

Scientific Experimentation and Evaluation

Assignment: 1

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What plan to do?

Our **task** is defined as: *Constructing a LEGO NxT differential drive robot and manually measure the observable pose variation for three different velocity motions.* The goal is to observed the variation on the manual measured poses and look at the error distributions that is leaded by the those.

In order to achieved the goal, there are some constraints that must be taken into account:

- The Device Under Test is a LEGO NxT robot.
- DifferentialPilot library for motion behaviour.
- Manual measurement comes out with additional error provided by the person who makes them.
- The time of every movement must be constant.
- There is not a true value to compare with, this must be obtained from the repetitions of the experiment.

In order to accomplish the constraints, our plan to follow consists on:

1. Define the measurement method (see below).
2. Achieve a good code which takes into consideration the provided restrictions.
3. Seven different curves movements are going to be measured: Straight line and 6 arcs (3 left and 3 right).
4. Define the curves that must be done according to functions parameters.

5. Twenty repetitions of every curve must be done.
6. Store the information of the final poses.
7. Compute the information to get the error gaussian distribution.

Measurement System

The measurement value (final pose) is acquired by a LEGO Nxt robot which uses the libraries provided by leJOS framework for motion and a large cardboard sheet, light sensor and geometric representation to acquire data.

Measuring Method

To accomplish the task we have defined the experiment as explained in the picture.

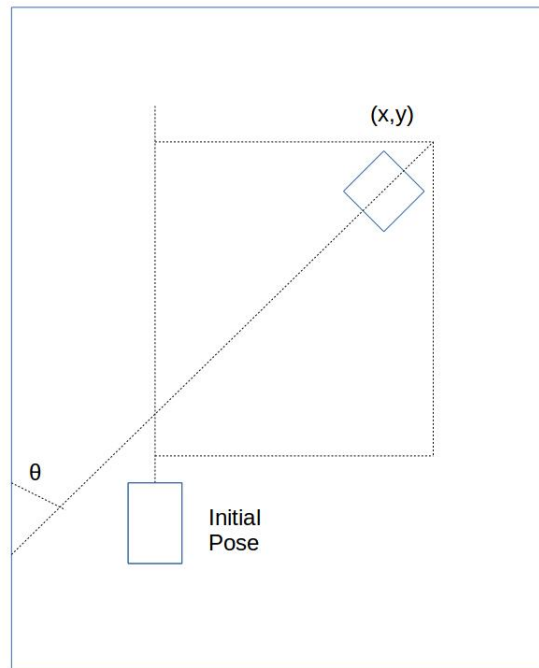


Figure 1: Experiment Description

The method description of image 1 is:

- One LEGO structure will set the robot at initial position so the initial position will be constant.
- A cardboard is used to mark the points of all the experiment.
- Two light sensors are used to mark the points in order to get the pose of the robot.
- Project the line that is created between the two measured points.
- The angle will be measured with the projected line.

The Measurement facilities include:

- One cardboard.
- Two light sensors.
- A pen.
- A protractor.

What difficulties are expected?

In order to accomplish the current task, we found the following constraints:

- The manual measurement will add errors to the measurement result.