Fourier Intelligence

Fourier Intelligence Rehabilitation Hub (RehabHub™)

Content

1. Company Introduction

Fourier Intelligence is headquartered in Zhangjiang, Shanghai. It provides comprehensive rehabilitation solutions with cutting-edge intelligent robotics technology. As per, for now, its robots have entered approximately 500 hospitals in about 20 countries, providing more than 100 million interactive training sessions. Fourier Intelligence serves hospitals, communities and families, aims to improve the efficiency of medical services and the quality of life for patients with mobility impairment and cognitive handicaps.

The company's core R&D team consists of the top experts in the robotics and medical fields. Besides, Fourier Intelligence has established innovation labs with Shirley Ryan AbilityLab (previously known as Rehabilitation Institute of Chicago), the University of Melbourne, ETH Zurich, and other leading institutions. The company has secured the financing from top-tier investors including IDG Capital, Volcanics Venture, Zhangjiang Technology Venture Capital and Guozhong Venture Capital.

Fourier Intelligence has recently established branches in Singapore and Malaysia to support all the business activities outside of mainland China which allows its robots to be shipped all over the world, including the United States, the United Kingdom, Singapore, Germany, Malaysia, Australia, Indonesia, South Korea, the United Arab Emirates, etc.

2. The Background of Fourier Intelligence Rehabilitation Hub (RehabHub™)

Based on "perception, processing and response" of intelligent robots, Fourier Intelligence Rehabilitation Hub (RehabHub™) will build an integrated rehabilitation platform which increases the width and depth of information application and gradually makes rehabilitation services quantifiable, standardised and intelligent.

It can collect patient data in real-time, enabling doctors to understand the patient's recovery and situation better. Besides, this concept will explore the interactive channels between patients and rehabilitation institutions. In addition, the intelligent rehabilitation robot can partially replace the labour-intensive repetitive training from the rehabilitation physicians and therapists. Fourier Intelligence thrives on supporting conventional rehabilitation medicine and upgrading modern rehabilitation medicine.

The Fourier Intelligence Rehabilitation Hub includes a variety of rehabilitation robots which indicated for upper limb, lower limb, wrist joint and ankle joint. It covers all stages in the rehabilitation process for every patient and helps the patient to achieve the goal of rehabilitation for all.

2.1 Current Status of Conventional Rehabilitation

In conventional rehabilitation therapy, the therapist manually performs one-to-one rehabilitation training with the patient. The training efficiency and intensity are difficult to quantify in this way. Yet, the training effect can be affected by the experience level of the therapist. Besides, there is no objective training data to evaluate the relationship between training parameters and the effects, making it challenging to optimise training parameters for a treatment plan.

2.2 Current Status of Community Rehabilitation

Professional rehabilitation therapists are generally more concentrated at general hospitals' rehabilitation department and the large rehabilitation centres. The lack of community rehabilitation therapists will lead to a lack of follow-up rehabilitation guidance after patients being discharged from the hospital. On the other hand, community rehabilitation institutions usually lack the modern rehabilitation equipment hence making them challenging to fulfil rehabilitation needs of the patients.

2.3 Man-machine Interaction Based on Force Feedback

The existing robotic-assisted rehabilitation device often provides constant assistance which cannot be adjusted according to the patient's condition. All the Fourier Intelligence's rehabilitation robotic is implemented with a self-developed motion control card, high-precision multi-dimensional force sensor and position sensor, which can monitor the patient's training in real-time and provide real-time feedback. With advanced force feedback technology, the robot can simulate a therapist's hand and offers on-demand assistance to the patient during training thus improving the patient's participation in exercise.

3. Global Demand for Rehabilitation

- The Global Disability Action Plan 2014---2021 (Action Plan) adopted by the World Health Organization in May 2014 aims to improve access to health services; to strengthen rehabilitation, assistive technology, supportive services and community-based rehabilitation; to strengthen data collection and support research on disability and related services.
- Rehabilitation 2030: A Call for Action addressed the significant and ever-increasing need for rehabilitation services around the world.
  Objectives:
  1) To draw attention to the increasing needs for rehabilitation.
  2) To highlight the role of rehabilitation in achieving the SDGs.
  3) To call for coordinated and concerted global action towards strengthening rehabilitation in health systems.
- Convention on the Rights of Persons with Disabilities

The purpose of the present convention is to promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities, and to promote respect for their inherent dignity. Parties involved in the convention are required to promote, protect, and ensure the full enjoyment of human rights by people with disabilities and ensure that they enjoy full equality under the law.

