ULS ROBOTICS

BES-Pro

Lower limb exoskeleton robots

傲鲨智能 ULSrobotics （2023）

BES-Pro

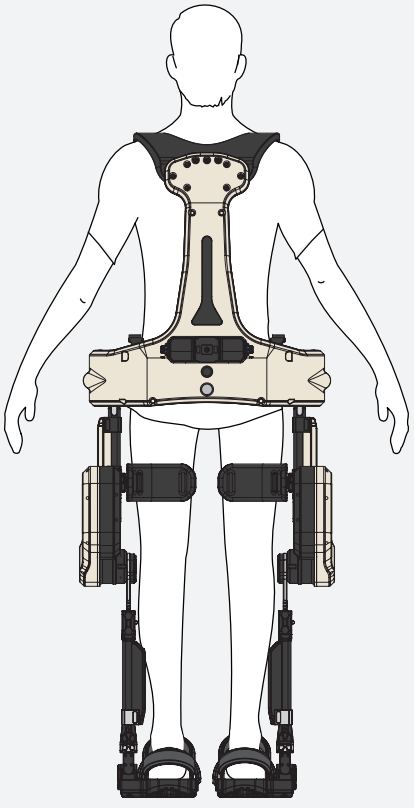
Lower limb exoskeleton robots

Product introduction

The Belt-drive Exoskeleton System (BES-Pro) is a Lower limb exoskeleton derived from ULSrobotics' professional products. It is designed to enable universities, R&D institutions and medical research centers to conduct further development and research.

BES -Pro lower limb exoskeleton robot integrates our self-developed advanced intelligent digital actuator to achieve one modular deceleration system and adaptive intelligent motion control system, combined with our unique software mechanical impedance, self-learning adaptive gait and artificial intelligence-based motion control algorithms and pattern recognition. Products to achieve lightweight modular design and waist exoskeleton interoperability conversion, flexible plantar pressure sensing array bipedal 32 channels, hip and knee joints with independent position sensors, not less than 16bit, visualization of the leg length adjustment. Provide developers with a technology-leading and high-performance exoskeleton robotics solution.

- Servo power unit
- Force impedance control technology
- Force control integration drive unit
- ULSrobotics's integrated TBG (Twist Belt Gear) deceleration system



- Flexible plantar pressure sensing array with two feet and 32 channels
- Long-term lithium battery management system
- Exoskeleton IoT motion data platform
- HMI highly matched adjustable mechanism and visual rapid height adjustment module

Cutting-edge system architecture for exoskeleton software

Supports applications in human augmentation, assisted walking and medical research.

Embedded system architecture									
API SDK Function package	Customiz-able gait curve	Non-gait curve	Adaptive force following gait	Force impedance control assistance software package	Position mode control	Torque mode control	Continuous PVT motion control	adjustment of motor controller for hip and knee joints	Phase calibration, etc.
Software language	Unity (C#)		VS (C#, JAVA)			MicroPython		MATLAB	
Communica-tion system	CAN (CANOPEN)	Ethernet	TCP/UDP	WIFI	UART	USB		4G IoT	
Hardware bottom layer	Support EMG			Support OpenBCI		Support Leap Motion			
	Support scalable RTOS			ARM-based hardware driver Lib		BSP			
	Motor drive system	Flexible force sensing array system		Double coding posi-tion feedback system		Digital man-machine interaction interface		Scalable CAN LAN	

NEW

LOWER LIMB EXOSKELETON ROBOTS

ULS ROBOTICS – **BES-Pro**

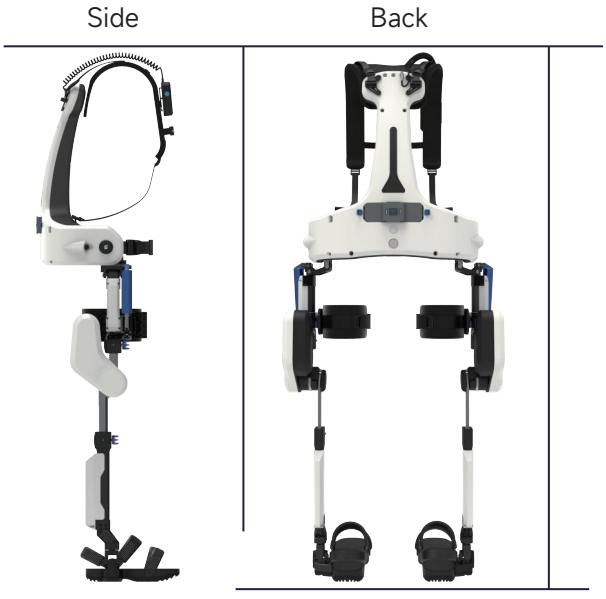
Burden alleviation · Assistance · Walking assistance · Data IoT

