A highly modular software toolset for robot motion development

Abstract
We present the design and development of a software toolset for developing robot motions. The modularity of the software allows reusing the same code for different robots. The software can be reconfigured by loading XML files which contained information of the robot hardware. Users can easily monitor the status of the robot hardware, such as motors’ connections and temperatures. Additionally, it features easy motion timeline editing and collision detection when a robot model is provided.

Sharing multiple variables between multiple programs can be done easily. Conventional method requires the user to include TCP/IP programs and define their own command parsing. By using Helium, the user no longer needs to write such code.

Helium

Data variables in Helium are represented as tree structures. Data to be shared between 2 programs are represented as C++ in the server side and ValueProxy in the client side. Both shares the same CellSignature, and are located on the same structure path even if each tree structure is different. Server Side and Client Side are sharing multiple variables while reusing the same code for different robots.

Basic Class

When get DATA is called
- GT: type of return value
- GP: type of parameter

when set DATA is called
- ST: type of data to be set
- SR: type of parameter needed

Example:

An XML as such on the right can be inputted into the tree by implementing the class as shown above. scalarMapping is used to read a single variable (settings) while vectMapping can automatically read an array of data (motors). The resulting tree is show on the left.

Dependencies
clapack, gtkmm-2.4, glib-2.2, (glib-2.0), g++
Tested on: Ubuntu 10.10, Ubuntu 11.10, Microsoft Visual C++ 2010

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With other Robots

Just by changing the XML configuration file, the software can be used with other robots without recompiling the program.

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