

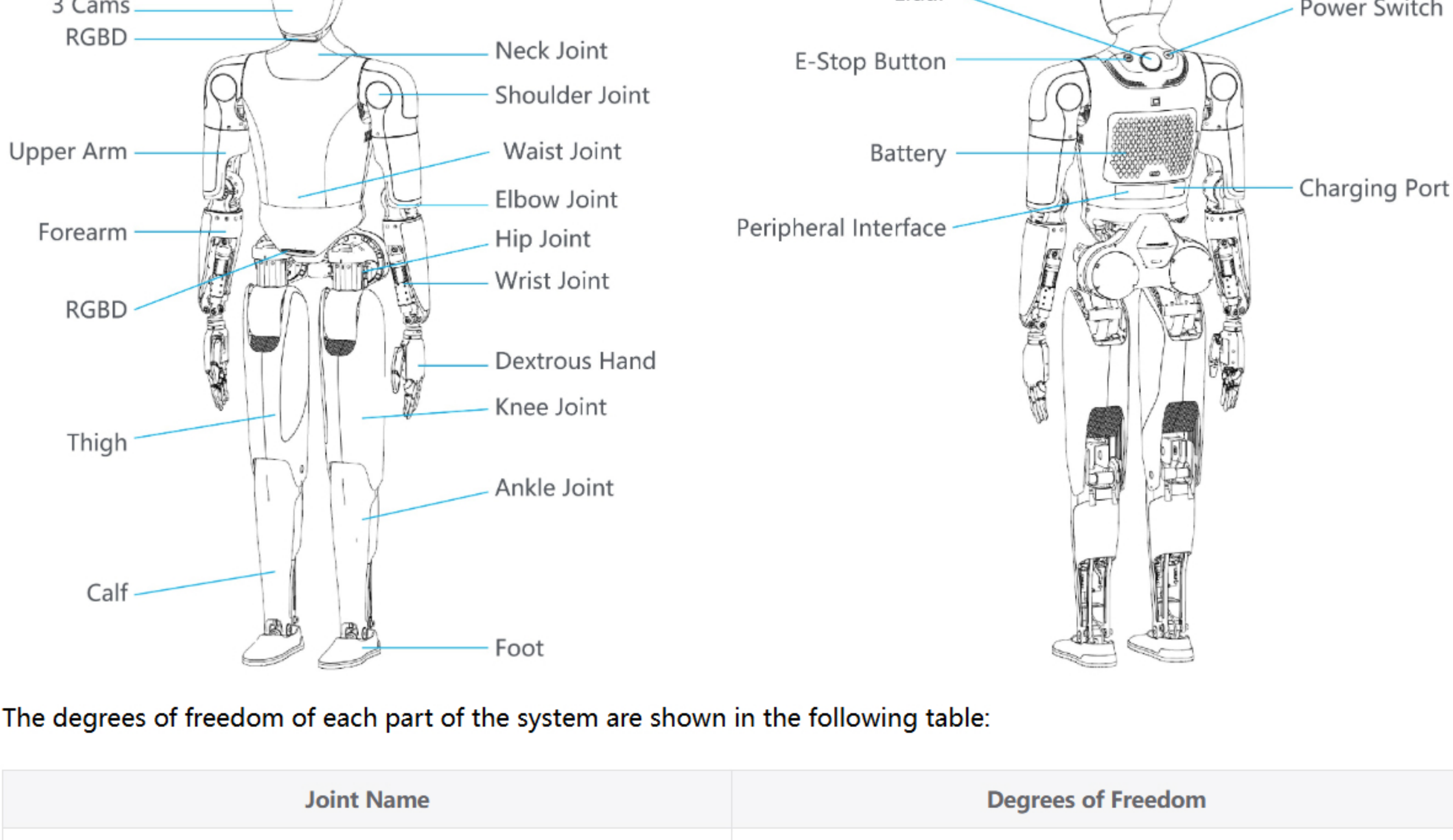
Overview

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Product SKUs

MagicBot Gen1 adopts an excellent biomimetic humanoid appearance design, with multiple joint degrees of freedom throughout the body, and is equipped with multiple sensors such as 360 ° LiDAR and high-definition camera, enabling multimodal humanoid interaction. A single arm has 7 degrees of freedom, including shoulder pitch, shoulder roll, shoulder yaw, elbow roll, elbow roll, wrist pitch, and wrist roll. A single leg has 6 degrees of freedom, including hip