Hardware Specification — Humanoid Robot
RoboCup Humanoid League Soccer — NAO V6

Robot Identification

Robot name: NAO V6
Platform: Standard (unmodified) NAO V6 humanoid robot platform.

Dimensions and Mass

Height: 574 mm   **Weight:** 5.48 kg

Degrees of Freedom and Actuators

Total Degrees of Freedom (DoF): 25

- Head: 2 DoF (Yaw, Pitch)
- Each Arm: 5 DoF
- Pelvis: 1 DoF
- Each Leg: 5 DoF
- Each Hand: 1 DoF

Motor technology: Brush DC coreless motors with joint movement encoders (MRE, 12 bits / 0.1°).

Actuator Model Name and Power (W)

Motor power (W): Not explicitly specified in the NAO V6 manufacturer datasheets. The available official specifications report motor types, speeds, and torques (below).

Motor Types (Speed and Torque)

Motor Type	Model	No-load Speed (rpm)	Stall / Continuous Torque (mNm)
Type 1	22NT82213P	$8700 \pm 10\%$	$65 \pm 8\%$ / 17.8 max
Type 2	17N88208E	$8400 \pm 12\%$	$9.4 \pm 8\%$ / 4.9 max
Type 3	16GT83210E	$10700 \pm 10\%$	$14.3 \pm 8\%$ / 6.2 max
Type 4	DCX 16S	$11400 \pm 10\%$	$22.4 \pm 10\%$ / 2.6 max
Type 5	22NT Z20	$8700 \pm 10\%$	$65 \pm 10\%$ / 17.8 max

Sensors (Specific Models / Specs where available)

- **Cameras:** Two front cameras; sensor model **OV5640** (SoC CMOS image sensor), 5 MP.
- **Inertial Unit:** 3-axis gyrometer and 3-axis acceleration sensing (IMU).
- **Sonar:** Ultrasonic transmitters/receivers (40 kHz) for obstacle detection.
- **Force Sensing:** FSR, 4 per foot; 0–25 N range.
- **Tactile Sensors:** Tactile head; tactile hands; foot bumpers.
- **Microphones:** Four omnidirectional microphones on the head.

Computing Unit(s)

- **CPU:** Intel Atom E3845 @ 1.91 GHz
- **RAM:** 4 GB DDR3
- **Storage:** 32 GB eMMC
- **Operating System:** NAOqi (Linux-based)

Materials

Manufacturer datasheets do not provide a detailed structural bill of materials (BOM). The robot is used as a standard unmodified NAO V6 platform.

Electronics

Internal actuator communication/control boards are not disclosed at part-number level in the manufacturer datasheets. The robot is used unmodified.

Battery

- **Type:** Lithium-Ion
- **Nominal voltage / capacity:** 21.6 V / 2.9 Ah
- **Energy:** 62.5 Wh
- **Typical run time:** ∼60 min (active use), up to ∼90 min (normal use)

References

- https://static.generation-robots.com/media/datasheet-nao-v6.pdf
- https://www.generationrobots.com/media/Specifications_NAO6.pdf