

MASTER'S THESIS

Design and Implementation of Multi-robots Visual SLAM System

FENG, Jiayi

Date of Award:
2022

[Link to publication](#)

General rights

Copyright and intellectual property rights for the publications made accessible in HKBU Scholars are retained by the authors and/or other copyright owners. In addition to the restrictions prescribed by the Copyright Ordinance of Hong Kong, all users and readers must also observe the following terms of use:

- Users may download and print one copy of any publication from HKBU Scholars for the purpose of private study or research
- Users cannot further distribute the material or use it for any profit-making activity or commercial gain
- To share publications in HKBU Scholars with others, users are welcome to freely distribute the permanent URL assigned to the publication

ABSTRACT

Simultaneously Mapping And Localization(SLAM) systems are essential in robotics systems. Using a single robot to map a large scene is time-consuming. Therefore, a map can be constructed using a group of robots working together. Visual-based loop detection in cooperative SLAM is essential, which can help to efficiently and accurately merge and construct global maps among robots working independently. However, most visual SLAM algorithms focus on loop detection along the same trajectory direction. These algorithms cannot handle multi-robot cooperative systems well because, in such systems, multi-robot trajectory direction may often form loops along opposing or perpendicular directions. In this paper, we propose a multi-robot cooperative SLAM system based on panoramic images. Each robot uses a camera as a sensor and a local map algorithm to construct a local map. All local maps are merged into a global map when loops are detected. The panoramic images provide scene information in all directions for loop detection. Experiments show that the loop detection accuracy is improved in the proposed system, and the time for constructing a global map is significantly reduced by using a multi-robot cooperative system.

Keywords: Visual SLAM, Cooperative Mapping, Panoramic Image