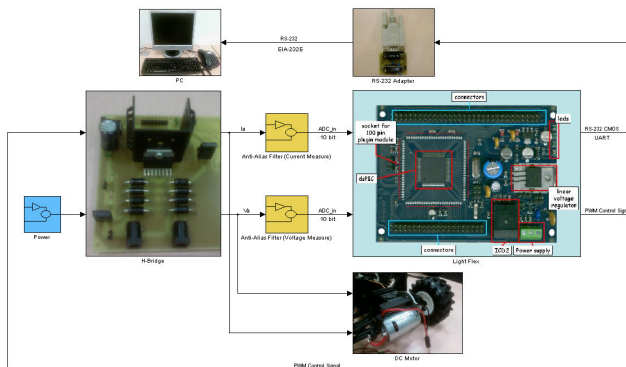


DC Motor: I-V Identification and torque control

FLEX and dsPIC

Tuesday 4 December 2007



This demo shows how to set up a procedure for identification of a DC Motor with permanent magnets aimed at digital torque control.

The application is divided into two parts:

- In the first part the dsPIC implements a simultaneous sampling of voltage and current and sends the data via serial bus to a remote PC (sampling time equal to approximately $4e-5$ sec, number of samples $12800 * 2$, signal voltage type PRBS);
- In the second part the PI controller, designed on the model identified, is used to control the current (directly) and the torque (indirectly) with appropriate characteristics of strength (sampling time of $6.4e-5$ sec);

On the PC side, the data are processed with a specific software for the system identification. The applied methods are:

- Subspaces Method (with generic I/O data);
- PEM method (to refine the model);
- Residual Analysis (to validate the model);

Read more...

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Software

On the FLEX side, the software is divided in 2 simple C applications for identification and control.

On the PC side, you need 2 specific softwares to receive data via serial COM port and to implements identification and control analysis.

