



UNIVERSITY OF TRENTO - Italy

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and Computer Science Department

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Identification procedure for Lego Mindstorm motor

Diego Verona, Aliaksandr Siarohin, Mattia Digilio

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Abstract

Report for the first assignment on Applied robotics. Identification parameters of the motor. In this report we discuss our method of obtaining the data from Lego Mindstorm motor as well as estimation of parameters from the motor data.

1 Collecting motor data

We use 2 methods for collecting the motor data:

1. Using the bluetooth connection
2. Using usb connection

1.1 Bluetooth data collection

We start from the brofist source, and we change message interface to include timestamp. The idea is follows:

1. Send message that tells motor to set up specific power.
2. Send message that requests tacho count from the motor.
3. Receive tacho count with timestamp.
4. Save (timestamp, tacho count) to file.
5. Go to step 2.

You can find code in <https://github.com/AliaksandrSiarohin/AppliedRobotics/brofist>. But using this methodology we obtain very high latency $\approx 50ms$. So we decided to use USB connection instead.

1.2 USB data collection

We use library pyusb to establish usb connection with brick. The idea is follows:

1. Establish connection with brick using pyusb.
2. Setup the motor power on the brick.
3. Send (timestamp, tacho count) from brick.
4. Receive (timestamp, tacho count) at PC.
5. Save (timestamp, tacho count) to file.
6. Go to step 3.

You can find code in https://github.com/AliaksandrSiarohin/AppliedRobotics/usb_collector. Using this methodology we obtain much better performance $\approx 2ms$ latency. Using USB we collect 10 data files with different raw powers.

2 Estimating the parameters from the data

To estimate the parameters we filter the data using butterworth filter and then we estimate the parameters using 2 methods:

- Regular method proposed on the lecture
- Regression method

2.1 Filtering

We use butterwoth filter of order 1 and and cut-off frequency 0.02. For example ??.

/apr/AppliedRobotics/motor_{data}/plots/v9020000.pdf

Figure 1: Deviation of x from it's mean.