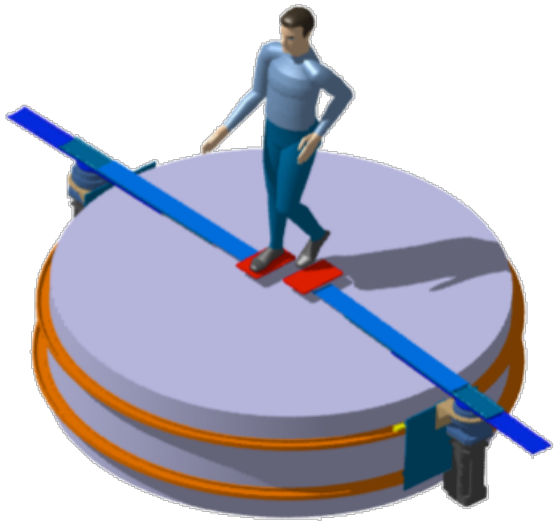
ELECTIVE IN ROBOTICS 2010/11
Short project in Module "Locomotion and Haptic Interfaces"

Control and 3D Simulation of the Feet Followers Device

The locomotion interface "Feet Followers" is another device designed by the Technical University of Munich (TUM) within the CyberWalk project. It consists of two robot manipulators of the RPR planar type, each with base mounted and moving independently on a circular rail. The last link of each manipulator acts as a (orienting) support for one of the walker's feet. Coordination and collision avoidance of the two robotic arms is necessary. The additional presence of a link transmitting forces to the human body can be neglected.



The supporting material includes:

[1] M. Schwaiger, H. Ulbrich, and T. Thümmel. "A foot following locomotion device with force feedback capabilities," *VIII Symp. on Virtual Reality*, pp. 309-321, Belém, BR, 2006.

[2] M. Schwaiger. *Konstruktion und Entwicklung omnidirektionaler Laufplattformen*, PhD Thesis (in German), Technical University of Munich, 2006 (see only Sect. 2.3.4 and Ch. 3).

[3] M. Schwaiger, "A foot following locomotion device with force feedback capabilities"
- Presentation slides (ppt)
- 3 accompanying videos (Geradeaus_Ausweich.avi, Drehung.avi, Ani1.avi)

[4] E. Mingo, Student presentation of Feet Followers, Elective in Robotics 2010-11 (pdf).

The students should derive a kinematic model of this platform, design a feet tracking strategy, and test the validity of the controller by simulations for different types of walks/gaits of the user. Assume that the 3D position of the feet is measured at any time. An observer of the intentional velocity of the user (or of its feet) can be used to add a feedforward action. The results can be presented with planar or, if possible, 3D videos.

ADL, November 21, 2011