4. Fourier Intelligence Rehabilitation Hub

4.1 Standard Configuration List

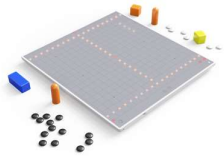
Name	Function	Quantity	Picture
ArmMotus™ M2 Pro Upper Limb Rehabilitation Robotic	• Assist upper limb rehabilitation training, including shoulder and elbow movement. • Multiple training modes, including passive, assistive, active, resistive, isometric cognition and attention training. • Futuristic design with a more compact working table • Combining the monitor, CPU and working table into one device. • Data-based training process: ROM assessment, real-time training performance display, training reports analysis. • Core technology: force feedback.	3	

ArmMotus™ M2 Gen Upper Limb Rehabilitation Robotic	• Assist upper limb rehabilitation training, including shoulder and elbow movement. • Multiple training modes, including passive, assistive, active, resistive, isometric cognition and attention training. • Data-based training process: ROM assessment, real-time training performance display, training reports analysis. • Core technology: force feedback. • Cover every stage of the rehabilitation process. • International certification: CE, FDA, TGA, CFDA	3	
BalanceMotus™ Balance Assessment and Training System	• Assess the balancing ability of patients and evaluate the risk hence providing appropriate training • Equipped with a quick-reacting centre of pressure (COP) trajectory function. • Support the calibration function of the device to ensure the accuracy of the data • Integrating games into balance training which allows patients to move their COP in a safe environment • Equipped with a handrail at three directions to prevent patients from falling	2	

AnkleMotus™ M1-A Ankle Joint Rehabilitation Robotic	• Enable individuals with ankle joint disabilities to perform routine ambulatory functions to increase their activity level. • Core technology: force feedback • Functions: dorsiflex and plantarflex of the ankle joint. • Multiple training modes, including passive, assistive, active, resistive and cognition training. • Data-based training process: ROM assessment, real-time training performance display, training reports analysis. • Cover every stage of rehabilitation training	2	
WristMotus™ M1-W Wrist Joint Rehabilitation Robotic	• Enable individuals with wrist joint disabilities to perform basic ADL. • Multiple training modes, including passive, assistive, active, resistive and cognition training. • Functions: pronation and supination of the forearm, flexion and extension of the wrist joint, ulnar and radial deviation of the wrist joint. • Core technology: force feedback. • Data-based training process: ROM assessment, real-time training performance display, training reports analysis. • Cover every stage of rehabilitation training.	2	

ExoMotus™ Lower Limbs Rehabilitation Robotic	• Enable paraplegics and hemiplegia patients to walk. • Lightweight: only 18kg. • Multiple gait databases. • Smartwatch control: adjust velocity, gait, etc. • Comfortable and easy to wear. • Core technology: force feedback. • Powerful actuating units. • Provide API/SDK and support secondary development. • Different versions: research version, medical version and home version.	2	
GaitMotus™ iReGo Weight Reduction Walking Robotic	• Help paraplegia, hemiplegia and other patients to achieve sit-stand training, balance training and walking-assisted training. • Adjustable 0-30kg weight-reducing range through force feedback technology. • Automatic walk guiding technology. • Dynamic balance training. • Assistive sit and stand training. • Combined with exoskeleton robots to replace the inconvenient railing system.	2	

CycleMotus™ A4 Active and Passive Training Equipment for Upper and Lower Limbs	• Provide active and passive training for upper and lower limbs. • Help to improve muscle strength, blood circulation and coordination of upper and lower limbs. • Three training modes: Active mode, passive mode, active/passive mode. • LCD touch screen control: 10-inch HD touchscreen LCD monitor. • Intelligent training management: Interactive gaming scenario, training report, adjustable parameters. • Safety features: Spasticity detection, Wi-Fi remote control, medical 24V power supply, emergency stop button.	4	
CycleMotus™ B2L Bedside Active and Passive Training Equipment for Upper and Lower Limbs	• Convenient for bedside rehabilitation of upper and lower limbs. • Help to improve muscle strength, blood circulation and coordination of upper and lower limbs. • Three training modes: active mode, passive mode, active/passive mode. • LCD touch screen control: 10-inch HD touchscreen LCD monitor. • Safety features spasticity detection, Wi-Fi remote control, medical 24V power supply, emergency stop button.	4	

HandyRehab™ Hand Function Rehabilitation Robotics	• One of the world's lightest wireless robotic gloves • Provide multiple hand function recovery training such as finger stretching, grasp and finger opposition. • Integrating EMG signal armband to detect user's intention to move and provide assistants. • Help users to improve the skills needed for daily living and working. • Equipped with the movement parameter tracking and key performance measuring features that allow therapists to better track user's recovery process • High portable and controlled with a tablet	3	
OTParvos™ Digital OT Training System	• Provide a portable digital training system for occupational therapy • Provide an extensive library of interactive games • Game library and training features can be added through a firmware upgrade • Support and provide the traditionally used tools by occupational therapists such as blocks, sticks, chess pieces, etc. • Portable and USB charging	3	

5. Benefit Analysis

- **Reduce cost and improve efficiency**

Robots can conduct high-intensity repetitive rehabilitation training in a fun way. Fourier Intelligence Rehabilitation Hub provides not only effective rehabilitation training for patients but also able to reduce the work intensity of the medical staff and the operating cost of the hospital. It helps to improve the efficiency of rehabilitation training and reduce the economic burden on patients' family and society.

