# Laboration 2: RGBD-cameras

Sensors and Sensing

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December 3, 2015

*All code for this exercise can be found at*
*https://github.com/tgolsson/sensors-laboration2-xtion*

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## 1 Theory and motivation

### 1.1 RGBD-cameras

RGBD-cameras, short for *Red-Green-Blue-Depth*-camera, is a type of low-cost camera commonly used for robot vision. The concept became widely popular with the release of the Microsoft Kinect in late 2010.

These cameras consist of two separate parts: one normal color-based camera, and one infrared sensor with accompanying projector. The sensing consists of projecting a deterministic pattern onto the scene, and then unprojecting them by comparing to previously captured patterns at known depths. By interpolating through these patterns, a full depth-image is generated.

### 1.2 Noise

A common problem in any type of sensing is the introduction of noise into the system. This noise can come from many sources, and be predictable or unpredictable. Examples of noise sources could be frequency hum from electric circuits, flickering lights, air pollution or pure inaccuracy. This noise can skew the results of sensors that make algorithm much more error prone.

There are many approaches to reduce noise. Proper calibration and good testing environments is a good start, but this can only reduce external noise. Internal noise of the sensor needs to be analyzed and minimized on a much lower-level such as by using specially constructed algorithms. For sensors, that generate some sort of sequence one very naive (but nonetheless effective) approach is the use of smoothing.

## 2 Implementation

This exercise details the usage of calibration and smoothing for a RGBD-camera inside ROS.