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# A Study on Cooperative Actions of Autonomous Mobile Robots

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**Keywords:** autonomous mobile robot, dynamic environment, subsumption architecture, cooperative action, artificial neural network.

Many simulations on a computer have been performed in the conventional robot research. However, various noises in the real world and restrictions conditions. Especially an autonomous mobile robot does not escape the influence. In this study, it aims at carrying out clearing up that cooperative action ,especially "following another robot" action in the case of not using an explicit communication means by two or more autonomous mobile robots in dynamic environment I implemented control program which a type differs from to an autonomous mobile robot, respectively, and by making it operate in a real environment considered in order to clarify control program structure suitable for communication-less "following another robot" action . It uses as the control architecture which mounts to a real robot, and is the subsumption architecture. It adopted. An "following another robot" action is decomposed into each module, and fundamental operation is performed.

In the experiment,

1. Two kinds of different module which judges a wall and the other object were implemented in the real robot. One is a control program only based on the design technique of subsumption. Another is the control program which used the feed forward type neural network that learned the discernment from a wall and the other object by the sensor value from static environment.
2. The performance of a control program was compared by measuring the number of times of "following another robot" action within fixed time.

Consequently, it is shown that the control program implemented recognition module designed based on experience of a designer is a high "following another robot" action performance relatively. And interesting various actions were observed.

On the one hand, it is shown that the control program implemented feed forward neural network is low performance relatively and "following another robot" action was hardly able to be taken, in dynamic environment, although high recognition accuracy is shown in static environment

In this study, the validity of the subsumption architecture was checked anew. If it experiments in a dynamic environment using control module included neural network which only map from static sensor information to output, it turns out that environmental recognition efficiency becomes bad and the performance of imitation action becomes low relatively. The reflected that a motion of the robot, such as the evolutionary calculation technique, itself to recognition mechanism acquisition process. approach is taken, It is considered that robust system using the interaction of system and environment can be built also under dynamic environment. Therefore, it is mutual interaction with environment study how from now on. It becomes a subject whether it should take in.