

## RT-LAB™ in Action: Centre for Intelligent Machines McGill University - Montreal

### Pose and Twist Estimation of a Rigid Body from Accelerometer Measurements



#### Objectives

- Control a 4-dof robot giving feedback from position encoders and accelerometers
- Accelerometer signal used to reinforce position data in order to remove vibrations from flexible robotic arms (eg. Canadian Space Agency's Space Arm)

#### Tools Used

- Simulink for development of control strategies
- 4 dof robot arm, called "CUATRO"
- RT-LAB Engineering Simulator (single target) with Sensoray SBS I/O card (12 accelerometer signals, 4 rotary encoders, 4 analog out to actuation motors)



#### Current State of Work

Presently working on calibrating the accelerometer to return positional data close to that of the encoders. Part of this work requires putting CUATRO through a range of paths and recording the data from the encoders and the accelerometers.

To see more information about this project please download the video at: [www.opal-rt.com/videos/Cuatro\\_McGill.wmv](http://www.opal-rt.com/videos/Cuatro_McGill.wmv)

The video shows CUATRO going through the following paths:

- 1)Joint by joint initialization
- 2)Simple Harmonic Motion on each joint
- 3)Circular motion, where a point in the end-effector

describes a circle in space, and

- 4)Fixed Point in space, where a point the end-effector remains fixed as the rest of the robot moves



It also shows how CUATRO can be manipulated manually through the Simulink interface and RT-LAB.



#### Use of RT-LAB

Philippe Cardou, Graduate Student of the Centre for Intelligent Machines, McGill University, Montreal found using RT-LAB for this project very easy. It allowed him to develop and implement the controller very quickly by buffering him from the low-level difficulties (such as dealing with registers and interrupts) inherent with other development tools.

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