

# QRIO

of **SONY**

SDR-3X (2000)

SDR-4X (2002)

**Q**uest for **Cu**riosity



16/03/2006

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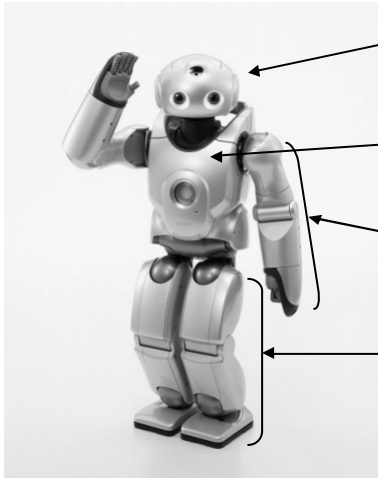
## basic data

- 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)

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# design



head

body

2 arms

2 legs

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# 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

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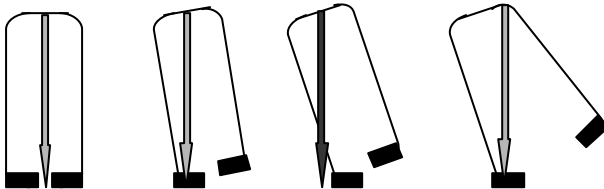
# walking (1)

- 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

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# walking (2)



static:  
crash

dynamic:  
compensate the lost of  
balance fast enough

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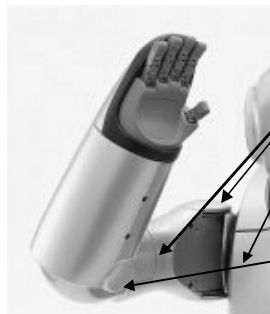
# running

- 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)

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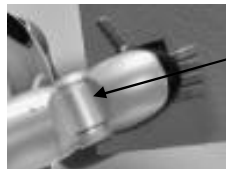
# arms



shoulder: simulated by  
3 separate joints

elbow: one-way joint

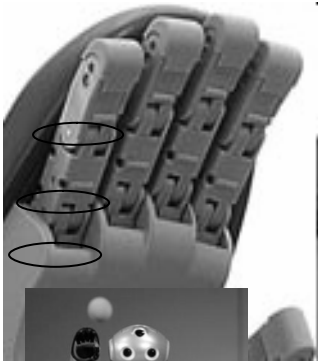
wrist: one-way joint



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## hand



3 joints each finger,  
one joint for the  
thumb

independent movement  
of each finger

is able to put, hold and  
throw things



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## body



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

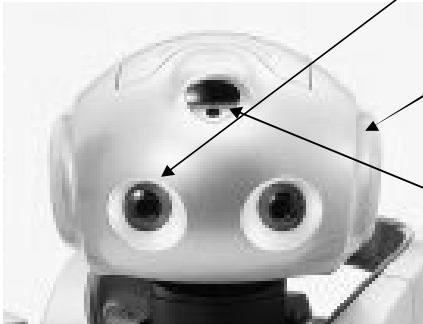
one-way joint in the hip  
→simulates some  
functions of the  
vertebral column of  
the human

Inclination sensor

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# head



2 CDD Color Cameras  
(stereoscopic vision)

7 microphones  
(sound direction)

third eye

speaker

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## 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

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## 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?"*

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## 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.

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## 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



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## security aspects

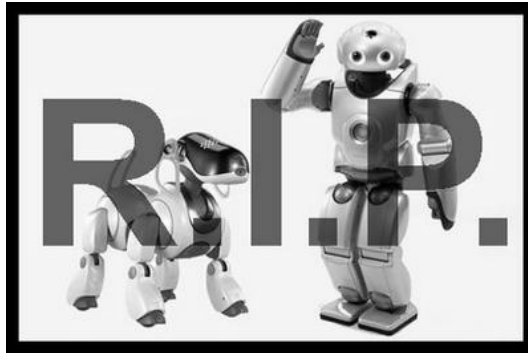
- Specialized sensors in QRIO's joints sense the moment they close on a person's finger and go slack.
- QRIO disperses the heat produced by its semiconductors using a fan so that it is always safe to touch
- secure falling

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## sad but true

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



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## videos



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# videos



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