ANNEX A – Master Thesis Proposal

1. Student Information

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Date and Signature

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24/03/13

2. Master Thesis Information (use as many pages as needed)

Title:

Description:

Aims: (see page attached)

Tasks:

Planning:

3. Supervisor Information

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Date and Signature

Title

External robot calibration

Description

Complex robots with multiple arms and sensors (in our case, cameras) must be calibrated both to the manipulators and to each other, since fused sensor data is often needed.

It can be solved as non-linear optimization problem by combining measurements from the robot's various sensors to calibrate the robot's joint offsets and external sensor locations. The approach is a variant of Bundle Adjustment technique [1].

Task / Aims

- Implementation in C++ using Ceres Solver [2] (non-linear optimizer).
- Make the ROS calibration package [3] more general:
    1. currently only for PR2 robot [4].
    2. The current python optimizer used in [4] doesn't support all the sensors together, then individual steps are needed which make the process less practical.
    3. Intrinsic can also be estimated in the same process.
- Analise in deep the especial case of stereo cameras, without joints. This studio case will help to validate the Bundle Adjustment approach.

References / Code

1. http://dl.acm.org/citation.cfm?id=685629
2. http://code.google.com/p/ceres-solver
3. http://ros.org/wiki/calibration
4. http://ros.org/wiki/pr2_calibration