Hardware Specification: Booster K1 Humanoid Robot

HSL Competition - Ruhrbot Devils

Date: January 31, 2026

Robot Configuration Overview

The team will use two own Booster K1 humanoid robots in an unmodified, pre-approved platform configuration, differing only by the onboard computer:
Robot 1: K1 with NVIDIA Jetson Orin AGX 32GB; **Robot 2**: K1 with NVIDIA Jetson Orin NX 8GB.

General Specifications

Parameter	Specification
Robot Name	Booster K1
Manufacturer	Booster Robotics
Height	Approx. 95 cm (standing)
Weight	Approx. 19.5 kg
Open Source Link	`https://www.booster.tech/booster-k1/`

Degrees of Freedom & Actuators

Total DoF: 22 (Head: 2; Each Arm: 4; Each Leg: 6).
Actuator Type: High-torque smart servos with integrated dual position encoder and torque feedback.

Head: Yaw, Pitch
Left Arm: Shoulder Pitch/Roll/Yaw, Elbow Pitch
Right Arm: Shoulder Pitch/Roll/Yaw, Elbow Pitch
Left Leg: Hip Pitch/Roll/Yaw, Knee Pitch, Ankle Pitch/Roll
Right Leg: Hip Pitch/Roll/Yaw, Knee Pitch, Ankle Pitch/Roll

Sensors

Vision: Wide Angle Stereo Camera Module - D-Robotics - Resolution: 544 * 488, FOV: 105° * 94°
Audio Input: Circular 6-microphone array (integrated in head).
Audio Out: Speaker (integrated in torso).
IMU: 9-DoF IMU - HiPNUC HI13R4N.
Joint sensing: Position and torque feedback on all actuators.

Computing Units

Robot 1 (Jetson Orin AGX 32GB): NVIDIA Ampere GPU, 2048 CUDA cores, 32GB unified memory, 200 TOPS.
Robot 2 (Jetson Orin NX 8GB): NVIDIA Ampere GPU, 1024 CUDA cores, 8GB unified memory, 117 TOPS.
Storage: 512 GB NVMe SSD.
Connectivity: 1×Gigabit Ethernet, Wi-Fi 6, Bluetooth 5.2.

Materials & Electronics

Component	Material / Notes
Frame / Shell	Aluminum alloy + engineering plastics
Motor control	Integrated motor controller boards (proprietary)
Power distribution	Centralized power management
Bus	CAN bus for actuators and sensors

Power System

Battery: Lithium-ion pack.
Configurations: 13s, 48V nominal; available in 48V@2Ah and 48V@5Ah variants.
Runtime: Approx. 30min@2Ah and approx. 80min@5Ah