CS491/691: Introduction to Aerial Robotics

Monocular, hardware-synchronized, Camera-IMU Localization

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Motivation and Problem Description

- A dual camera apparatus with an interaxial separation of 118mm to measure depth

- Fixed wing drones would be able to more accurately measure altitude and distance to objects with downward facing cameras mounted to each wing. The further these cameras can be separated, the greater the depth that can be measured.

Proposed Approach

- Mount 2 PS cameras to a rod of at least 1m in length and synchronize clocks
- Mount the camera apparatus to a car
- Calibrate cameras
- Record ROS bags of slow driving on the roof of the West Stadium Parking Garage.
- Use ROS bags to generate disparity
- Used image_pipeline, usb_cam, and ros_bag packages

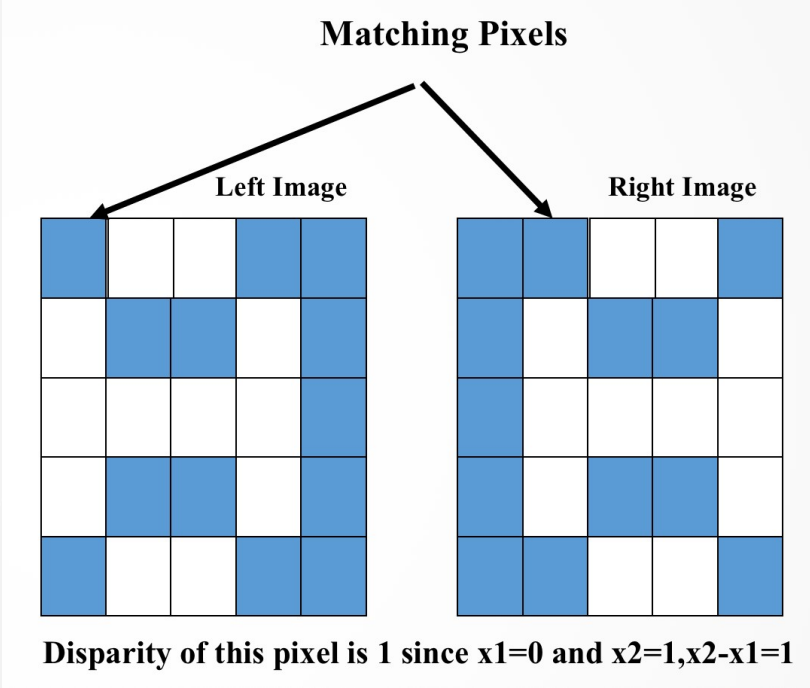
Construction
- 2 PS cameras
- Metal rod

Calibration
- Print Calibration Image
- Calibrate Cameras

Testing
- Mount to Car
- Record data

System Description

- Calibration uses Gaussian adaptation to find optimal solution.
- Disparity = x2 – x1
- Depth is inversely proportional to disparity



Results

- Successfully calibrated cameras
- Recorded ROS bags
- ROS bags converted to disparity image
- Next Step is SLAM