

Omnidirectional Mobile Robotics



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Research Fields Robotics, Instrumentation

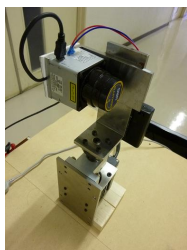
Keywords Mobile Robot, Environment Recognition, Obstacle Avoidance

● Research Outline

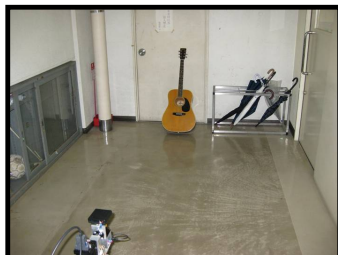
3-D Environment Recognition

Localization and environment map building are necessary to navigate remote-controlled mobile robot as well as autonomous mobile robot. Scanning laser rangefinder is a useful device which determines the distance to surrounding objects. However, its sensing area was limited to a horizontal plane.

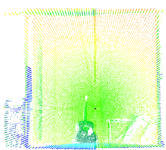
We realized a 3-D scanning system by rotating a 2-D scanning laser rangefinder. 3-D omnidirectional position data up to 4m around the sensor are given by single scan. Moreover, large area map can be built by connecting multiple scan data as seen below.



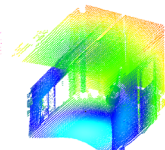
3-D Scanner



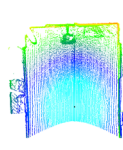
Target Scene



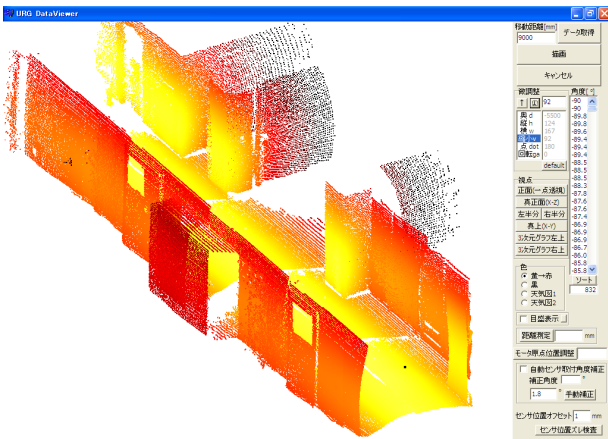
Front View



Bird's Eye View



Top View

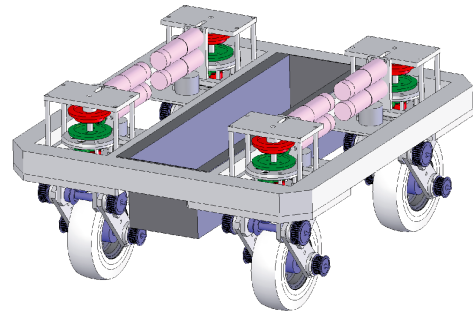


Map Building (Corridor)

Omnidirectional Mobile Robot using Differential-Drive Steering System

Omnidirectional mobile robot is able to move in any planar direction regardless of its current posture. However, conventional omnidirectional robots realized their omnidirectional motion by using special wheels such as mecanum wheels, ball wheels and omni-wheels. To improve its mobility, omnidirectional robot equipped with normal rubber tire was needed.

We developed a omnidirectional mobile robot equipped with caster-drive normal tire which has offset between the steering axis and the center of the wheel. Our caster-drive mechanism (Differential-Drive Steering System) minimizes required motor power by generating the driving and steering velocities from two motors using differential gearing.



Omnidirectional Mobile Base



Omnidirectional Wheelchair