



미래를 위한 인공지능과 스마트농업

스마트농업 크로스코칭 세미나



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Navigation of a Mobile Robot in the Indoor Environment Based on Visual Odometry Particle Filter and SLAM-Gampping Algorithm

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Introduction

- ◆ Localization is one of the important method for autonomous indoor robots to recognize it's position.
- ◆ In general, navigation of mobile robots is conducted using GPS. But in indoor environment, GPS is unavailable.
- ◆ Several algorithms have been applied to localize robots, but still needs to be improved.
- ◆ In this study, we proposed a method to navigate mobile robots in the indoor environment by combining visual odometry particle filter and SLAM-Gampping algorithm.

Materials & Methods

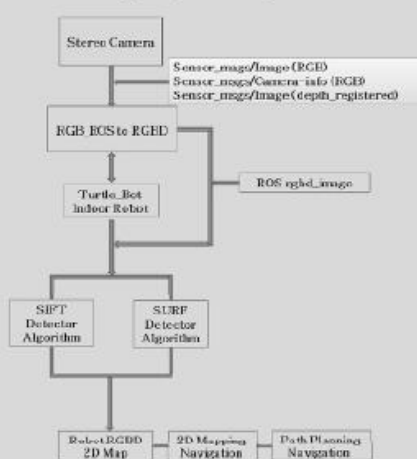
◆ Autonomous Navigation Systems



◆ Hardware Specifications

ROS (Robot Operating System)		ROS (Robot Operating System)	
Model: RV-100	A2	Depth Resolution	0.8 ~ 20m/600
Distance Range	0.10 ~ 12 m	Lens Field of View	90° (H) x 40° (V) x 110° (D)
Angular Range	0 ~ 360 degree	Sensor Resolution	1/32 degree
Distance Resolution	0.8 ~ 1.5 mm	Connectivity	USB 3.0 port with 1.5m
Angular Resolution	0.05 ~ 1.35 degree	Size and Weight	175 x 200 x 22 mm (4.9 x 7.9 x 1.7")
Sample Duration	0.25 (1/4 second)	Depth Format	32-bit
Sample Frequency	2000 ~ 5000 Hz	Output Device	128 mm (5.1")

◆ Procedure of Mapping Navigation



◆ SLAM-Gampping Algorithm

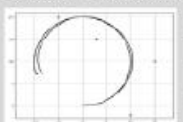
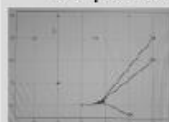
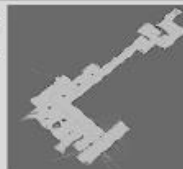


◆ Visual Odometry Particle Filter



Results

- ◆ Visual odometry particle filter algorithm showed that robot could know the position and follow the target location.
- ◆ The position error was relatively small in the office building.
- ◆ In future work, we will test the robot in more complicated indoor environment such as, glass



Simultaneous of Visual Odometry Particle Filter Localization

Real Time Simultaneous Localization and Mapping

Acknowledgement

This work was supported by the Korea Institute of Planning and Evaluation for Technology in Food, Agriculture, Forestry (IPET) through the Agriculture, Food and Rural Affairs Research Center Support Program (MAFRA) (No.714002-07), and Advanced Production Technology Development Program (No. 318094-3) funded by the ministry of Agriculture, Food and Rural Affairs (MAFRA).



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