

Robotic Platform: **Booster T1**

Category	Feature	Specification
Physical	Height	118 cm
	Weight	30 kg
	Degrees of Freedom (DoF)	23 (Legs: 12, Arms: 8, Head: 2, Waist: 1)
Actuators	Primary Motors	High-torque Brushless DC Motors
	Peak Torque	130 N·m (Knee/Hip joints)
	Feedback System	Dual-encoder (Absolute + Incremental)
Computing	Main Processor (Logic/AI)	NVIDIA Jetson AGX Orin (200 TOPS)
	Sub-processor (Motion)	Intel Core i7
	Communication	WiFi 6 / Ethernet / CAN Bus
Sensing	Vision System	Intel RealSense Depth Camera
	Motion Sensing	9-Axis IMU (Accelerometer, Gyro, Magnetometer)
	Joint Feedback	Integrated Position, Current, and Temp Sensors
Power	Battery Type	Lithium-ion (24V - 48V)
	Operating Time	~45 to 60 minutes (Competition workload)
Performance	Walking Type	Omnidirectional Bipedal Gait
	Recovery	Autonomous Self-Righting (Prone/Supine)

Hardware Specifications

The Booster T1 is equipped with **23 Degrees of Freedom (DoF)**, allowing for fluid, human-like movement on the pitch. The joint configuration includes 6 DoF per leg, 4 DoF per arm, 2 DoF for the head (yaw/pitch), and 1 DoF for the waist, enabling the complex weight shifts required for kicking and fall recovery. Each joint is powered by high-torque motors (up to 130 N·m at the knee) with dual-encoder feedback for high-precision posture control.

Perception and Computing

To handle the "fully autonomous" requirements of the HSL, our T1 units utilize a dual-processing architecture:

- On-board Computing: An **NVIDIA Jetson AGX Orin** (delivering up to 200 TOPS of AI performance) serves as the primary vision and logic hub, paired with an Intel i7 processor for real-time motion control and gait planning.
- Sensors: Environmental perception is driven by an **Intel RealSense depth camera** for 3D spatial awareness and ball tracking. This is supplemented by a **9-axis IMU** for real-time balance correction and fall detection.

Movement Capabilities

The T1's motion control system supports omnidirectional walking and rapid directional changes, which we have optimized for soccer-specific drills. Its durability allows it to withstand the physical rigors of a 3v3 match, including high-impact falls, with a built-in "self-righting" routine that enables the robot to autonomously return to a standing position from either a prone or supine state.

References:

1. Robotics, B. (n.d.). Booster T1 | Made for developers. Booster Robotics.
<https://www.booster.tech/booster-t1/>