



# SINFONIA

Sinfonia is the most advanced device for functional hand rehabilitation, equipped with a robotic glove able to mobilize fingers, detect patient's active movements and perform mirror bimanual training.

SENSORIZED GLOVE  
ON FINGERS ACTIVELY  
MOVED BY THE PATIENT

ROBOTIC GLOVE ON THE  
HAND WITH MOTOR DEFICIT





**SINFONIA** robotic glove can work in different modes:

- **BIMANUAL MIRROR TRAINING:** thanks to Sinfonia, even the hemiplegic patient can actively guide the exercise. The movements of his 'healthy' hand are recognized by the device and reproduced on the contralateral limb through the robotic glove.
- **PASSIVE:** finger flexion and extension are generated by the robotic glove according to customizable parameters. Mobilization is supported by multi-sensory stimulation (3D animation, sound effects, musical accompaniment, voice guidance, interaction with objects) to ensure patient involvement and to extend the cortical areas reached by neuroplasticity mechanisms.
- **ACTIVE-ASSISTED:** proposed exercises require the patient to initiate a motor task autonomously; the robotic glove follows the patient's activity and the motorized system intervenes to help only when necessary. Performance indicators give immediate feedback on the patient's degree of autonomy in flexion and extension.
- **ACTIVE:** Serious games motivate the patient to do his best to exploit his distal active ROM. Exercises train fist closing, hand opening, single finger flexion-extension, and tridigital pinch. Intuitive graphs at the end of the exercise show the patient and therapist the recorded trend, session after session.

#### Main features:

- Finger **flexion and extension** are dynamically activated by the patient, to increase his degree of involvement and motivation.
- The **cortical areas stimulation** is amplified by the mirror mechanism, by observing the 3D hands in movement and by performing serious games and functional tasks with real objects.
- Compared to traditional **Mirror Therapy**, Sinfonia enables one to go beyond the movement illusion: real motor training can be generated by the robotic glove on the hand with a motor deficit, increasing the rehabilitation potential.

#### ▪ THERAPIST-DRIVEN MOBILIZATION:

Sinfonia allows the therapist to wear a glove endowed with sensors to **dynamically guide** the movement of the passive mobilization glove on the patient's hand.

Timing and amplitude of finger flexion and extension movements are therefore managed by the operator in real-time, allowing the therapy to be constantly customized, depending on the patient's response and specific motor task proposed.

The master-slave logic application amplifies the rehabilitation glove potential, synergizing with the relationship of trust and complicity between therapist and patient.



- According to the logic of **Action-Observation Therapy**, exercises with Sinfonia can require the observation of a motor task video before the exercise itself is performed. The software includes a wide range of videos: from single-joint movements to more complex actions.
- The operator creativity is maximized, allowing the execution of **grasping and reaching exercises with real objects**, often taken from everyday life and professional environment.

CLINICAL EFFICACY  
PROVEN BY SCIENTIFIC  
PUBLICATIONS

ON THE MARKET  
SINCE 2011

INTERNATIONAL  
PARTNERS

MORE THAN 10,000  
PATIENTS TREATED  
EVERY YEAR

MADE IN ITALY

## GLOREHA SOFTWARE

Involves the patient with audio and visual effects, 3D movement simulations, engaging, challenging, and fun serious games



Provides feedback on the patient's performance and stores all therapies



Enables the therapist to upload new videos to be shown as preview and tutorial before the motor exercise



Allows customizing the exercises, adapting to the peculiarities of each patient from time to time



Guides the patient through customizable vocal messages



# CLINICAL REFERENCES



**Dr. Luciano Bissolotti**  
Domus Salutis Rehabilitation Center  
Italy

“ I had the opportunity to realize how much the robotics, in particular Gloreha, was able to quickly act to the mutual satisfaction of the clinician and the patient. In particular, within a few sessions, it was immediately possible to record a reduction in focal spasticity with a significant reduction in the Ashworth scale values ”



**Dr. Franco Molteni**  
Villa Beretta Rehabilitation Center  
Italy

“ The movement is experienced, imagined and perceived by the patient, thanks to the execution of activities the glove makes possible ”



**Ulrich Thiel**  
Hellmuth & Thiel Praxis  
Germany

“ Gloreha glove offers the patient the possibility to feel the object, grasp it autonomously and to benefit of a high quality proprioception stimulation ”

