

QRIO

of **SONY**

SDR-3X (2000)

SDR-4X (2002)

Quest for **Cu**riosity



16/03/2006

Robotics: QRIO
Franz Mayringer

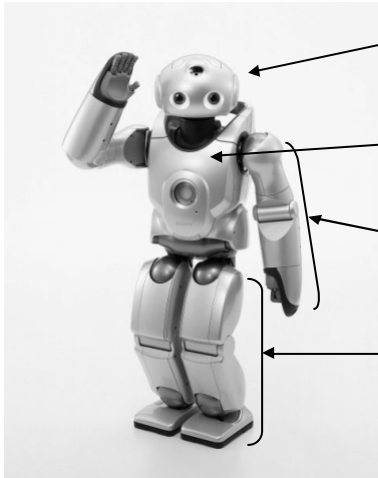
basic data

- 58 cm tall
- 8 kilograms heavy
- “Makes life fun, makes you happy!”
→ entertainment robot (like “Aibo”)
- bipedal humanoid robot
- is able to do everything a human can do
(approximately)

16/03/2006

Robotics: QRIO
Franz Mayringer

design



head

body

2 arms

2 legs

16/03/2006

Robotics: QRIO
Franz Mayringer

legs



hip-joint: ball-and socket
joint, movement is
possible in every way

knee: one-way
articulation

jump-articulation: ball-
and-socket joint

4 pressure sensors

16/03/2006

Robotics: QRIO
Franz Mayringer

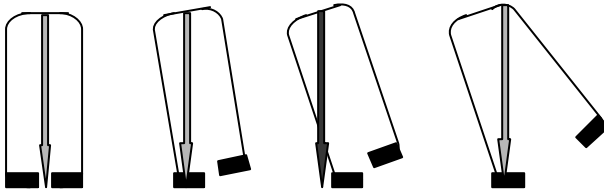
walking (1)

- QRIO moves with dynamic walking
- → not only “static walking”:
means, that the robot keeps its center of gravity within the zone of stability
- QRIO is able to react fast enough, to compensate the danger of falling down, when the center of gravity is out of the zone of stability

16/03/2006

Robotics: QRIO
Franz Mayringer

walking (2)



static:
crash

dynamic:
compensate the lost of
balance fast enough

16/03/2006

Robotics: QRIO
Franz Mayringer

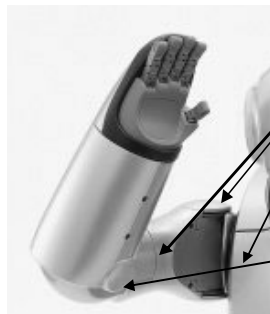
running

- QRIO is credited in Guinness World Records Book (2005) as being the fastest running humanoid robot; the first bipedal robot capable of running
- running: moving while both legs are off the ground at the same time
- QRIO is able to run 23cm/second (0,828 km/h)

16/03/2006

Robotics: QRIO
Franz Mayringer

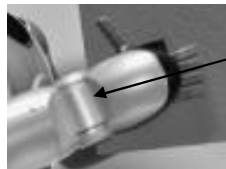
arms



shoulder: simulated by
3 separate joints

elbow: one-way joint

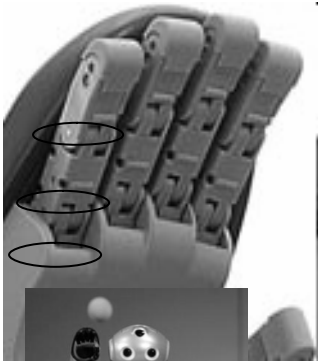
wrist: one-way joint



16/03/2006

Robotics: QRIO
Franz Mayringer

hand



3 joints each finger,
one joint for the
thumb

independent movement
of each finger

is able to put, hold and
throw things



16/03/2006

Robotics: QRIO
Franz Mayringer

body



two one-way joints in
the neck to move the
head

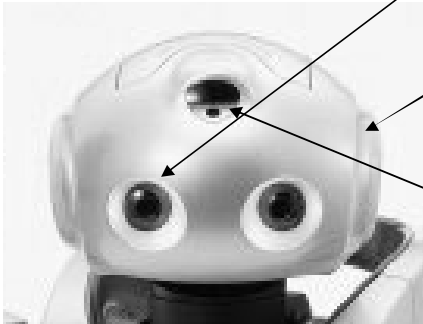
one-way joint in the hip
→simulates some
functions of the
vertebral column of
the human

Inclination sensor

16/03/2006

Robotics: QRIO
Franz Mayringer

head



2 CDD Color Cameras
(stereoscopic vision)

7 microphones
(sound direction)

third eye

speaker

16/03/2006

Robotics: QRIO
Franz Mayringer

interaction with people (1)

- detection and recognizing faces and voices
- vocabulary of ~ 60.000 words
- unknown vocabulary acquisition
- Conversation control
 - based on short-term and long-term memory
 - conversation using memorized words
 - conversation using memorized scenarios

16/03/2006

Robotics: QRIO
Franz Mayringer

interaction with people (2)

- Emotionally expressive speech
- Reuse of acquired information:
"You said different things what you said in the morning"
- Dialogue with Message:
"There is a massage from your father. He said: "..."
- *Scenario based Dialogue:*
"Travel is one of my favorite things. But I can't actually go somewhere by myself, so I just imagine traveling. Do you like traveling?"

16/03/2006

Robotics: QRIO
Franz Mayringer

interaction with people (3)

- Phrase-driven dialogues:
QRIO: *"Did you enjoy today?"*
human: *"Well, it's just an ordinary day."*
QRIO: *"Huh, well, it's just an ordinary day, isn't it?"*
- QRIO also uses gestures and colors to show its emotions.

16/03/2006

Robotics: QRIO
Franz Mayringer

other functions

- wireless network connection
- avoiding obstacles by using its stereoscopic vision
- using special color markers on the floor enables it to have orientation and memorize where it is



16/03/2006

Robotics: QRIO
Franz Mayringer

security aspects

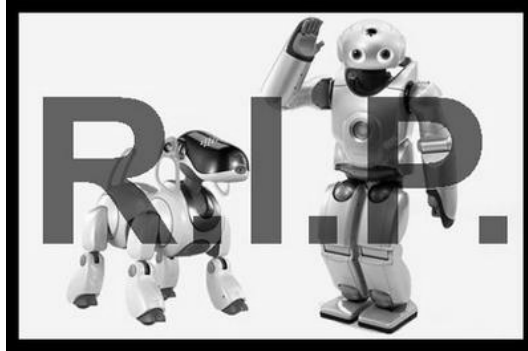
- Specialized sensors in QRIO's joints sense the moment they close on a person's finger and go slack.
- QRIO disperses the heat produced by its semiconductors using a fan so that it is always safe to touch
- secure falling

16/03/2006

Robotics: QRIO
Franz Mayringer

sad but true

in January 2006, the finance chief of Sony said,
that the robot development is stopped, to save
money.



16/03/2006

Robotics: QRIO
Franz Mayringer

videos



16/03/2006

Robotics: QRIO
Franz Mayringer

videos



16/03/2006

Robotics: QRIO
Franz Mayringer