- **Provide objective and accurate quantitative data**

The robot can provide real-time feedback and record detailed data, provide unbiased and precise assessment and training parameters, and help to research robotic-assisted therapy of patients with neurological and musculoskeletal injuries.

- **Considerable social and economic benefits**

Keep up with the development of advanced rehabilitation medical technology, enable patients to enjoy world-class rehabilitation. Medical institutions can recover costs within one year, improve work efficiency and make considerable profits in the future.

6. Value-Added Services

6.1 Connect with the global partner of Fourier Intelligence

- Established a joint lab with prestigious universities, including the University of Melbourne, Imperial College of London, etc.
- Established academic communication and research collaboration with more than 30 top hospitals and rehabilitation institutes, including Shirley Ryan AbilityLab (previously known as Rehabilitation Institute of Chicago).
- Share academic resources and jointly cultivate a new generation of talents in rehabilitation medicine and engineering.

6.2 Global Rehabilitation & Assistive Technology (GReAT) Network

To better facilitate communication and optimisation of research and clinical resources among Fourier Intelligence's collaborators with top experts in the robotics and medical fields.

GReAT Global Rehabilitation & Assistive Technology Network


Prof. Dario **Farina**
(Imperial College London)


Prof. Robert **Riener**
(Swiss Federal Institute of Technology in Zurich, ETH)


Prof. Hermano Igo **Krebs**
(Massachusetts Institute of Technology)


Prof. Marco **Santello**
(Arizona State University)


Prof. James L. **Patton**
(Shirley Ryan AbilityLab)


A/Prof. Ying **Tan**
(University of Melbourne)


Prof. José Luis **Pons** Rovira
(Shirley Ryan AbilityLab, Instituto Cajal)


Prof. Qing **Xie**
(Ruijin Hospital)

6.3 Become Supporting Organisation of GReAT Network

- Support the establishment of rehabilitation and assistive technology system through innovative development and research on rehabilitation and assistive technology
- Build communication and cooperation platforms for rehabilitation workers in different fields
- Share international networks and expert resources to solve common problems in the development process, create a fair and open market environment, and provide professional information to professionals in the industry.

6.4 Excellent Clinical Training and After-sales Service System

Each of Fourier Intelligence's clinical trainers has more than three years of clinical experience and has received standardised training. Fourier Intelligence will ensure that customers received the best service from delivery, commissioning and operation of the product, equipment maintenance and management, technical training and services and other aspects to make customers satisfied.

- **Product Warranty**

Warranty period: Within two years from the date of receiving.

In case of any non-human damage to the parts of the goods purchased by the customer during the warranty period, new parts will be replaced without any charges.

- **After-sales Service Team**

The professional after-sales service department will answer the questions raised by users in time and provide timely equipment maintenance service to ensure the regular operation of the equipment.

- **Spare Parts Supply**

The company stores sufficient spare parts to ensure that the customer does not delay the system operation due to lack of parts. In special cases, the corresponding model equipment can be provided for a temporary replacement.

- **Product Training**

After the installation and commissioning of the equipment, clinical trainer authorised by Fourier Intelligence will train the personnel in charge of the equipment on management and operation.

- **Regular Site Visit**

Fourier Intelligence has set the inspection system as one of the routine maintenances. The company inspects running equipment every two years. The inspection is mainly conducted by engineering and technical personnel. The

company will listen to the feedback from the customers to improve the functions and quality of the products.

- **Service Hotline**

Service hotline: 021-50308716. Solve all kinds of problems for customers from Monday to Friday every week.

- **Service after Warranty Period**

Fourier Intelligence will charge customers for the on-site maintenance and update service (spare parts and maintenance time costs) when the product exceeds the warranty period.

Appendix: Product of Fourier Intelligence Rehabilitation Hub

Fourier Intelligence Rehabilitation Hub (RehabHub™)

ArmMotus™ M2 - Pro Upper Limb Rehabilitation Robotic

Core Technical Specification

*Implementing force feedback into upper limb functional training, supporting passive, assistive, active and resistive, isometric and cognition training. The force feedback sensor acquires a precision level of 0.1 kg which range between 0-20 kg. Real-time force feedback report immediately shows the participation of the active force during training and integrate with adjustable training intensity parameters at the same time.

*Able to simulate different resistance, mass, elasticity, obstacle, surface texture and many other mechanical effects.

*Diversified training that integrates multiple 2D and 3D scenario, such as the interaction between visual and audio feedback. The technology simulates reality as if immersing the user with the training scenario which not only fun but intuitive.

