UNITREE

TECHNOLOGY DRIVES WORLD PROGRESS

Web: **www.unitree.com**

Email: **sales_global@unitree.com**

Tel: **+86 17621781139**

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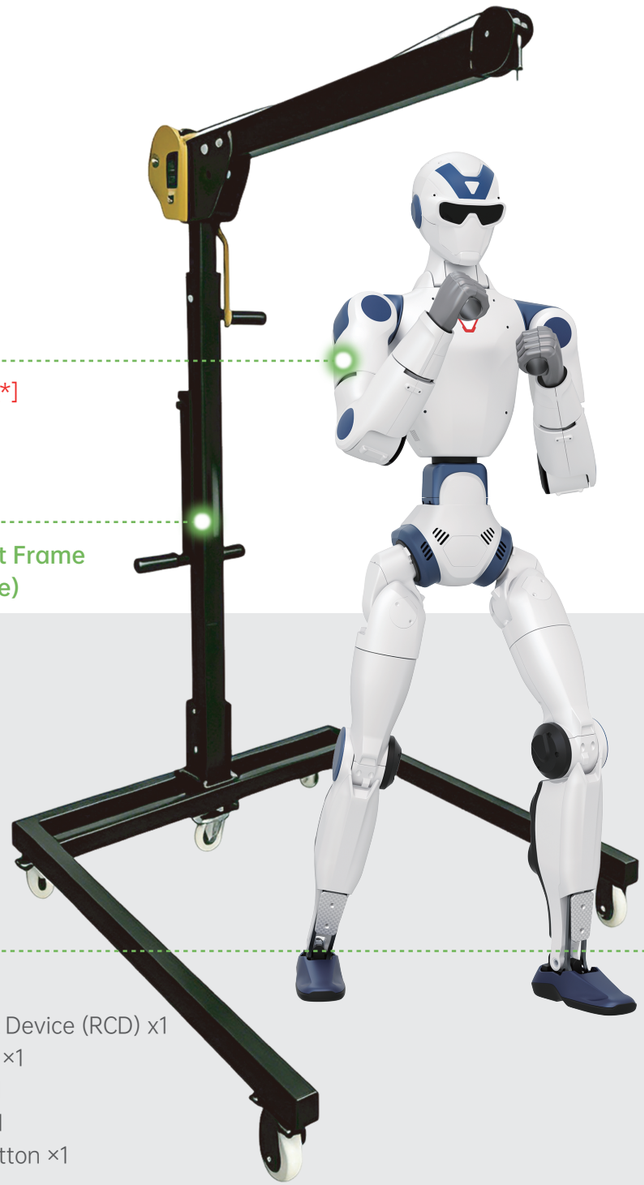
UNITREE