roll, hip yaw, hip pitch, knee pitch, ankle pitch, and ankle roll. The head has 2 degrees of freedom, including neck joint pitch and neck joint roll. The waist has 2 degrees of freedom, including lumbar joint pitch and lumbar joint roll. The whole machine has a total of 52 degrees of freedom (including passive degrees of freedom), ensuring that the robot can achieve high flexibility in motion and precise attitude control.

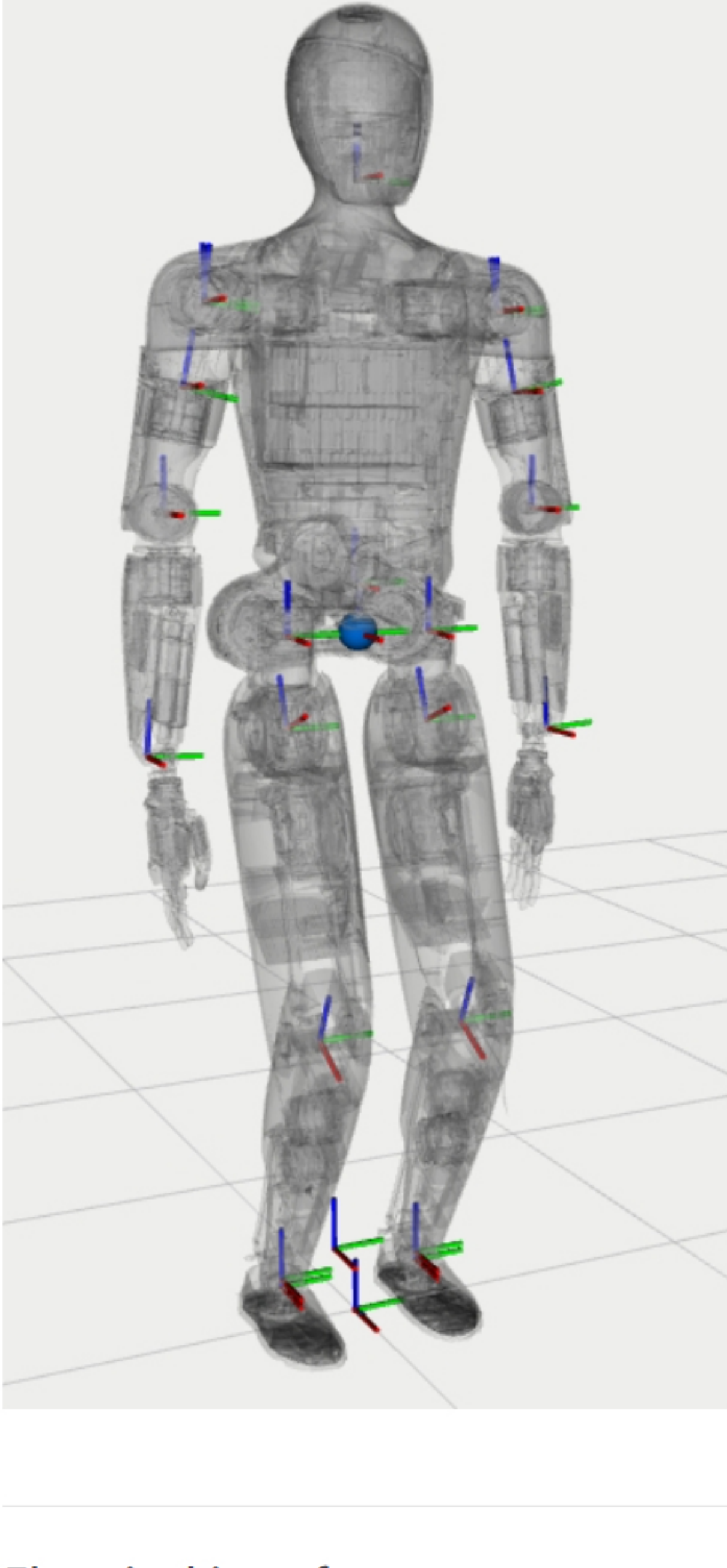
The following is a schematic diagram of the sensor layout. Please refer to the actual product for details.



