Hardware Description

1. General Information

Robot Name: NAO V6

Height: 574 mm

Weight: 5.48 kg

2. Degrees of Freedom (DOF) & Actuators

2.1 Total Degrees of Freedom Distribution

Total Degrees of Freedom: 25 DOF

Head: 2 DOF

Arms (per side): 5 DOF × 2

Pelvis: 1 DOF

Legs (per side): 5 DOF × 2

Hands (per side): 1 DOF × 2

2.2 Motor Type & Actuator Models & Performance

Motor Type: Coreless DC Motors

Actuator Models & Performance:

Type 1 (Legs/Hip): 22NT82213P (Stall Torque: ~1.8 N·m)

Type 2 (Hands/Wrists): 17N88208E (Stall Torque: ~0.3 N·m)

Type 3 (Head/Arms): 16GT83210E (Stall Torque: ~0.5 N·m)

Type 4 (Shoulders): DCX 16S (Stall Torque: ~0.8 N·m)

Type 5 (Ankles): 22NTZ20 (Stall Torque: ~1.5 N·m)

Note: All joints are equipped with MRE (Magnetic Rotary Encoders) using Hall effect sensor technology, with a precision of 12 bits / 0.1°.

3. Sensor System

Vision Sensors: 2× Front Cameras, Sensor Model: OmniVision OV5640 (SoC - CMOS Image Sensor); 5 MP resolution; Output: 640x480 @30 fps.

Inertial Measurement Unit (IMU):

Gyroscope: 1 unit (3-axis, 5% precision, angular velocity ~500°/s)

Accelerometer: 1 unit (3-axis, 10% precision, rated acceleration ~2g)

Magnetometer: 1 unit (3-axis, precision ±0.1°)

Sonar Sensors: 2× Transmitters, 2× Receivers (Frequency: 40 kHz, Detection Range: 0.20 m to 0.80 m).

Force Sensitive Resistors (FSR): 4 sensors per foot (Range: 0 to 25 N).

Tactile Sensors: Head (3 zones), Hands (2 zones), Chest button, Foot bumpers.

4. Computing Unit & Electronics

Computing Unit (CPU): Intel Atom E3845 (Quad-core processor, clock speed 1.91 GHz).

Memory/Storage: 4GB DDR3 RAM; 32GB eMMC Flash.

OS/Control System: Integrated motherboard running Open Nao (GNU/Linux based on Gentoo); supports Ethernet (10/100/1000 BASE T) and WiFi (802.11a/b/g/n).

Audio System: 2× Speakers (40mm diameter, 2W); 4× Microphones (Head).

5. Material & Battery Specifications

Material: High-strength engineering plastics (ABS-PC) with an internal aluminum alloy frame.

Battery Specifications: Lithium-ion battery; Rated Voltage: 21.6V; Capacity: 2.9 Ah (62.5 Wh); Operating time: ~90 minutes (normal use); Charging Time: ~2.5 hours (using official charger).

6. Others

Protection Class: IP54 (dust and splash proof)

Open Source Compatibility: Official support for ROS (Robot Operating System) framework integration.