Yıldız
Rescue Simulation League
Virtual Robot Competition

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Introduction

Team Yildiz consists of members that are mainly working on Machine Learning, Computer Vision and Robotics, especially Simultaneous Localization and Mapping (SLAM) algorithms. Autonomous exploration, simultaneous localization and mapping, victim detection are the problems that we dealt in this project.

Methodology

In this project we worked with P3AT robot model. Laser rangefinder and odometry data coming from robot are used for processes managed in the project.

In order to ensure that robot will explore all the map, a good exploration algorithm was needed. An A* based exploration method, which finds unexplored areas on the map and directs robot, is used.

For simultaneous localization and mapping Polar Scan Matching method is used because of its high localization capability.

Our victim detection method is based on skin detection. Images are transformed to HSV and YCbCr color spaces, skin color is detected in both spaces and the results are combined.


Experiments

In victim detection module, combining HSV and YCbCr color spaces for skin color detection improved success rate.
Our A* based exploration method works fine and environment is explored successfully.
In the experiments it is seen that Polar Scan Matching method can create a highly reliable map and estimate the position of the robot even without encoder data.
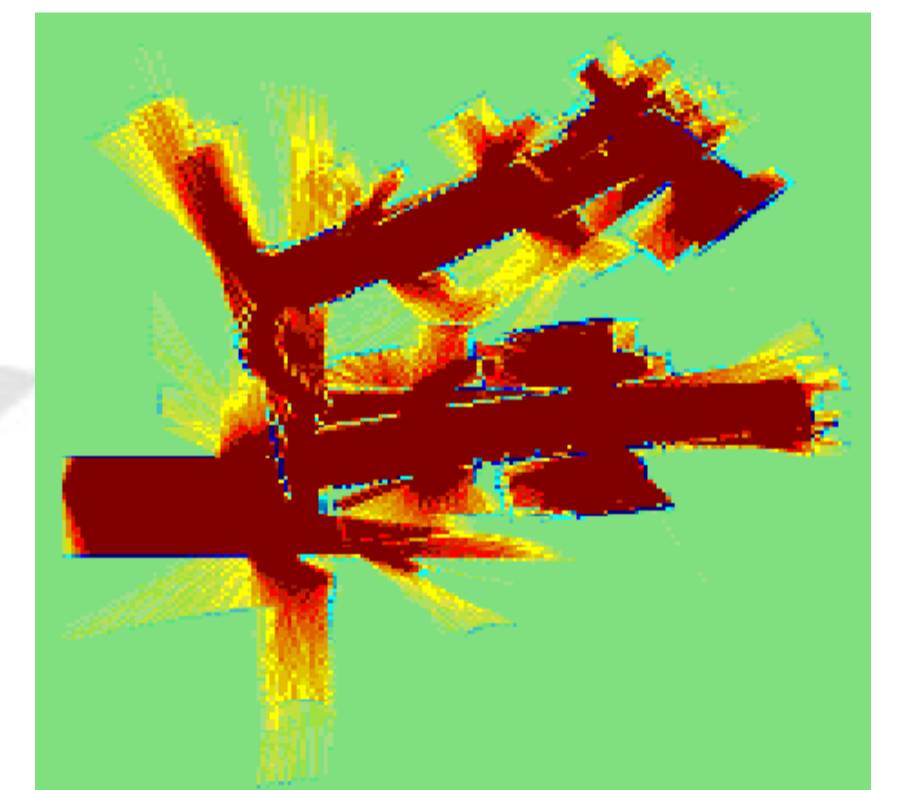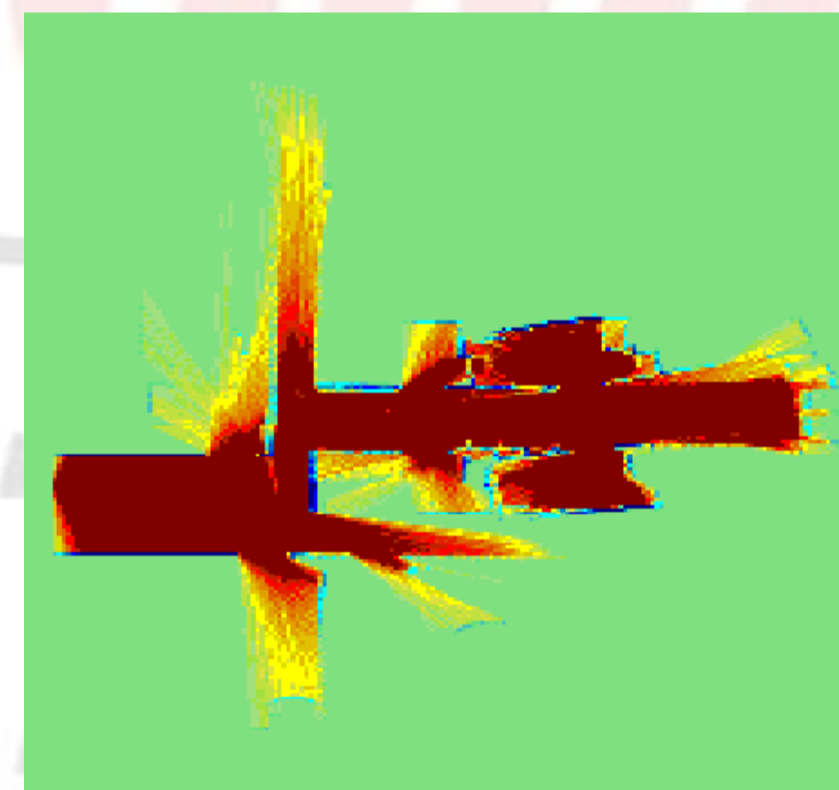
Conclusions & Future Work

In this project we dealt with autonomous exploration, SLAM and victim detection problems. It is seen that our methods work fine in the simulation environment.
For the future, it's planned to improve these methods and make experiments on real robots.

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