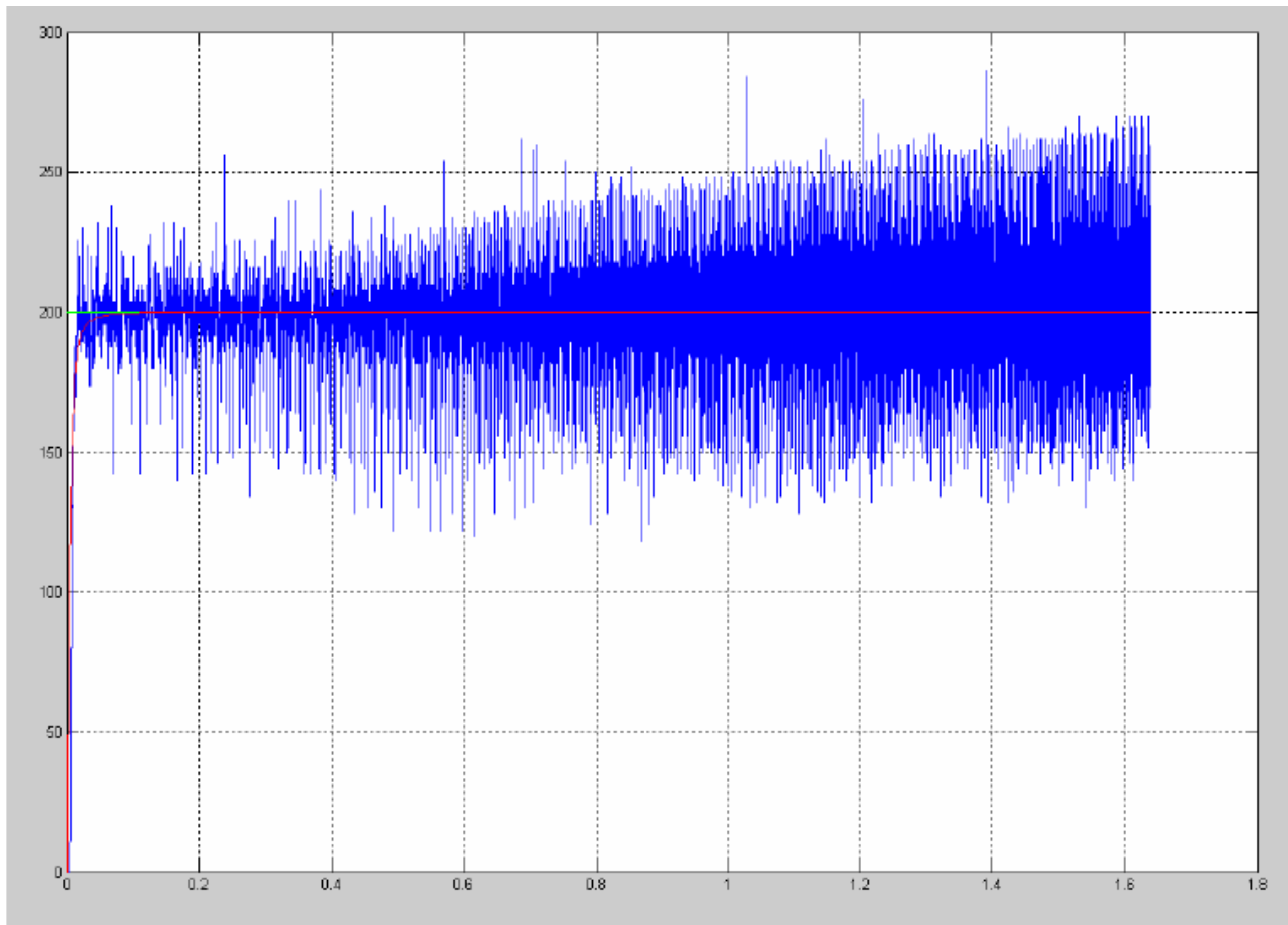
Hardware

This is the list of hardware components needed to reproduce the demo:

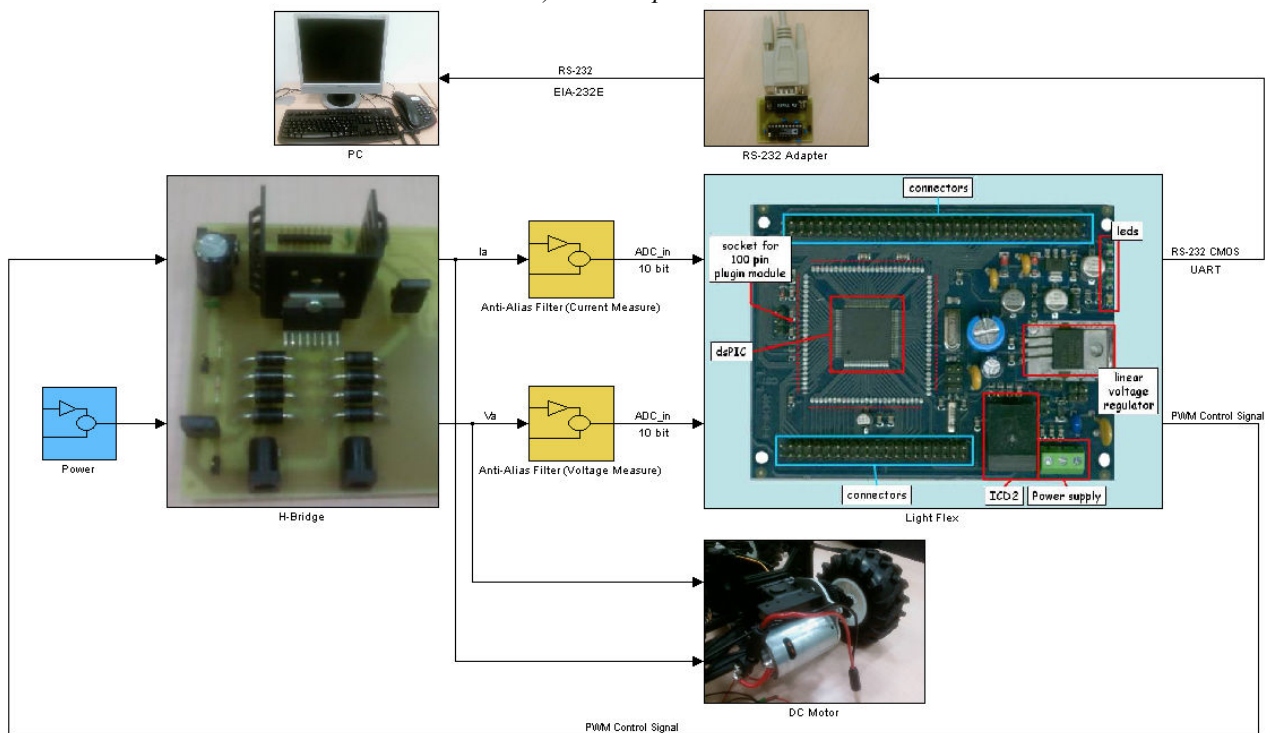
- FLEX board (light or full)
- 3 home made PCBs (for H-Bridge circuit, anti-alias filters, RS-232 adapter);
- a few resistences, ICs and connectors
- a DC motor;
- a PC;

Photo(s)

In the figures below you can see: 1) the accuracy of the model identified (red line) compared to the real motor output (blue line) during the initial phase of the experiment; and 2) the conceptual diagram.



1) Experiment



2) Conceptual diagram