Other Technical Specification

- Futuristic design with a more compact working table.
- Combining the monitor, CPU and working table into one device. Minimising space, cable exposure and plug point amount requirement.
- The training trajectory is adjustable, and the robotics arm acquires the feature to record and playback the motion throughout the training. This helps to tailor a user-specific therapy.
- Multiple safety protection, equipped with emergency stop button, force protection, position limitation protection.
- Multiple gripping handles: the machine is equipped with a single-hand handle, both-hand handle, spherical handle, distal phalanx handle in order to meet different training requirements.
- Adjustable moving speed of 0 - 35 cm/s, control precision of 1mm.
- Adjustable moving range ≥560mm*400mm.
- Adjustable machine height that ranged between 600mm and 1000mm.
- Machine dimension: ≥850mm X1000mm.
- Multiple training objectives of the upper limb, including muscle strength, ROM, muscle control ability, and cognition.
- Control method: combine full servomotor control and computer control, training duration, range of motion and moving speed can be manipulated.
- Floating-point arithmetic processors to support high-speed and complex motion control algorithms.
- Powerful database management which able to record every user data created under each therapist. All data can be checked, created, deleted and modified.
- The report will record the user's training performance and related kinematics parameters. Besides, the report can be accessed and printed at any time after training.
- Internal signal transmitting: Quick reacting, far transmitting and highly resistant to magnetic disturbance. Able to work in an environment with loud noise.
- Adjustable passive training speed (mm/s): 0mm to 100mm/s.
- Mechanical structure, using synchronised and belt guiding design, super-thin training workspace.
- Support multiple languages (English/ Simplified Chinese/ Polish/ Traditional Chinese).
- The machine supports interchangeable bright and dark colour software interface. Support three interchangeable lighting on the training workspace. Easily portable wheels for device moving.

- Operating environment: a) Temperature 5ºC to 40ºC b) Humidity: 30%RH – 75%RH c) Atmospheric pressure: 700hPa- 1060hPA

ArmMotus™ M2 - Gen Upper Limb Rehabilitation Robotic

Core Technical Specification

*Implementing force feedback into upper limb functional training, supporting passive, assistive, active and resistive, isometric and cognition training. The force feedback sensor acquires a precision level of 0.1 kg which range between 0-20 kg. Real-time force feedback report immediately shows the participation of the active force during training and integrate with adjustable training intensity parameters at the same time.

*Diversified training that combines multiple 2D and 3D scenario, such as the interaction between visual and audio feedback. The technology simulates reality as if immersing the user with the training scenario which not only fun but intuitive.

Other Technical Specification

- The training trajectory is adjustable, and the robotics arm acquires the feature to record and playback the motion throughout the training. This helps to tailor a user-specific therapy.
- Multiple safety protection, equipped with emergency stop button, force protection, position limitation protection.

- Multiple gripping handles: the machine is equipped with a single-hand handle, both-hand handle, spherical handle, distal phalanx handle in order to meet different training requirements.
- Adjustable moving speed of 0 - 35 cm/s, control precision of 1mm.
- Adjustable machine height that ranged between 825mm and 1225mm.
- Dimension: 768mm X1136mm.
- Multiple training objectives of the upper limb, including muscle strength, ROM, muscle control ability, and cognition.
- Control Method: combine full servomotor control and computer control, training duration, range of motion and moving speed can be manipulated.
- Floating-point arithmetic processors to support high-speed and complex motion control algorithms.
- Powerful database management, which able to record every user data created under each therapist. All data can be checked, created, deleted and modified.
- The report will record the user's training performance and related kinematics parameters. Besides, the report can be accessed and printed at any time after training.
- Internal signal transmitting: It is quick reacting, far transmitting and highly resistant to magnetic disturbance. Able to work under an environment with loud noise.
- Adjustable passive training speed (mm/s): 0mm to 100mm/s.
- Mechanical structure, using synchronised and belt guiding design, super-thin training workspace.
- Support multiple languages (English/Simplified Chinese/ Polish/ Traditional Chinese).
- Operating environment: a) Temperature 5ºC to 40ºC b) Humidity: 30%RH – 75%RH c) Atmospheric pressure: 700hPa- 1060hPA

BalanceMotus™ - Balance Assessment and Training System

Product Tendering Specifications

Implementing 13 parameters as reference, balancing test can be quick and easy.

No.	Parameters	Unit	Range	Description
1	Motion Speed	mm/s	0 ~ 50	The speed of the user's centre of pressure (COP) shifting in one direction.
2	Motion Acceleration	mm/s^2	0 ~ 400	The acceleration of the user's COP shifting in one direction.
3	Lateral Range	mm	0 ~ 100	The lateral movement range of the user's COP.
4	Sagittal Plane Range	mm	0 ~ 100	The sagittal plane movement range of the user's COP.
5	Lateral Speed	mm/s	0 ~ 50	The lateral movement speed of the user's COP.
6	Sagittal Plane Speed	mm/s	0 ~ 50	The sagittal plane movement speed of the user's COP.
7	Lateral Acceleration	mm/s^2	0 ~ 400	The lateral movement acceleration of the user's COP.