Battery life 3-4h

32 channels for plantar pressure

Equipment weight <18kg

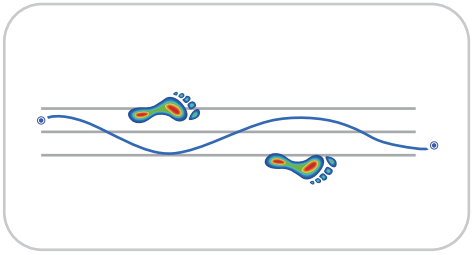
12 degrees of freedom



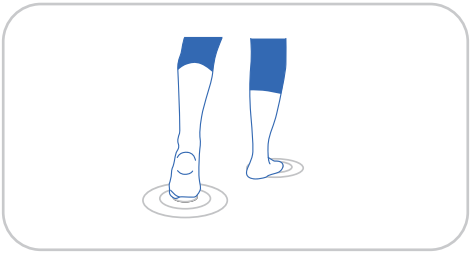
Supports diverse applications and development functions

ULSrobotics's unique mechanical impedance software algorithm, self-learning adaptive standard gait, non-standard gait and AI-based motion control algorithm and pattern recognition

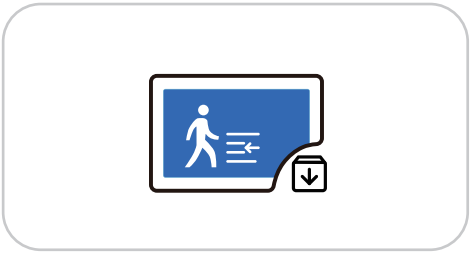
Development function



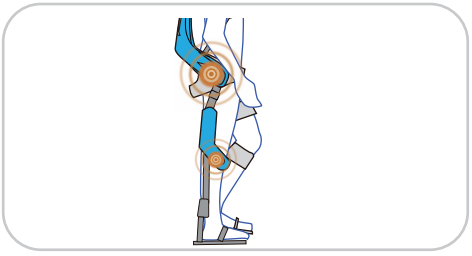
Customizable gait curve



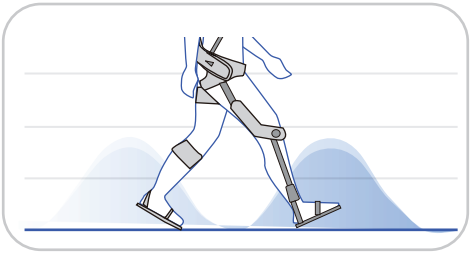
Adaptive force following gait



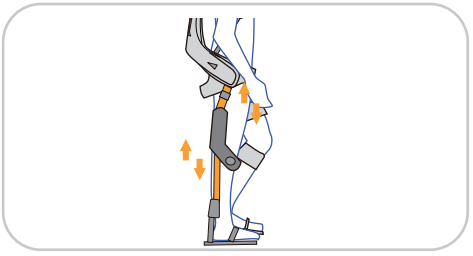
Force impedance control assistance software package



Torque mode control



Continuous PVT motion control



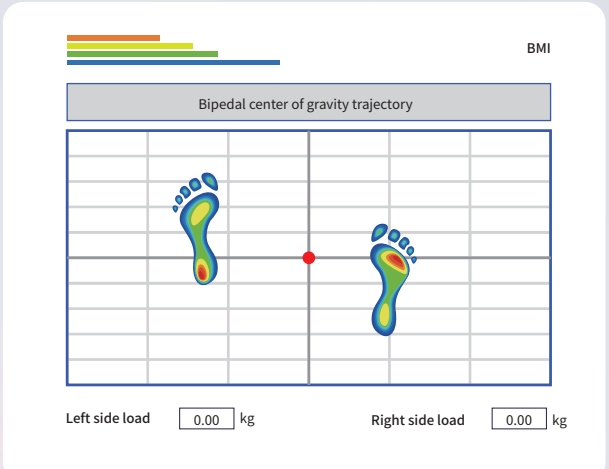
PID adjustment of motor controller for hip and knee joints

Open data and a rich suite of development APIs

The exoskeleton communicates wirelessly to display posture and assistance data in real time, enabling customized data calibration.

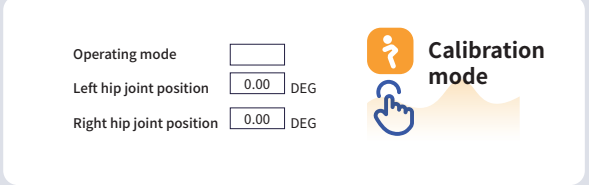
Data function

Plantar pressure data



Exoskeleton data curve

Individualized data calibration



Human-machine integration makes an optimal teaching aid for exoskeleton

Advantages

Excellent performance

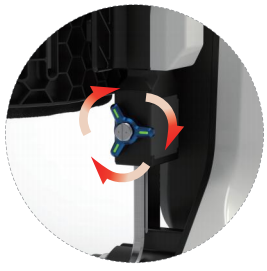
Rich functions

Open interface

Data support

wifi real-time data transmission

Multiple APIs (support direct control of the position and torque)



