Masterproef industriële ingenieurswetenschappen

Vision-based control of Robotic arm with six degrees of freedom

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Problem

The options for vision-based control of the Mitsubishi Melfa RV2SD are limited with the provided software from Mitsubishi. This makes the robot unsuitable for research for the university. Is it possible to use Matlab to control the robot with vision technology?

Objectives

- *Creating a serial communication between Matlab and the robot.*
- *Make a demo application where the robot has to sort out square, rectangular and circular objects.*
- *Use a USB webcam for the vision.*

Equipment

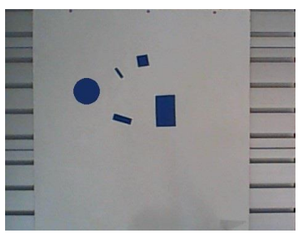
The hardware used for this project:
- *Mitsubishi Meffa RV2SD*
- *Logitech C170 USB webcam*
- *RS232C-connector*

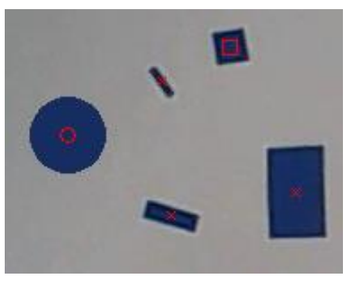
The software used for programming the robot:
- *Digital Image Processing Toolbox*
- *Image Acquisition Toolbox*
- *Mitsubishi Melfa Toolbox*
- *Mitsubishi RT Toolbox2*

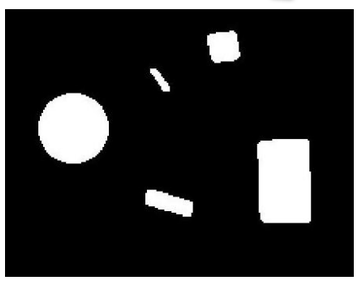
Method

1. Image Acquisition

The first step of the program is to import an image from the USB webcam to Matlab.





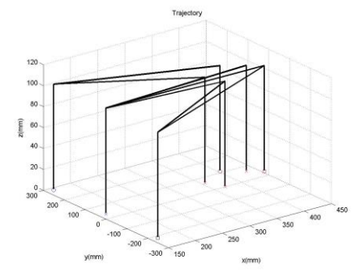


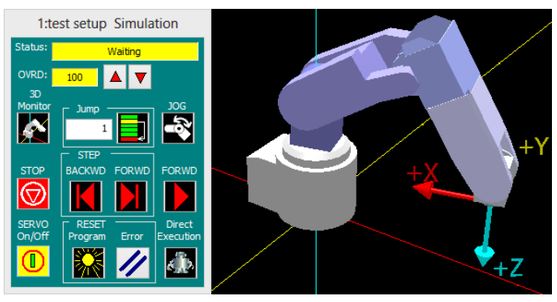
2. Image Processing

With the incompactness function and the weighted center, the shapes and the positions of the objects are determined

3. Trajectory Planning

With this data the trajectory of the robot is planned.



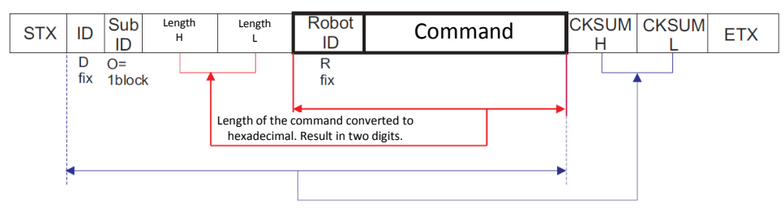


4. Simulation

A simulation in RT Toolbox 2 and Matlab is created to ensure the robot moves correctly.

5. Communication

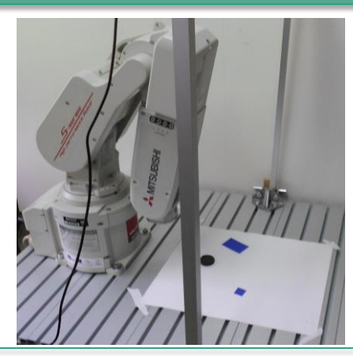
The trajectory is written to the program on the controller of the robot, according to the R3 protocol.



[AutoCont Controlsystems. Komunikace RS232 - ROBOT RV-2SD. Manual.]

Conclusions

- Communication between Matlab and robot is possible when sending R3 protocol commands via the serial connection.
- The robot is able to sort out the objects.
- With the incompactness the shapes of the objects can be determined.



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