The degrees of freedom of each part of the system are shown in the following table:

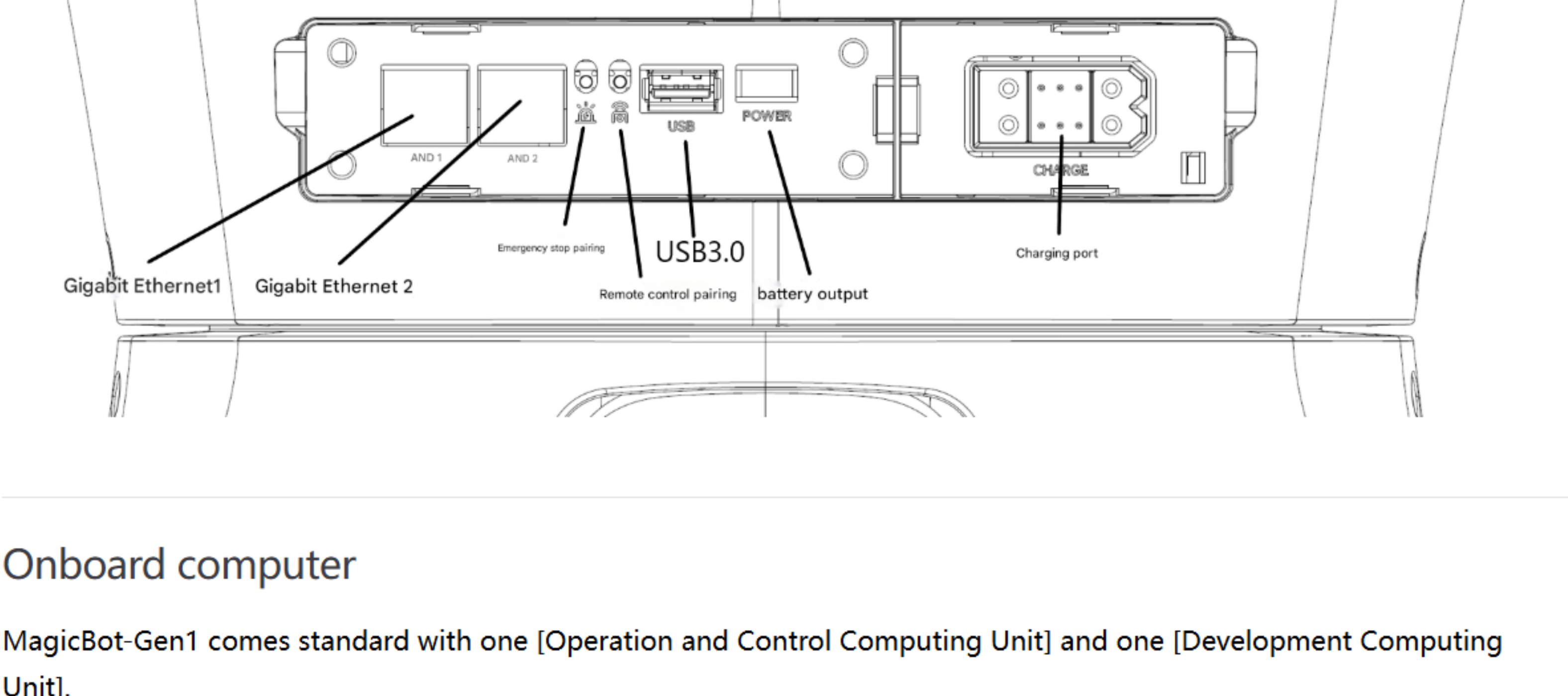
Joint Name	Degrees of Freedom
Head	2
Arm	7 × 2
Dextrous Hand	11 × 2
Waist	2
Leg	6 × 2
Total	52