Humanoid Robot Experimental Platform

Equipment Composition

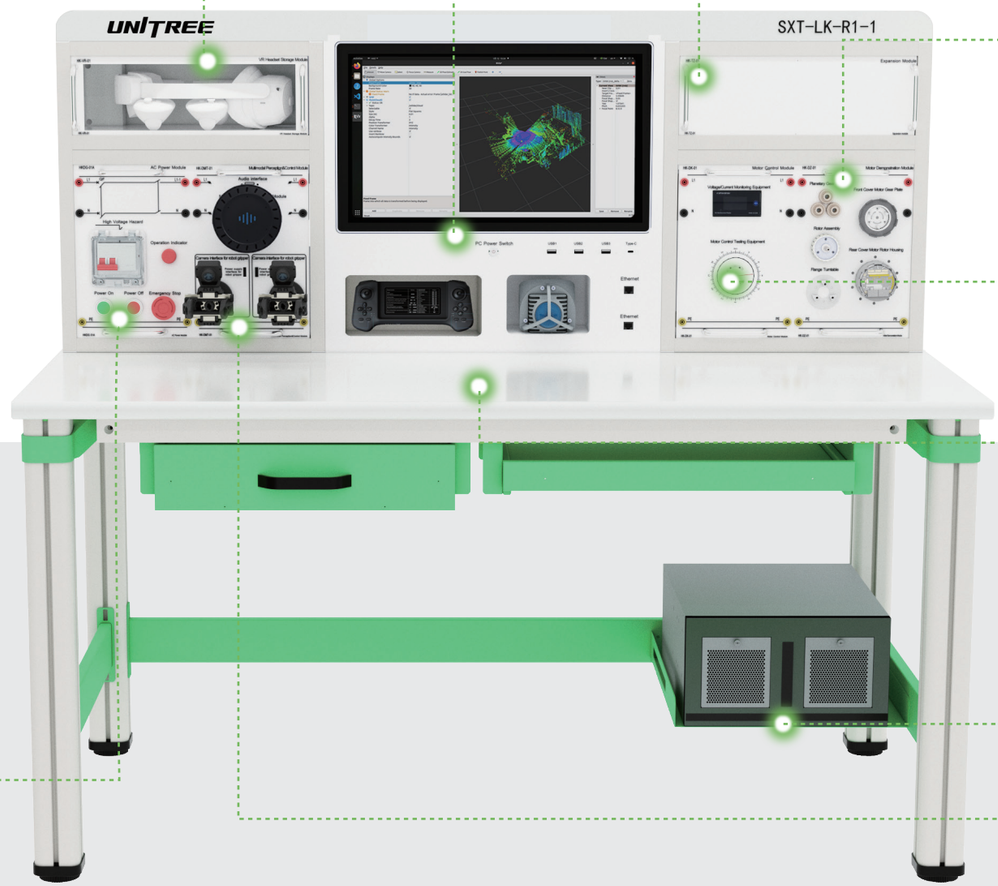
The Humanoid Robot Experimental Platform is a versatile humanoid robotics platform designed for higher education, scientific research, and innovation practice. Integrating an advanced motion control system, comprehensive perception modules, and open software interfaces, it provides a systematic and extensible training foundation for disciplines such as automation, computer science, artificial intelligence, and related fields.



Humanoid Robot [*]

Protective Support Frame
(Suspension Frame)

AC Power Module
- 2P Residual Current Device (RCD) x1
- Operation Indicator ×1
- Power On Button ×1
- Power Off Button ×1
- Emergency Stop Button ×1



VR Headset Storage Module
- VR Headset Kit ×1 [*]

Workstation
- Monitor ×1
- PC Power Switch ×1
- USB3 Expansion (USB ×3, Type-C ×1)
- External 220V Power Supply ×2
- Ethernet ×2
- Humanoid Robot Remote Controller ×1[*]
- LiDAR Kit ×1 [*]

Expansion Modules (Reserved)

Motor Demonstration Module
- Planetary Gear Reducer ×1
- Front Cover Motor Gear Plate ×1
- Rotor Assembly ×1
- Flange Turntable ×1
- Rear Cover Motor Rotor Housing ×1

Motor Control Module
- Voltage/Current Monitoring Equipment ×1
- Motor Control Testing Equipment ×1

Teaching Platform
- Dimensions: 1450×800×1300mm (LxWxH)
- Aluminum extrusion with steel-wood composite;Worktop: Fire-resistant, waterproof, wear-resistant high-density board
- Keyboard Tray ×1 Drawer ×1

Computer Equipment
- Computer Host ×1

Multimodal Perception & Control Module
- Microphone-Speaker Array Device ×1
- Robot Gripper ×2[*]

[*]This product does not include the device. It must be purchased separately.

Module Composition

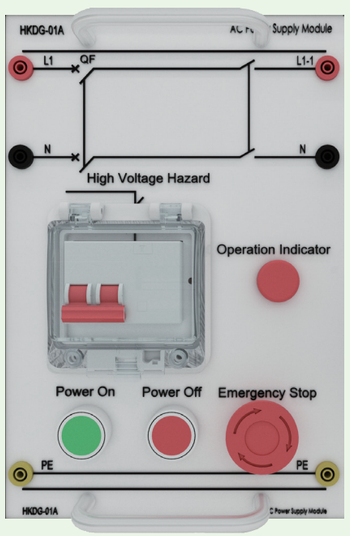
VR Headset Storage Module

- VR Headset Kit ×1 [*]



AC Power Module

- 2P Residual Current Device (RCD) x1
- Operation Indicator ×1
- Power On Button ×1
- EMERGENCY STOP Button ×1
- Power Off Button ×1



Multimodal Perception & Control Module

- Microphone-Speaker Array Device ×1
- Robot Gripper ×2 [*]



