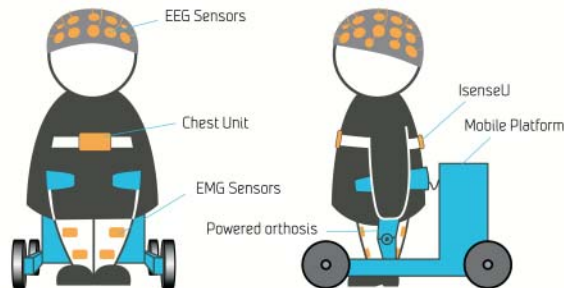


Executive summary

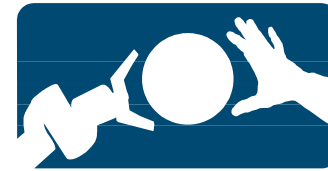
The CORBYS project was an Integrated Project funded by the European Commission under the 7th Framework Program, Area: Cognitive Systems and Robotics.



CORBYS developed an integrated robot control architecture to support robot-human co-working with high level cognitive capabilities such as situation-awareness, learning, anticipation and decision-making. CORBYS cognitive control system is usable in a wide range of robotic applications where robots have to be able to cope with the dynamic yet complex environments within which humans function. CORBYS increased the possibilities of human-robot interaction, as its focus has been on robots creating synergy with human behaviour. The CORBYS control architecture was validated within two demonstrators: a novel robot-assisted gait rehabilitation system, and an existing autonomous mobile robot for environment investigation.

Consortium

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Cognitive Gait Rehabilitation System

Push-Pull Control (PPC) Cables

PPC cable-based actuation system controls the movements of the orthosis joints in the sagittal plane. 3 actuators per orthosis leg are placed on the mobile platform while the PPC cables are flexible links to the joints that transfer the rotational movement of the motors to specifically designed orthotic joints.

Powered Orthosis

The powered orthosis assists the patient's lower limb joint motions. There are 6 DoFs at each leg: 3 in the hip, 1 in the knee, and 2 in the ankle joints.

The hip, knee and ankle joint motions on the sagittal plane are active DoFs; the hip DoFs in the transverse and frontal planes and the ankle DoF in the transverse plane are passive.

Operating Modes

Learning

Learning of the "therapist-assisted gait" as reference for the corrective mode.

Corrective

Adaptation of robotic support according to patient's performance and patient's state.

Linear Unit

The linear unit enables both lifting and lowering of the patient's body and side to side movement of the patient's body. It is equipped with two servo-positioning motors for the actuation of the vertical axis which are chosen in order to provide partial body weight support. One servo motor is used for the actuation of the horizontal axis.

Pelvis Link

The pelvis link is the connection between the linear unit, attached to the platform, and the powered orthosis. The pelvis link ensures that the patient's pelvis can rotate in the frontal and transverse planes. The F/T sensor for measurement of the interaction force between the patient and the CORBYS system is placed within the pelvis link.

Mobile Platform

The mobile platform will provide mobility for a patient. It serves as a component carrier for the linear unit, motors for the orthosis, central power supply, and other CORBYS system modules such as the safety module and the computers upon which the modules of the control architecture run.

