Monocular Multi-Robot Trajectory Control with RGB LEDs
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Introduction
Using Multi-Robot Enabled Dexterous Locomotion to Search for Victims in Disaster Areas

Goals
1. Simultaneous Localization and Mapping (SLAM) in disaster areas for search and rescue applications
2. Utilize a team of low cost and disposable robots

Project Goals
Utilize a stationary webcam detecting RGB LEDs to provide trajectory control for multiple "Zumy" robots:
1. Detect RGB LEDs in the environment
2. Estimate Robot Poses (Pose, Covariance)
3. Robot Localization
4. Feedback Control

Zumy Robot Platform [1]
Processing:
ODROID & mbed
Motion:
Track encoders & forward drive model

Method
System Overview

RGB LED Detection

Correspondence and Pose Optimization [2]

Gauss Newton Minimization

Extended Kalman Filter (EKF) Tracker

Camera Update

Motor Propagation

State Vector

State Dynamics (Euler Integration)

Pose Estimate and Filtered Pose

Results

We demonstrate simultaneous monocular localization and control of two robots with effective disambiguation by RGB LEDs.

In the figures to the right, we command one robot to follow a 16cm radius circular trajectory. Displayed are the overlayed raw pose estimates and Extended Kalman Filter estimates.

References
1. https://wiki.eecs.berkeley.edu/biomimetics/Main/Zumy