

F O R S C H U N G S P R A X I S
 for
 Jiabin Wu
 Mat.-Nr. 03657284, field of study EI

Assembly and Control of a Humanoid Torso with Variable Stiffness Actuators

Problem description:

The developed of robots able to operate in unstructured environments and to physically interact with unknown objects requires impedance management. A novel technological trend in robotics focuses on the development of actuators able to change their stiffness with dedicated mechanisms, the so-called variable stiffness actuators (VSA) [1], [2].

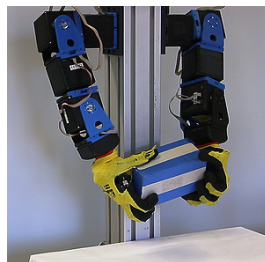


Figure 1: Humanoid torso with VSA

In this Forschungspraxis work the student has to assemble a humanoid torso consisting of 12 VSA and a head. The student is also asked to compute forward and inverse kinematics of the arm and to implement the zero deflection control [2] and position control of the two arms in Matlab/Simulink.

Work schedule:

- Assembly of the humanoid torso.
- Compute forward and inverse kinematics of the arms.
- Zero deflection control in Matlab/Simulink.
- Position control in Matlab/Simulink.

Bibliography:

- [1] M. G. Catalano, G. Grioli, M. Garabini, F. Bonomo, M. Mancini, N. G. Tsagarakis, A. and Bicchi. VSA - CubeBot. A modular variable stiffness platform for multi degrees of freedom systems, in *International Conference on Robotics and Automation*, 2011.
- [2] G. Tonietti, R. Schiavi and A. Bicchi. Design and control of a variable stiffness actuator for safe and fast physical human/robot interaction, in *International Conference on Robotics and Automation*, 2011.

Supervisor: M.S. Matteo Saveriano
 Start: 03.08.2015
 Delivery: 02.10.2015