**Tatiana Jeglic**  
Center Fizioterapije Ljubljana  
Slovenia



“ I chose Gloreha because it allows the patients to really feel and manipulate the objects, and also bimanual or bilateral activities. We can really improve their ability to perform their daily life activities in better quality of movement ”



**MULTIDISCIPLINARY  
REHABILITATION  
PROJECT**



**GLOREHA DEVICES  
FOR ALL PHASES  
OF REHABILITATION**



**GLOREHA IS AGELESS:  
CHILDREN AND ADULTS**



**COMBINED FUNCTIONAL,  
COGNITIVE AND MOTOR  
REHABILITATION**

Stay up-to-date on our news

[www.gloreha.com](http://www.gloreha.com)



## Clinical indications

Gloreha devices are extensively used on neurologic patients with motor and/or cognitive deficits. They can be effectively applied in sub-acute as well as in chronic phase to support distal, proximal, functional and cognitive recovery.

The most frequent indications are: Stroke, Traumatic Brain Injury, Spinal Cord Injury, Cerebral Palsy, Parkinson's Disease, Peripheral Neuropathies, Neurodevelopmental Disorders.

Gloreha devices can also be useful supports in the treatment of patients with **musculoskeletal disorders** and in the post-operative stage.

“According to recent literature, the hand rehabilitation program with Gloreha provides an intensive, repetitive, functional, task oriented, specific, and customizable treatment. [...]

The exercises with devices work on plasticity in the central nervous system due to the neuromotor, audiovisual feedback: the multisensory action-observation system enables patients to re-learn impaired motor function through the activation of internal action-related representations. [...]

Our results showed a great improvement on the ADL and positively marked functional recovery of motor function. An important aspect of our study was the association of robotic therapy with the traditional rehabilitation-based approach of physiotherapy and OT to provide more full and intensive sessions to improve the outcome.

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Milia P, Peccini MC, De Salvo F, Sfaldaroli A, Grelli C, Lucchesi G, et al. Rehabilitation with robotic glove (Gloreha) in poststroke patients. Digit Med 2019;5:62-7

“

Robot-assisted training using the Gloreha device demonstrated beneficial effects on body structure and function, including upper extremity motor function, brachioradialis muscle recruitment, and coordination, in children with Cerebral Palsy. The beneficial effects were maintained 1 month after training termination.

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Kuo FL, Lee HC, Hsiao HY, Lin JC. Robotic-assisted hand therapy for improvement of hand function in children with cerebral palsy: a case series study. Eur J Phys Rehabil Med. 2020 Apr;56(2):237-242. doi: 10.23736/S1973-9087.20.05926-2. Epub 2020 Jan 14. PMID: 31939267.

“

Gloreha glove is feasible and effective in recovering fine manual dexterity and strength and reducing arm disability in sub-acute hemiplegic patients. [...] Patients in the treatment group significantly improved the motor function of the paretic upper limb (Motricity Index), their coordination and mono-manual dexterity (Nine Hole Peg Test) and strength (Grip and Pinch) in contrast to controls, and the cost savings was considerable.

”

Vanoglio F, Bernocchi P, Mulè C, Garofali F, Mora C, Taveggia G, Scalvini S, Luisa A. Feasibility and efficacy of a robotic device for hand rehabilitation in hemiplegic stroke patients: a randomized pilot controlled study. Clin Rehabil. 2017 Mar;31(3):351-360. doi: 10.1177/0269215516642606. Epub 2016 Jul 10. PMID: 27056250.

## Clinical benefits

- Maintenance and improvement of the joint range
- Proprioceptive stimulation
- Improvement of visual-spatial and attentive skills
- Increase in functional independence
- Reduction of pain, oedema and hypertonia
- Prevention of adhesions, contractures, and immobilization damages
- Improvement of joint metabolism, lymphatic and blood circulation
- Maintenance of functional skills and body perception
- Increase in coordination and dexterity
- Increase in grip and pinch strength







**IDROGENET SRL**  
Via Monsuello, 246  
25065 Lumezzane (BS) ITALY  
Phone/Fax +39.030.871932  
[info@gloreha.com](mailto:info@gloreha.com)  
[www.gloreha.com](http://www.gloreha.com)