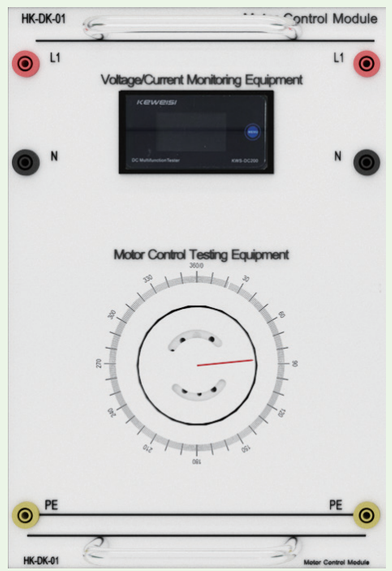


Main Control Module

- Monitor ×1
- Humanoid Robot Remote Controller ×1 [*]
- LiDAR Kit ×1 [*]

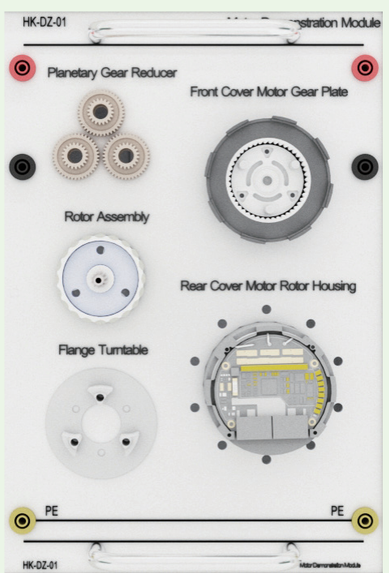
Motor Control Module

- Voltage/Current Monitoring Equipment ×1
- Motor Control Testing Equipment ×1



Motor Demonstration Module

- Planetary Gear Reducer ×1
- Front Cover Motor Gear Plate ×1
- Rotor Assembly ×1
- Flange Turntable ×1
- Rear Cover Motor Rotor Housing ×1



[*]This product does not include the device. It must be purchased separately.

Complementary Practical Training Modules

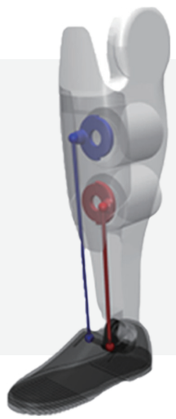
01.
MAIN BODY MOTOR



Humanoid Robot Architecture
- Humanoid robot system architecture
- Structural Components and Operating Principles

Basic Motor Control Experiment for Humanoid Robots
- Motor control principles
- C++ programming fundamentals

02.
MOTION CONTROL

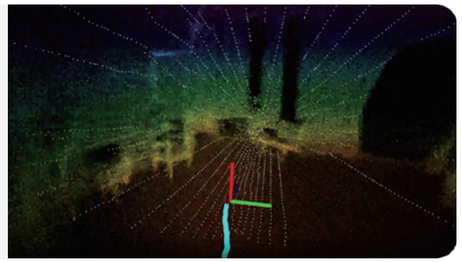


Basic Motion Control for Humanoid Robots
- Humanoid Motion Fundamentals
- High-level motion control

Custom Motion Programming for Humanoid Robots
- Motion design and programming
- Upper-body motion control

Basic End-Effector Gripper Control
- Gripper operating principles
- Basic gripper control

03.
PERCEPTUAL SENSING



IMU Data Acquisition and Analysis
- DDS message subscription
- IMU Data Analysis

Audio Signal Processing and Speech Recognition
- Audio module fundamentals
- Speech acquisition and recognition

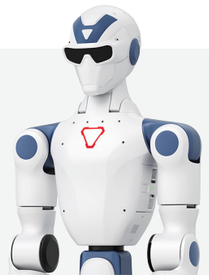
LiDAR Data Acquisition and Processing
- LiDAR SDK Basic
- Point Cloud Acquisition and Processing (ROS 2)

04.
VR TELEOPERATION CATEGORY



Full-Body Humanoid Training and Practice
- Motion capture
- RL(Mimic Training and Deploy)
(OTA update support will be added in a future update)