Fast visual adjustment and locking of height and leg length

Torque mode control

Adaptive force following gait

Plantar pressure distribution

Application field

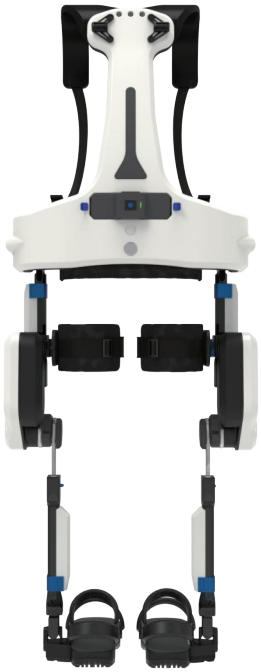
Education and teaching

Medical research

Rehabilitation training

Academic research

Powerful equipment technical parameters to meet your application requirements



Lower limb exoskeleton robots/**product specification**

ULS ROBOTICS **BES-Pro**

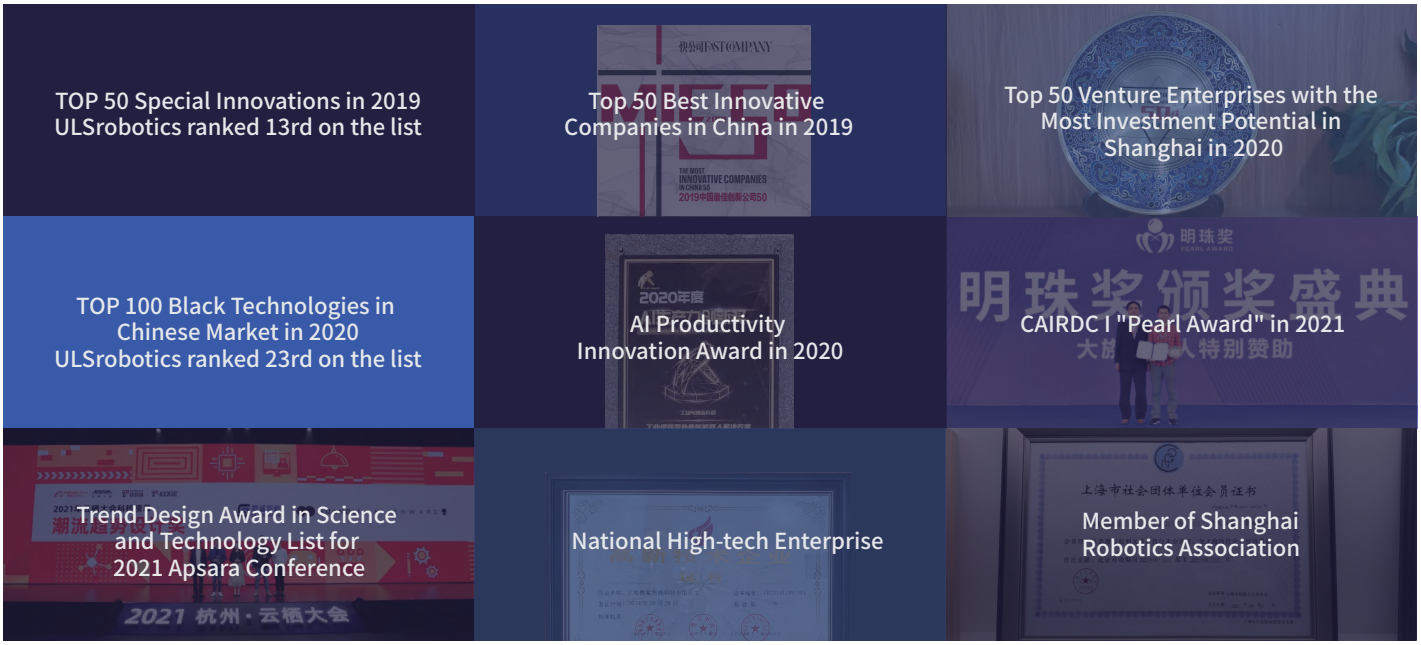
Equipment weight	＜18kg（including 1 power battery）
Working time	3-4 h/battery
Battery type	Lithium battery 20~42v
Height range	160~185cm (support height adjustment)
Standard software	Motion control software, embedded system software, real-time discrete bus system software
Plantar pressure	32-channel plantar pressure data support
Degree of freedom	12 Degrees of Freedom Ontology, 4 Active Degrees of Freedom, 8 Passive Degrees of Freedom
Driving unit	Drive and control integrated low-voltage torque servo motor system, integrated gearbox

Company profile

ULSrobotics, founded in 2018 and headquartered in Science Park of Shanghai University of Financeand Economics, Shanghai, China, is a high-tech company based on robotics exoskeleton technology platform. ULSrobotics is dedicated in developing, manufacturing and supporting solutions for industrial, medical and educational fields with exoskeleton robots.

ULSrobotics' core R&D team is one of the earliest companies in the world to engage in exoskeleton robotics research and development, with rich experience in designing and developing robot control systems, motion-control algorithms, multi-sensor data fusion, human-computer interaction and machine vision, etc. ULSrobotics' exoskeleton product line covers upper limb, waist, lower limb and whole body, etc. The products have obtained ISO9001 quality certification and CE safety certification. Till now, ULSrobotics has a wealth of application scenarios, such as automobile manufacturing, aviation ground services, electric power, mining and educational research.

Enterprise honor



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