ImagingLab Robotics Library for DENSO – Controller Setup

(using Teaching Pendant)

1. Requirements:

- DENSO Controller RC7, firmware version 2.8 (or newer).
- PC provided with DENSO Wincaps II software.
- DENSO Teaching Pendant (in the following list indicated by TP) or DENSO Mini Pendant (in the following list indicated by MP).
- Ethernet connection between robot controller and PC (for example using an Ethernet switch).

2. Instructions

1. Set the robot controller to the *Manual Mode*.
2. Activate the ORiN option:
    a. using TP: navigate the menu to *Set»Option→Extension→InputID* and input code "1214" in order to activate the "ORiN" option;
    b. using MP: *AUX→Extension→Extension→Add→Password*: 1214.
3. Set controller communication permissions:
    a. using TP: navigate the menu to *Set»Set.Com.→Permit* and set the Ethernet port to "Read/Write" (first set RS-232C port to "Disable");
    b. using MP: *HALT-COM-(Load)→Permit*.
4. Set the controller IP address:
    a. using TP: navigate the menu to *Set→Set.Com.→Address* and set the IP address;
    b. using MP: *HALT-COM-(Load)→IP Address*.
5. Check the cable in order to verify the Ethernet connection between PC and controller.
6. Restart the controller and try to ping its IP address from the PC. If impossible to ping, check previous steps in order to setup correctly the Ethernet communication.
7. The LabVIEW library uses the b-CAP communication protocol (by DENSO). This protocol uses the TCP port 5007 of the RC7M/J controller. If the server communication function of the controller (menu navigation in TP: *[F6 Set]→[F5 Set.Com.]→[F11 Server]*) uses the same port, b-CAP cannot work.
8. For the safety reason and to meet with "Single point of control" requirement, only the selected PC can control the robot controller. Moreover, the robot controller becomes executable only in the *External Automatic Mode*.

9. Set the controller executable token:
    a. using TP: navigate the menu to *Set→Set.Com.→Ext.Run* choose *Ethernet* and set the IP address of the PC by "F4:IP set";
    b. using MP: *HALT-COM-(Load)→Ext. RUN→Ext. RUN→Client IP.*
10. To externally control the robot from a PC using LabVIEW "Step stop signal" and "Instantaneous stop signal" need to be closed. Refer to robot controller manuals like "The installation and maintenance guides" and "PART2 I/O EXTENSION BOARD FOR RC7M" of "OPTIONS MANUAL" for details.
11. For the robot controller of the ANSI type:
    a. using TP: navigate the menu to *I/O»Aux.»Int./Ext.* and select "External automatic operation" in the "Single Point of Control" menu in order to change the robot controller to *External Automatic Mode*;
    b. using MP: *AUX→SnglPtCtl→External.*
12. In order to execute robot motion commands (e.g. Move, Drive, etc) or to start tasks by LabVIEW, the following PAC programs *RobSlave.pac*, *RobSlave.h* and *UserExtention.pac* need to be sent to the robot controller and need to be executed. Use WINCAPS II to transfer PAC programs to the robot controller. These programs could be provided also by ImagingLab.
13. Follow these instructions to transfer PAC programs to the robot controller using WINCAPS II:
    a. Start robot controller and change to *Manual* mode.
    b. Start WINCAPS II, and create a new project that matches robot controller type.
    c. Import *RobSlave.pac*, *RobSlave.h* and *UserExtention.pac* programs.
    d. Create executable program and transfer the programs to the robot controller.
    e. Start RobSlave task as one-cycle execution.
14. Set the robot controller to the *Automatic Mode*.
15. Now the robot controller is ready to be controlled by LabVIEW using the ImagingLab Robotics Library.