

Title	移動ロボット群向けの個体識別可能なロボット間位置計測システム
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Identification Robot ID and Positioning system for Mobile Robots

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Background

A great deal of research has been carried out in recent years in the field of mobile robots system. These systems consisting of mobile robots equipped with simple functions for handling individual parts of a large-scale task are expected to be able to perform more effectively and efficiently than a single sophisticated robot with advanced functionality. Also, a great many tasks actually require swarm robots. In order to perform a task in cooperation mobile robots, it is important to know position of other robots. The mobile robots system with camera and communication have a problem can not coincide visible object and communication. When robot wants to specify a robot and to communicate, robot is require to identification robot ID.

Approach

As general positioning system between robots, there are Ultrasonic wave, photo sensor system and stereo vision system. Ultrasonic wave and photo sensor system can measure direction of only one axis. When

we want to measure position between many robots at same time, robot need to have many sensors. This sensor can not discriminate robot and Obstacle. Stereo vision system can discriminate robot and Obstacle. But This system can't measure position between many robots at same time.

In this paper, we propose a method of using omnidirectional vision sensor to measure robot ID and position(distance and degrees) between robots. Each robot has omnidirectional vision sensor and color code for robot ID.

system flow is firstly robot take a omnidirectional image , color filtering image for analyze color code and computing code data then we can get position data.

Result

I make omnidirectional simulation image use parameter of omnidirectional camera with POV-Ray. POV-Ray is a ray tracing program. I took performance data of degrees, distance and robot ID with simulation image. Degree result have $\pm 0.3[^\circ]$ errors. This reason is error of round off sin function when panoramic extension. Distance result have less than 5[%] error within 5[m] and since 5[m] error is very big max 34[%]. Within 5[m] distance result is effective positioning system. But since 5[m] distance result is not effective and should use identification Robot ID. Robot ID result is no error from 10[m]. Since 10[m] code pixel less than ID number, so it can not get ID data. This system is effective when robot want measure many robots position at same time.