05.
PRACTICE AND TRAINING CATEGORY



Comprehensive Humanoid Robot Speech Module Lab
- Advanced Secondary Development
- Speech recognition and motion execution

Comprehensive Humanoid Robot Vision Recognition Lab
- Object detection
- Humanoid Motion Planning and Gripper Trajectory Planning

LiDAR Mapping for Humanoid Robots
- Advanced Unitree SDK2 Development
- SLAM mapping and navigation (DDS-Based Development)

Humanoid Robot Gripper Installation and Control Lab
- Gripper Installation Procedure
- Advanced gripper control

Curriculum System

➤ 《Humanoid Robot Safety & Maintenance》 [*]

Recommended Hours	64 Hours	64 Hours Credits	4 Credits
Hardware Platform	Unitree R1 Humanoid Robot, Humanoid Robot Experimental Platform		

➤ Course Objectives

1. Master the core technologies of humanoid robot system safety and maintenance, and develop the ability to independently complete related development tasks.
2. Develop skills in system maintenance and fault diagnosis, including identifying basic hardware and software issues, handling abnormal situations, and managing system logs.

Course Modules	Course Modules
Module 1: System Safety Architecture & Deployment Standards	Hoisting protection Emergency stop button layout Workspace isolation Software security boundary Pre-deployment safety checklist
Module 2: Sensor Fault Diagnosis	LiDAR data anomaly detection Depth camera disconnection diagnosis IMU drift detection Multi-sensor consistency verification
Module 3: Communication Security & Interference Handling	DDS communication configuration Bluetooth/network congestion handling Safe recovery mechanisms after communication interruptions
Module 4: Motion Anomaly Detection & Emergency Recovery	Joint position anomaly detection Motion limit verification Fall detection and posture recovery Emergency stop response time measurement
Module 5: Log Management & Issue Reproduction	Log classification strategies Log recording and storage Automatic log upload Root cause analysis
Module 6: System & Performance Monitoring	Motor temperature monitoring Performance baseline establishment Battery voltage and robot performance evaluation
Module 7: Version Management	Humanoid robot OTA updates and firmware version management、rollback strategy

[*]This product does not include the device. It must be purchased separately.

➤ 《Humanoid Robot Experimental Platform Course》 [*]

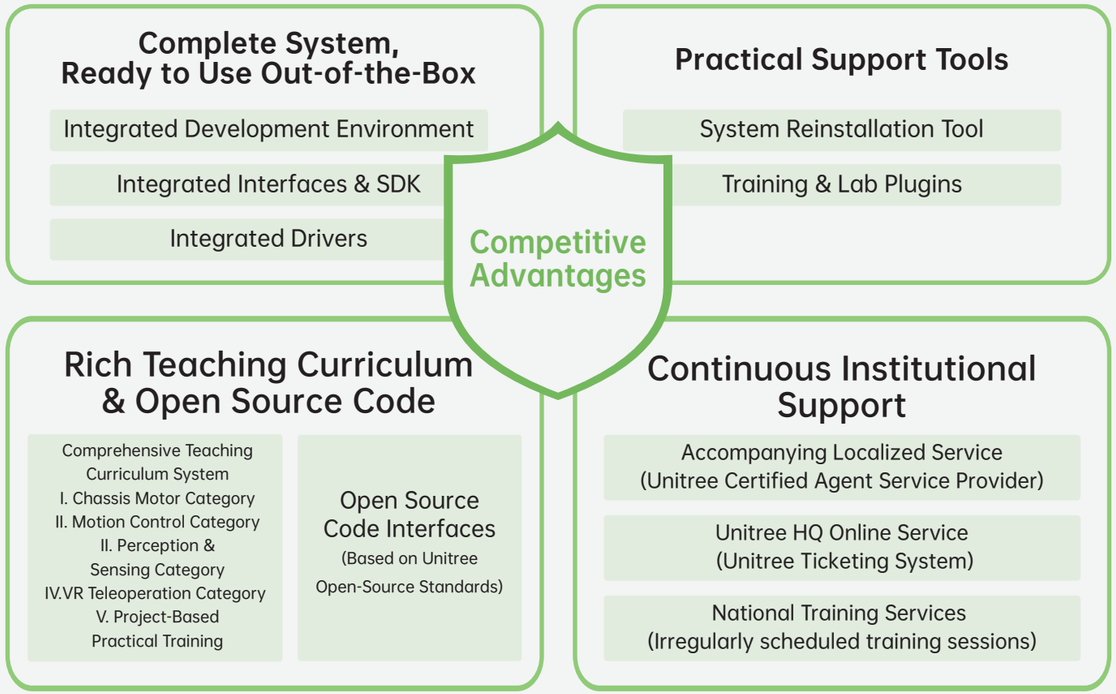
Recommended Hours	64 Hours	64 Hours Credits	4 Credits
Hardware Platform	Unitree R1 Humanoid Robot, Humanoid Robot Experimental Platform		

