

## SYSTEM INTEGRATION

### Mobile Robot Group System Controlled by a Human

Until now, we have been developing a system for multiple mobile robot operation by a single human user. Now, we implement object-command level in which the user gives the robots motion of an object and robots manipulate the real object as the user says. It is very difficult for the robots to perform that scenario automatically in an unknown environment.

In order that robots may achieve tasks in unknown environments, we must solve two problems; that is, environment recognition and self-positioning problems. Concerning the former, the two robots, each robot has a monocular camera, acquire a 3-dimensional position of a point in the environment with a stereo vision method. As for the latter, we set marks, which are designed suitable for pose observation, on the robots, and the robots measure their positions each other. In each phase mentioned above, the human user gives commands to the robots appropriately. Schematic view of our proposed system is illustrated in Fig. 1.

By solving the above problems, we can make a virtual environment in the computer. The virtual environment displays work site information to the user (Fig. 2). If so, the user operates a simple model of an object in the virtual environment and robots manipulate the object in the object-command level. We verified effectiveness of our proposed method by experiments (Fig. 3).

*Keywords:* Human Robot Interaction, Stereo Vision, Object-command Level, Multiple Mobile Robots, Environment Recognition, Relative Pose Measurement

#### References

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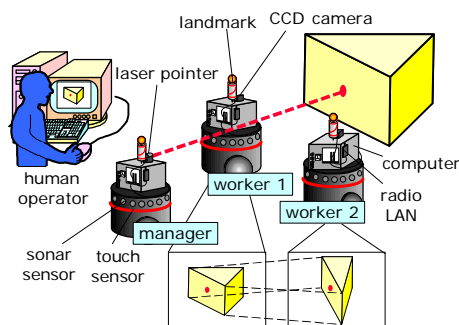


Fig. 1 Proposed system

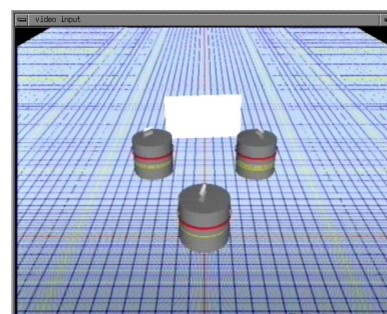


Fig. 2 Virtual environment



(a) operation site



(b) work site

Fig. 3 View of the system