When all joints are at zero degrees, the coordinate systems are as shown in the figure below, where red is the x-axis, green is the y-axis, and blue is the z-axis.



Electrical interface

The MagicBot Gen1 has multiple types of peripheral interfaces reserved at the back waist (under the battery cover), which can be used for device debugging, secondary development, mounting peripherals, and other operations.



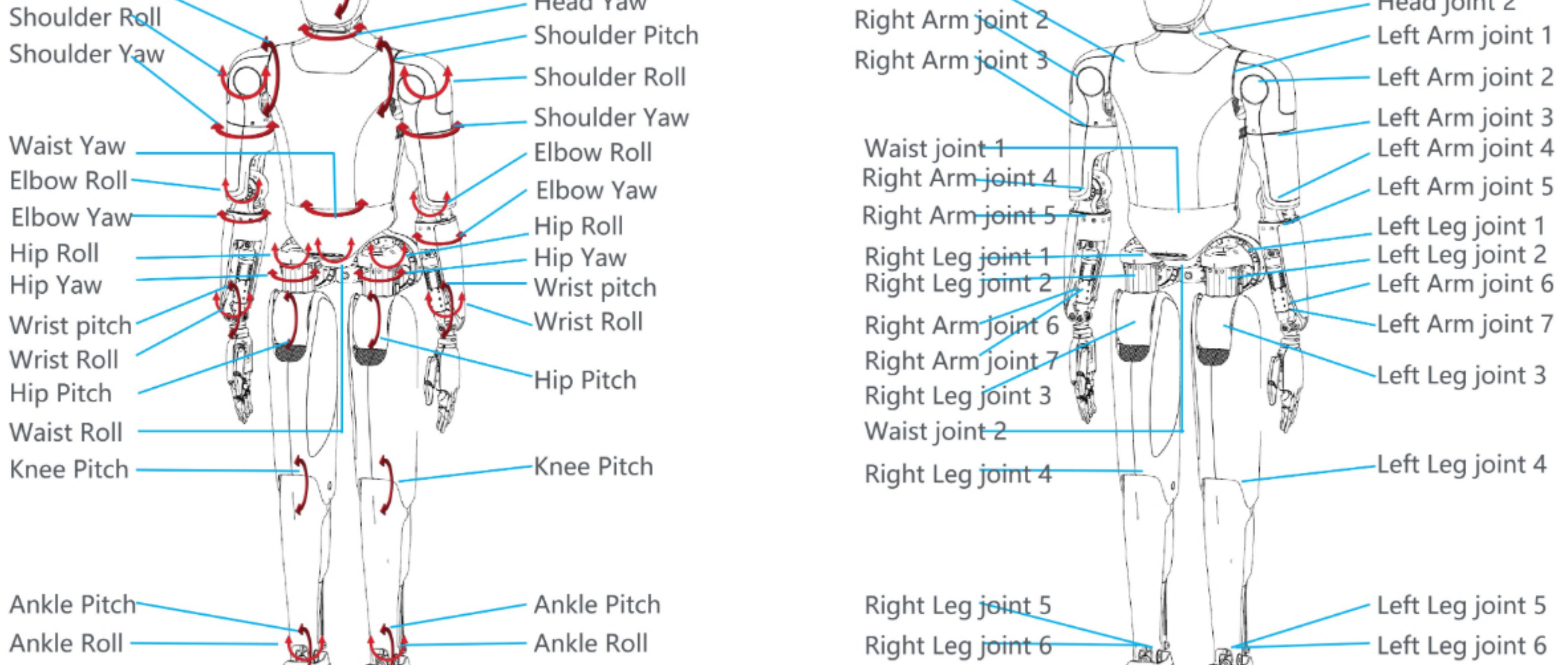
Onboard computer

MagicBot-Gen1 comes standard with one [Operation and Control Computing Unit] and one [Development Computing Unit].

parameter	Development of computing units
model	Jetson Orin NX
CPU	Arm® Cortex®-A78AE
Number of cores	8
Number of threads	8
Maximum turbo frequency	2GHz
Video Memory	16G
Memory	16G
cache	2MB L2 + 4MB L3
storage	512G
GPU	1024-core NVIDIA Ampere architecture GPU with 32 Tensor Cores
Graphics card maximum dynamic frequency	918MHz
Gaussian and Neural Accelerator	3.0
instruction set	64bit
OpenGL	4.6
OpenGL ES	3.2
Vulkan™	1.1
CUDA	11.4

Joint sequence names and joint limits

The specific joints and numbers of the system are as follows:



Part	Name	Range of Motion
Head	Head Yaw	±60°
	Head Pitch	±20°
Arm	Shoulder Pitch	±158°
	Shoulder Roll	-10~165°
	Shoulder Yaw	±150°
	Elbow Roll	-10~127°
	Elbow Yaw	±167°
	Wrist Pitch	±26°
	Wrist Roll	-63~49°
Waist	Waist Yaw	±90°
	Waist Roll	±20°
Leg	Hip Roll	-20°~+30°
	Hip Yaw	-15°~+30°
	Hip Pitch	-120°~+40°
	Knee Pitch	0°~+150°
	Ankle Pitch	-75°~+30°
	Ankle Roll	-20°~+20°

LiDAR

