognize surroundings, calculate objects, then move and work accordingly. Therefore, the robots' "Function" (eq. mobile system) and "Intelligence" (eq. recognizing system) are necessary to accomplish these conditions. We, however, cannot use them because of its complicated system and high-price. This idea leads us to a conclusion, "Support Environment where the robots work.".

In this study, we propose a methodology of environmental support. The details are as follows.

(1) We propose "Visual Marks with Memory Storage" which consists of landmark and memory parts. A robot can measure absolute pose of the measured mark or relative pose between a robot and the mark with the landmark part. Then it can understand contents of task process with the memory part. The designed mark is shown in Fig. 1.

(2) We fix the most appropriate arrangement of navigation marks for robot through simulation. The simulation extends a solution for a locating problem that is one of the most appropriate arrangement problems.

(3) We experiment Table-clear-off with a manipulator to verify the functions that recognize objects pose and understand contents of task process. Also we experiment Obstacles-avoiding with a mobile robot to verify the function that determines absolute pose in a room. As a result of the experiments, we confirm that our method is useful. The experimental result on Obstacles-avoiding with a mobile robot is shown in Fig. 2.

Keywords: Service Robotics, Environmental Support, Artificial Landmark, Mark Recognition

References

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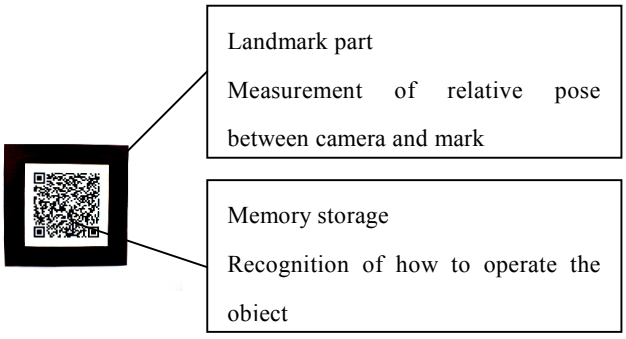

Fig. 1 The mark with memory storage

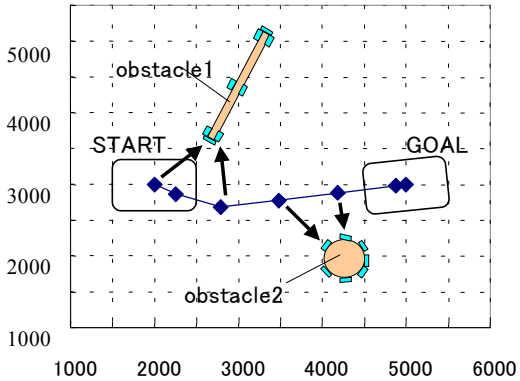

Fig. 2 Experimental results (Obstacles-avoiding)