Automated configuration of vision sensor systems for industrial robotics

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Introduction

Many tasks in an industrial production line are performed on too small a scale to justify a dedicated robot solution. To handle these tasks an adaptive robot solution must be developed. When implementing a robotic solution that utilizes computer vision, uncertainties are unavoidable and must be taken into account when setting up the system. As the configuration of a vision system to meet certain uncertainty limits can be very time consuming, an automated configuration process will be developed.

Physical object | Pose uncertainty

Area of investigation

There are three main challenges that must be addressed in order to automate the vision sensor system configuration.

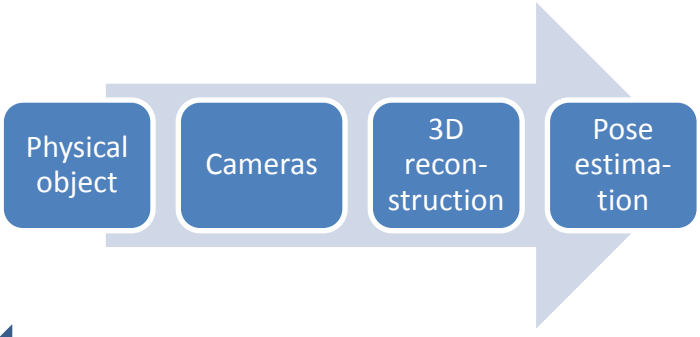
1. Identify and model uncertainties
2. Simulate uncertainty propagation
3. Sample the configuration space to find an optimal configuration

1. Identify and model uncertainties

The various sources of uncertainties must be identified and modeled in order to quantify the uncertainties. The uncertainties can be due to camera noise, calibration errors, sampling resolution, object properties, etc.

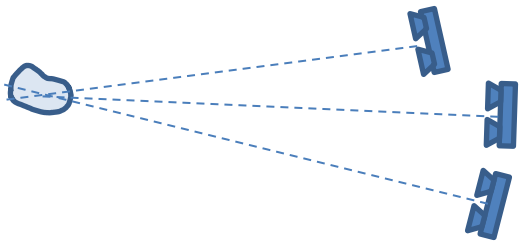
2. Simulate uncertainty propagation

The propagation of uncertainties through the computer vision pipeline must be investigated in order to simulate the accumulated uncertainty in a full vision sensor setup.



3. Sample the configuration space to find optimal configuration

Using the simulation of uncertainties the configuration space must be sampled in order to find an optimized sensor configuration which meets given uncertainty limits.



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