BACKGROUND

° **Stroke** and other neurological conditions affect the population of infants in percentages that cannot be considered marginal.

° **Preterm infants** are the infants at highest risk for **neurological damage**.

	Where?	How often?
Traditional rehabilitation sessions	Rehabilitation centres	Few times a week
CareToy	At home	Every day, more times a day

° Reduce the cost of entire European Healthcare System
° Increase the efficacy of rehabilitation

Intensive and multiaxial intervention

To promote **early intervention** in the first year of life and to **reinforce therapy** by "CareToy": a portable low cost smart system telemonitored.

AIM

Expected Results

1° The CareToy system, obtained by integrating the developed modules, will be able to extract ***fundamental parameters*** during infants' ***rehabilitation therapy*** in a reliable and accurate way, elaborate these multi-parametric data and to communicate with remote rehabilitation centres.

2° Validate the system as a tool for early intervention of preterm infants with brain injuries such as perinatal stroke.

3° Plans for exploitation: specific ideas and purposive plans for industrialization will emerge.

The Consortium

Scuola Superiore Sant'Anna (Italy)

IRCCS Fondazione Stella Maris (Italy)

Fonden for Helene Elsass Center (Denmark)

University of Ljubljana
Univerza v Ljubljani (Slovenia)

Universität Hamburg
DER FORSCHUNG | DER LEHRE | DER BILDUNG
Universitaet Hamburg (Germany)

MR&D S.p.a.
Innovation partner
Marketing Research & Development SPA (Italy)

STMicroelectronics srl (Italy)

Project Information

THE BIOROBOTICS INSTITUTE
Scuola Superiore Sant'Anna

Project coordinator:
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@Health Better Healthcare for Europe
European Commission

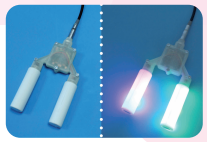
CareToy

A MODULAR SMART SYSTEM FOR INFANTS' REHABILITATION AT HOME BASED ON MECHATRONIC TOYS

www.caretoy.eu

SENSORIZED TOYS

One of the main aims of the CareToy H is to promote **manipulation capabilities**, thus we designed a kit of sensorized toys in order to induce an effective grasping in a "spontaneous" way while measuring different parameters (e.g. pressure, force, movements).



° MICKEY

° STICK

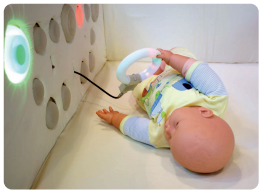
° FLOWER

° RING

° U-TOY

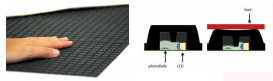
FEEDBACK WALLS

The sensorized mat is surrounded - around its two lateral sides - by feedback walls. Each wall has a size of about 90 cm x 40 cm and can provide **audio-visual stimuli** thus they are attractive and stimulating for the infants.



SENSORIZED MAT

The sensorized mat has the aim to detect the **posture** and the movement of the infants during the rehabilitation session.



Scuola Superiore Sant'Anna
patent application n.PI2011A000091

SCREEN WALL

The frontal wall is provided by **screens** that can show moving pictures (animations) with and without sounds that switch on and off.

BELT WALL

The belt wall completes the structure with an adjustable pillow in order to allow sitting posture. This soft pillow is equipped with a **switch** and a belt for allowing the infant to sit by laying his/her back against the wall.

ARCHED GYM

The arched gym is a structure that can be placed in the CareToy H where toys can be hanged in the three points of interest. Twelve different **orange lights** are embedded into the arch that progressively switch on and off from one side to the middle and/or to the other side.

The proposed PLATFORMS

Telerehabilitation Station

Remotely communication with the rehabilitation staff for monitoring and assessing the rehabilitation techniques

internet

Hospital or Rehabilitation centres

CareToy C - 2 units

For clinical assessment

The fundamental building modules of the CareToy C are:

- **vision module (composed by five screens for visual stimulation)**
- **commercial eye tracker**
- **infant-seat**
- **kit of sensorized toys**

GYM Module

CareToy H is composed by:

- **kit of sensorized toys**
- **sensorized mat module**
- **interactive walls**
- **arched gym**
- **camera**
- **wearable sensors**
- **telerehabilitation module**

Telerehabilitation Module

CareToy interface

Infant's parent

CareToy system at infant's home for the intervention process

CareToy H - 6 units

WEARABLE SENSORS

In order to get some informations about the arms and trunk movements the University of Ljubljana (CareToy partner) developed **wireless magneto-inertial wearable devices** designed as bracelets and chest strap.