8	Sagittal Plane Acceleration	mm/s^2	0 ~ 400	The sagittal plane movement acceleration of the user's COP.
9	COP Major Axis	mm	0 ~ 20	COP's range of motion in the long term
10	COP Minor Axis	mm	0 ~ 5	COP's range of motion in the short term
11	Motion Speed Major Axis	mm/s	0 ~ 20	COP's range of motion at maximum speed.
12	Motion Speed Minor Axis	X	0 ~ 10	COP's range of motion at minimum speed.
13	Motion Area	mm^2	0 ~ 600	The area covered by COP's trajectory.

Overall score: 0-100% (Obtained by implementing the nonlinear algorithm on the 13 parameters above）

Overall result: Average（0-60%），mild（61-80%），Moderate（81-100%）

Core Technical Specification

*The validation of 300 clinical data was highly consistent with Berg scale data, and therefore had the same evaluation efficacy as Berg scale. This makes the equipment has the absolute advantage of high efficiency and low limitation of operator requirements.
*Diversified training that integrates multiple 2D and 3D scenario, such as the interaction between visual, audio and tactile feedback. The technology simulates reality as if immersing the user with the training scenario which not only fun but intuitive. And the network database can be updated.
*Powerful database management, which able to record every user data created under each therapist. All data can be checked, created, deleted and amended.

Other Technical Specification

- Analysis of nonlinear parameters to provide a comprehensive balance ability evaluation index with clinical application value;
- Four highly precisive pressure sensor to facilitate the early staged balancing ability screening, test and training.
- Record every training and assessment data, record movement trajectory, self-generated clinical analysis reports for future therapy plan reference.
- Support multiple languages (English/ Simplified Chinese/ Polish/ Traditional

Chinese)

- Support interchangeable bright and dark colour software interface.
- The equipment supports the calibration function of the device to ensure the accuracy of the data.
- Weight precision test- Device weight loading: 5- 135kg, when loading is ≥50kg, the error is not more than ±1.5%; when loading is <50kg, the error is not more than ±1.5%.
- Stability- When the supporting base is levelled, foot level and surface level is ≤2mm, no shaking should be experienced during operation. Supporting base tilted angle is <10º.
- Centre of pressure test- Device is equipped with a quick-reacting centre of pressure trajectory function.

AnkleMotus™ M1-A - Ankle Joint Rehabilitation Robotic

Core Technical Specification

*Implementing force feedback into ankle joint functional training. High sensitivity force sensor ensures timely and accurate force feedback. The range of the torque sensor is 0-100Nm, the sensitivity of the sensor is 1.5mV /V, the feedback value can be displayed in real-time, and the training parameters can be adjusted.

*The motion control board adopts the high-speed computing chip of NVM technology and ART accelerator, which can simulate the mechanical effects of different dampers and different masses.

*Multiple 3D and 2D interactive experience scenes are provided, including visual, auditory and haptic feedback training. The training process is interesting and immersive, and the network database can be updated.

Other Technical Specification

- Adjustable moving speed of 0-40rpm, control precision of 0.1°.
- Adjustable Range of Motion: dorsiflex 0~30°， plantarflex 0~50°.
- Under the condition of networking, the network database can be published to facilitate multi-centre cooperation.
- Nominal Voltage: AC220V， 50/60Hz; Nominal Power:200W
- Mobile trolley, integrated operation display terminal, real-time display of 3D scene.

- Device Dimension: 430mm*533mm*363mm
- Control Method: combine full servomotor control and computer control, training duration, range of motion and moving speed can be manipulated.
- Safety Protection: provide spasticity sensitivity test. The device will stop moving when it detects the user's spasticity
- Floating-point arithmetic processors to support high-speed and complex motion control algorithms.
- Powerful database management, which can record every user data created under each therapist. All data can be checked, created, deleted and modified.
- The report will record the user's training performance and related kinematics parameters. Besides, the report can be accessed and printed at any time after training.
- The software reserves multiple interfaces, such as EMG signal and EEG signal interface, to expand the function of the device.
- Internal signal transmitting: It is quick reacting, far transmitting and highly resistant to magnetic disturbance. Able to work under an environment with loud noise.

WristMotus™ M1-W - Wrist Joint Rehabilitation Robotic

Core Technical Specification

*Implementing force feedback into wrist joint functional training. High sensitivity force sensor ensures timely and accurate force feedback. The range of the torque sensor is 0-100Nm, the sensitivity of the sensor is 1.5mV /V, the feedback value can be displayed in real-time, and the training parameters can be adjusted.

*The motion control board adopts the high-speed computing chip of NVM technology and ART accelerator, which can simulate the mechanical effects of different dampers and different masses.

*Multiple 3D and 2D interactive experience scenes are provided, including visual, auditory and haptic feedback training. The training process is interesting and immersive, and the network database can be updated.

