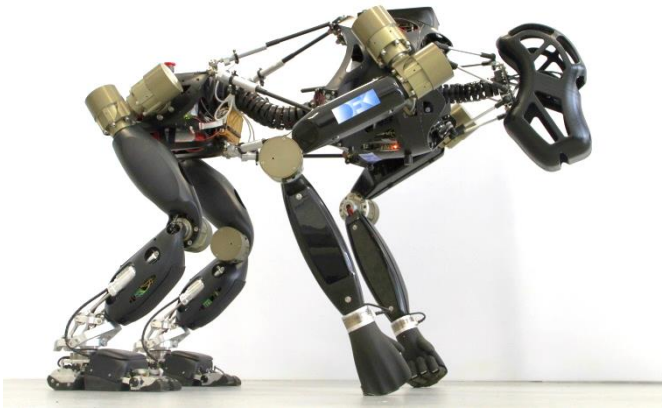
German Research Center for Artificial Intelligence

CHARLIE

A hominid robotic System

System Description

The robot Charlie is a hominid robotic system, which is equipped with an active artificial spine and about 60 sensors in its multi-point contact feet. The robot is an ideal test platform to tackle uneven terrain or to master various inclines. Charlie has the ability to perform a stand up motion and stands stable on two legs. In addition to basic research on robots mobility and perception, the research aim is to investigate a possible transferability of motion pattern from quadrupedal to bipedal locomotion, in order to certain hints on processes that may have taken place in the evolution of bipedal walking.



Technical Details

- **Size:** the height of the robot in a four-legged posture is 75 cm and 130 cm in a humanoid posture; the robot has a shoulder width of 44 cm and is 35 cm wide at the hips
- **Construction:** the control components are located in the upper body, whereas the energy supply and energy management is located in the hip area
- **Total weight:** 21.5 kg (including batteries)
- **Power supply:** 44.4 V / 2.4 Ah (lithium polymer)
- **Run-time**: approx. 80 min
- **Actuator:** two 5-DoF in the front and two 7-DoF in the rear legs, 6-DoF in the torso, 6-DoF to control the head
- **Sensors:**
  - **Joints:** Joint position (absolute and relative), speed, current consumption, supply voltage, and temperature
  - **Foot**: 49 pressure sensors, a 3-axis accelerometer, a distance sensor, three absolute encoder, temperature sensors and a 6-DoF force/torque sensor
  - **Spine:** 2 x 6 Position sensors (absolute and relative), six 1-DoF force sensors
  - **Body:** Inertial Measurement Unit, battery voltage, two cameras in the head
- **Speed:** up to 0.6 m/second
- An ARM Cortex-A8 embedded PC with 800 Mhz is responsible for the control of the robot. The structures designed and built are as self-contained as possible with regard to sensing, sensor preprocessing, control, and communication.

Application: Space robotics, SAR and Consumer

Projects:

VaMEx-VIPE
Exploration of difficult to access terrain using visual and proprioceptive data in Valles Marineris
(05/2015 - 04/2018)

iStruct
Intelligent Structures for mobile robots
(05/2010 - 08/2013)

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