➤ Course Objectives

1. Master the core technologies of humanoid robot experimental platforms and develop the ability to independently complete related development tasks.
2. Utilize the rich interfaces and modules of the humanoid robot experimental platform to build students' understanding and hands-on capabilities in humanoid robot hardware systems.

Course Modules	Course Modules
Module 1: System Architecture & Kinematics Fundamentals	R1 humanoid robot mechanical structure Joint parameters Degrees of freedom configuration and kinematic fundamentals
Module 2: PMSM FOC Low-Level Motor Control	Rotating magnetic field principles Dual encoder characteristics Gear ratio calculation Motor ID and serial communication
Module 3: Basic Motion Control	R1 SDK High/Low-Level interface configuration Standing, walking, and posture adjustment DDS communication
Module 4: Custom Motion Design & Upper-Body Control	Joint torque release Power-off state snapshot reading and motion file saving Upper-body control design and validation
Module 5: Basic End-Effector Gripper Control	Dex1-1 gripper DDS communication Position, velocity and torque control Gripper control on the training platform
Module 6: Sensor Data Acquisition & Calibration	IMU data acquisition and analysis LiDAR point cloud acquisition and noise filtering
Module 7: LiDAR Perception & Autonomous Navigation	Livox Mid-360 point cloud visualization SLAM mapping Pose initialization and navigation
Module 8: Integrated Course Project	Develop an autonomous grasping system based on the ACT model and vision modules, covering the complete workflow from visual perception and ACT imitation learning to gripper control.

Providing institutions with **a premium service support system** through **project-based practical training** and **scientific research experiments.**



Supporting Manuals & Installation Services

User Manual

- Training platform startup
- Shutdown & Reset
- Operation
- Precaution

Installation Service

Worry-free installation by Unitree Technology certified installation engineers

Specifications

Product Name	Model	Functional Specifications		
Humanoid Robot Experimental Platform	SXT-LKR1-1	Practical Training Platform	Overall Configuration	Dimensions: 1450×800×1300mm (LxWxH)
				Aluminum extrusion with steel-wood composite; Worktop: Fire-resistant, waterproof, wear-resistant high-density board
				Keyboard Tray ×1 Drawer ×1
			AC Power Module	2P Residual Current Device (RCD) x1
				Operation Indicator ×1
				Power On Button ×1
				Power Off Button ×1
				EMERGENCY STOP Button ×1
			Electrical Configuration	Input Voltage: 220V
				Maximum Power: 1800W
			Multimodal Perception & Control Module	Audio Port ×1
				Microphone-Speaker Array Module x1
				Gripper Camera Port ×2
				Gripper Power Supply Port ×2
			Main Computer Module	GPU: 16GB with CUDA Support
				CPU: i5 Processor
				Memory: 16GB
				Storage: 512GB
				Network: Network Card x2
				Operating System: Ubuntu 22.04
				Computer Power Button ×1
				LiDAR Storage Module ×1
				Remote Controller Storage Module ×1
				Ethernet Port ×2
				USB Expansion (USB ×3, Type-C ×1)
			Motor Control Module	Voltage/Current Monitoring Equipment ×1
				Motor Control Testing Equipment ×1
			Motor Demonstration Module	Planetary Gear Reducer ×1
				Front Cover Motor Gear Plate ×1
				Rotor Assembly ×1
				Flange Turntable ×1
				Rear Cover Motor Rotor Housing ×1
			VR Headset Storage Module	VR Headset Storage Module ×1
			Expansion Module	Expansion Module ×1
		Safety Support Frame	Safety Support Frame (Suspension Frame)	Included as standard