Other Technical Specification

- The adjustable moving speed of 0-40rpm, control precision of 0.1°.
- Adjustable Range of Motion: flexion and extension of wrist joint -80°~70°; ulnar and radial deviation of wrist joint -30°~20°; pronation and supination of forearm -80°~80°.
- A variety of functional accessories can meet the needs of different users. Complementary to upper limb training equipment
- Under the condition of networking, the network database can be published to facilitate multi-centre cooperation.
- Nominal Voltage: AC220V，50/60Hz; Nominal Power:200W

- Professional display screen, integrated operation display terminal, adjustable screen angle 0-180° to meet the training needs of different angles.
- Device Dimension: 430mm*533mm*363mm
- Control Method: combine full servomotor control and computer control, training duration, range of motion and moving speed can be manipulated.
- Safety Protection: provide spasticity sensitivity test. The device will stop moving when detects the user's spasticity
- Floating-point arithmetic processors to support high-speed and complex motion control algorithms.
- Powerful database management, which can record every user data created under each therapist. All data can be checked, created, deleted and modified.
- The report will record the user's training performance and related kinematics parameters. Besides, the report can be accessed and printed at any time after training.
- The software reserves multiple interfaces, such as EMG signal and EEG signal interface, to expand the function of the device.
- Internal signal transmitting: It is quick reacting, far transmitting and highly resistant to magnetic disturbance. Able to work under environment with loud noise.

ExoMotus™ - Lower Limb Exoskeleton Rehabilitation Robotic

Core Technical Specification

Product Features

- Unique Force Feedback Technology

The force sensor installed in the calf strap and foot can collect the interaction force between the user and the exoskeleton in real-time. Based on these data, the exoskeleton device can realise real-time assistance through an internal algorithm.

- User-friendly wearable design

The mechanical design of the exoskeleton is based on human kinematics and meets the gait requirements of normal people. The size of the leg, hip and knee of the exoskeleton is adjustable, suitable for different people

- Intelligent wireless communication

The parameters of the exoskeleton can be adjusted according to the user's condition through the smartwatch, including the step height, step length, walking speed, sitting posture, standing posture and walking pattern, etc.

Exoskeleton Open Platform System

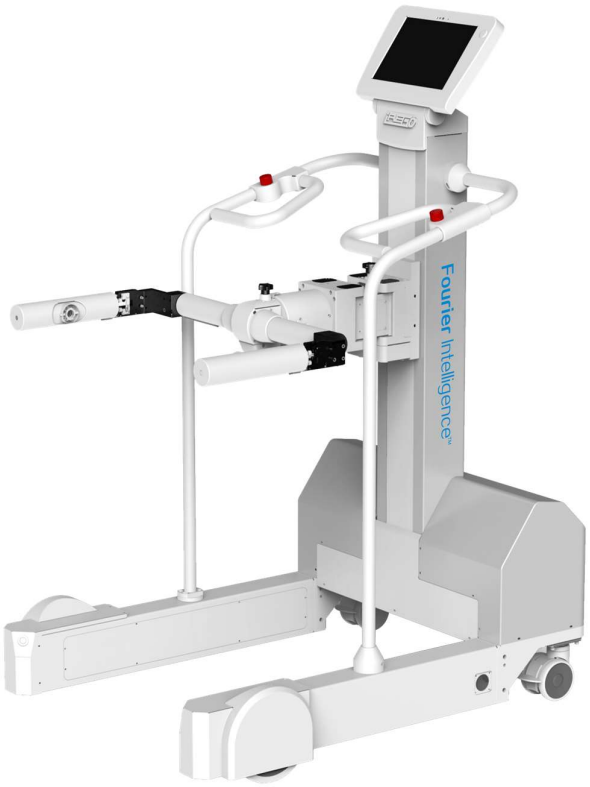
- The operating platform of the exoskeleton system is open to the public. Users can use the SDK provided by Fourier Intelligence to access the underlying functions of the system and carry out secondary development of the system. This can help users save research and development time, economic cost, and so on.

Technical Specification

- Both hips and knees have one active degree of freedom, and both ankles have one passive degree of freedom
- Battery pack: Material--Li-Ion, voltage--48 V DC, capacitance--no less than 3 AH, continuous operation--no less than 3 hours.
- The total weight does not exceed 20 kg
- Adjustable hip joint movement -40º - 120º; adjustable knee joint movement -100º - 0º; adjustable ankle joint movement -30°-30°.
- Operation Temperature: 0°C -40°C; Storage Temperature: -10°-55°.
- Motor: brushless DC servo motor, torque-319mNm, voltage/power-48V/100W
- Sensors on the soles of the feet:
  Rated Load 0 Kg- 100Kg;
  Integrated accuracy 0.1% (linearity, lag, repeatability);
  Sensitivity 1.0-2.0mV/V.
- Sensor on the leg:
  Rated Load 0 Kg- 30Kg;
  Integrated accuracy 0.05% (linearity, lag, repeatability);
  Sensitivity 1.5mV/V.
- SDK: open SDK interface, users can independently control the motor and collect sensor values.
- The software reserves multiple interfaces, such as EMG signal and EEG signal interface to expand the function of the device. Ethernet interface support CAN network communication and C# function development.
- Supported programming language: C++, C#, Python, LabView, MATLAB
- Development environment: Visual Studio, PyCharm, LabView, MATLAB
- Technical function: motor control of exoskeleton, read sensor data, motor state feedback
- Training function: standing, sitting and walking training.
- Hand controller: controls the sitting, standing, walking and stopping of the exoskeleton.
  The exoskeleton can communicate with the exoskeleton through the smartwatch, and control the exoskeleton robot to walk, sit, stand and stop, as well as store the training parameters.