The MagicBot Gen1 is equipped with a MID-360 laser radar on the back neck, which provides 360 ° blind spot perception with miniaturization and low power consumption characteristics, accurately obtains environmental data, assists in mapping navigation and obstacle avoidance, and can complement vision to adapt to complex scenes.

Depth Camera

The MagicBot Gen1 is equipped with D435 depth cameras at the lower jaw and waist, which have a wide field of view and can comprehensively capture environmental information. The global shutter is adapted to dynamic scenes, and the low light environment is stable with accurate depth perception. It supports real-time environment modeling and obstacle avoidance, and is compact and easy to integrate, enabling the robot to intelligently interact with the surrounding environment.

Robot specifications

MagicBot-Gen1

Project Name	Specifications
Height, Width, and Depth (Standing)	174cm × 58cm × 28 cm
Arm Reach	160 cm
Thigh + Calf	95 cm
Total Weight	Approximately 70 kg
Battery	Capacity: 25Ah (1.35Kwh)
Motion Speed	≥2 m/s
Maximum Dual-Arm Load	15 kg
Maximum Joint Torque	≥350 N·m
Maximum Slope Angle	≥20°
Dextrous Hand	11-DOF Haptic Dextrous Hand (Optional)
Single-arm Degrees of Freedom	7 (3 shoulder joints + 1 elbow joint + 3 wrist joints)
Single-leg Degrees of Freedom	6 (3 hip joints + 1 knee joint + 2 ankle joints)
Computing Power Module	Basic computing power: 8-core high-performance CPU Perceived computing power: NVIDIA Jetson Orin
Sensor Configuration	3D LiDAR, depth camera, trinocular camera
Audio Module	Ring microphone, speaker
Communication Module	5G Module(Optional), Bluetooth 5.2, Wi-Fi 6
Reducer	Planetary Reducer, Harmonic Reducer