- Use the smartwatch to adjust the gait parameters according to the user's condition, including the gait length, gait height, gait speed and joint angle.
- Size of adjustable parts:
  thigh length 370mm-400mm;
  shank length 350mm-400mm;
  knee circumference adjustment;
  Hip width adjustment: 285mm-390mm
  The adjustable part of exoskeleton has dimension mark to ensure the accuracy of dimension adjustment.
- Emergency stop: In case of any problem, press the emergency stop button to cut off all power supply, to ensure the safety of users.
- Joint limitation protection mechanism: ensure that the user will not be hurt by excessive rotation of the joint motor during use.

GaitMotus™ iReGo - Intelligent Weight Reduction Walking Robotic



Core Technical Specification

- Dynamic weight reduction can be carried out through force feedback technology. The weight reduction range is 0-30 kg. It can automatically follow the user to walk.
- The equipment can follow the patient's centre of gravity to complete the sitting, dynamic balance and walking training.
- Provide a variety of 3D and 2D interactive experience scenes. And the training process is fun and immersive.

Other Technical Specification

- The height of weight-reducing frame is 180-220cm.
- The weight of the equipment is 150kg, and the maximum bearing capacity is 400kg.
- Multiple safety measures: the equipment is equipped with double-side emergency stop switch, weight reduction binding, anti-fall mechanism and other safety guarantees.
- Weight reducing frame base specification: length * width: 123*77cm, can meet the minimum size under the maximum bearing, and width < 90cm.The

height range of the upper handrail is 873~1140mm, and the height of the lower handrail is 600mm.

- The tilt angle of the display can be adjusted from 45° to 135°, which can meet the optimal height for station training and sitting training.
- Control method: combine full servomotor control and computer control, training duration, range of motion and moving speed can be manipulated.
- Extensive application scenarios: it can be combined with a wheelchair, treatment bed, treadmill, orthopaedic apparatus and exoskeleton robot for training.
- Dynamic weight reduction can be achieved by following the centre of gravity during walking.
- Powerful database management, which can record every user data created under each therapist. All data can be checked, created, deleted and modified.
- Mechanical structure: movable dynamic weight reduction frame which is durable and resistant to heavy load.

CycleMotus™ A4 - Active and Passive Training Equipment for Upper and Lower Limbs

Core Technical Specification

*Display the statistics of training process parameters such as exercise mileage, exercise time and energy consumption, provide real-time feedback of training data, and the training results can be quantified, evaluated and reported for output.

*Simple switch between active, passive and resistive of the upper limb; Multi-angle and multi-dimensional training mode for upper limb (horizontal training,

vertical cross-training, vertical horizontal training).

*Able to detect spasticity intelligently and relieve spasticity automatically (identify spasticity and automatically reverse to prevent joint muscle injury); spasticity sensitivity can be divided into three levels: high, medium and low.

Other Technical Specification

- Equipped with emergency stop button
- Equipped with a 10-inch touch screen working desk. A variety of built-in games. Able to interact with users in active mode.
- Adjustable pedal support
- Real-time RPM settings. Reverse setting to zero, and slowly accelerate to set RPM.
- Self-checked function on every start-up to check for any possible error and show it on the monitor.
- Program update function. Program update can be done automatically through the USB disk, convenient and fast.
- Resistant mode current sampling. Allowing resistance control to be more stable.
- Resistance：During active training，resistance settings range between 0-20 units.
- Maximum power: maximum power of 10Nm in passive training mode.
- Revolutions per minute (RPM): Upper and lower limb RPM is 5-60rpm during passive training.
- Time settings: Range between 0 – 99min.
- Rotation angle: horizontal: 180°, vertical: 90° (upper limb)

CycleMotus™ B2L - Bedside Active and Passive Training Equipment for Upper and Lower Limbs

Core Technical Specification

*Applicable to a wide range of people. Help many early bedside patients with active and passive training

* Personalised prescription, parameter (resistance, power, training) setting function, and voice prompt function;

* It can detect spasticity intelligently and relieve spasticity automatically (identify spasticity and turn back automatically to prevent the injury of muscles) and the spasticity sensitivity can be adjusted, with three modes of high, medium and

low.

* Quantifiable rehabilitation training process, including real-time movement distance, movement time and energy consumption.

Other Technical Specification

- Equipped with emergency stop button
- Bilateral symmetry training function of upper or lower limbs;
- Equipped with a 10-inch touch screen working desk. A variety of built-in games. Able to interact with users in active mode.
- Adjustable pedal support
- Real-time RPM settings. Reverse setting to zero, and slowly accelerate to set RPM.
- Self-checked function on every start-up to check for any possible error and show it on the monitor.
- Program update function. Program update can be done automatically through the USB disk, convenient and fast.
- Resistant mode current sampling. Allowing resistance control to be more stable.
- Resistance：During active training，resistance settings range between 0-20 units.
- Resistance：During active training，resistance settings range between 0-20 units.
- Maximum power: maximum power of 10Nm in passive training mode.
- Revolutions per minute (RPM): Upper and lower limb RPM is 5-60rpm during passive training. Soft, harmonious and low noise when running.
- Time settings: Range between 0 – 99min.
- Rotation angle: horizontal: 180°, vertical: 90° (upper limb)

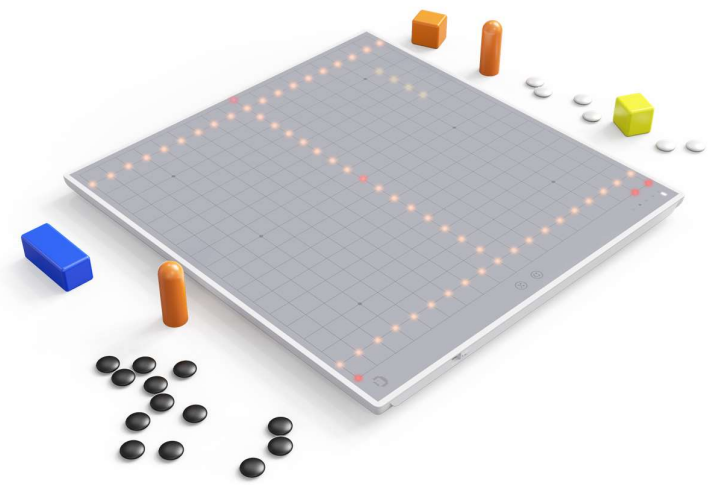
HandyRehab™ - Hand Function Rehabilitation Robotic

Technical Specification

- Multiple training modes including passive training, assistive training, mirror therapy training. Training report will be generated and saved after each training.
- Acquired 8 individual motors in one hand and each of them has a motor power of approximately 3-4 kg.
- Multiple Hand function training including opening and closing of the hand, ball grasping, glass grasping, pen holding, pinching, document holding, cell phone holding, etc.
- Each hand acquired 8 freedom of movements. Range of motion (ROM) of each joint can be adjusted. ROM of proximal interphalangeal joint is 0º-75º while ROM of metacarpophalangeal joint is 0º-80º.
- 6 different functional training can be allocated into one training session in order to suit the diverse training needs of patients
- Device dimensions: Length: 230mm, width: 165mm, height: 130mm.
- Two palm sizes are available which are medium and large. Length" 170mm- 200mm, width 75mm- 85mm.
- Device is made of ABS and polyoxymethylene which makes it durable, portable and weigh only 380g.
- Software supports EMG signal detector which detects the patient's EMG signal of their flexors and extensors.
- Support 3.5V lithium battery which can last for 1 to 3 hours after fully charged.

- Adopted Bluetooth 4.0 wireless connection.
- Support user’s information database. Provide access to create, search and modify user’s information.
- System will generate report for each training comprising training score and other parameters. These reports can be acquired at any time.
- Software support two languages including English and traditional mandarin.
- Operating environment: a) Temperature: 5ºC- 40ºC b) Humidity: ≤80%RH c) Atmospheric pressure: 70kPa- 106kPa.
- Storage environment: a) Temperature: -15ºC- 55ºC b) Humidity: ≤90%RH c) Atmospheric pressure: 70kPa- 106kPa.

OTParvos™ - Digital OT Training System



Technical Specification

- Provide mind games and training for eye and hand co-ordinations by implementing magnetic sensors, LED array, dynamic control algorithm and AI technologies.
- Multiple training options that train on upper limb motor function, fine fingers movement, eye and hand coordination, cognitive function, etc.
- Multiple accessories (such as sticks, blocks, computer mouse-like object, chess pieces, etc) are provided in order to training on power squeeze grip, opposition, precision gripping, etc.
- Fulfil different training goals such as ball power squeeze gripping, ball precision gripping, cylindrical grip, pinching and finger scissoring.
- Multiple games (such as Ping pong, Cartoon, Gomoku, Go chess) are provided. The gaming parameters are adjustable to adapt to the desired training difficulty.
- Support man-man and man-AI training mode.
- When connected to WiFi, the system will go online and able to share data and training information.
- Provide sound and visual input towards the user in order to achieve a more abundant training experience.
- Game library and training features can be added through a firmware upgrade.
- Number of cells: 19 X 19 = 361
- Training platform surface dimension ≥ 42mm X 42mm

- Device dimensions: 463mm X 438mm X 50mm
- Packaging dimensions: 495mm X 495mm X 80mm
- Weight: Clean weight: 2.2kg, gross weight: 3.5kg
- Operating environment: a) Rated voltage: 5V (USB Type-C Input) Tb) temperature: 5ºC- 40ºC c) Humidity: <80%

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