



Mirò is an easy to use and inexpensive assistive technology device and tool that allows people with disabilities, paralyzed or merely limited in their movements due to age, to perform normal daily activities autonomously. Communication is an essential component of a good quality of life and allows everyone to have a social behavior, resulting in an active role in the family and social environment. Miro allows everyone to use the computer, communicate, control household appliances, save energy, and survey the house in one word self-autonomy.

Miro is a unique tool capable of satisfying the needs of a person who have limited mobility, visual or hearing impairment and in general any communication problems.

Current technology provides us with many electronic and informatics tools that properly used and implemented provide simple solutions aimed to make people as independent as possible. The actual limitation is the presence of a great variety of devices, mostly very expensive that can satisfy only a few with single and limited needs.

Miro is a unique and innovative device that incorporates many systems with the state of the art technology:

- 1) Eye tracker to control the computer.
- 2) Alphabetical, Symbolic and Scanning communicator to assist the communication.
- 3) Digital Controller for implementation of home automation control (domotics).
- 4) Voice assistant to control and manage all commands.
- 5) Internet interface connections facilitated for Smartphone, Tablet Android, and iOS.
- 6) Gesture Motion for the recognition of hand movements and command control.

Miro integrates all this and makes it simple and accessible to all.

1) Eye tracker to control the computer

People with severe speech, language or neuromuscular disorders or in the event of absolute impossibility of movement can use as an augmentative communication controller this specific device consisting of optical sensors and infrared illuminators that intercept the movement of the eye allowing the user to interact and enhance the computer accessibility with the speed, power and accuracy of a gaze interaction with the computer software. The facilitated commands on the screen and the system of electronic actuators for home automation control ensure the interaction with whom and what surrounds them.

Numerous progress have been made by technology of eye control "eye tracking" allowing today to have high quality at affordable prices.



The optical sensor with high resolution and infrared illuminators can work at frequencies similar to those of natural light to do not damage or offend the eyes.

Another important element is the possibility to use a laptop computer with large screens, batteries for outdoor use, touch-screen and especially very fast processors, Full-HD video cards, DDR3 Ram memories.

2) Alphabetical, Symbolic and Scanning Communicator to assist intercommunication

Miro integrates a powerful engine of facilitated expressions that respond to the requirements in order of priority and importance of the users demand.

The communicator has the objective to compose words and sentences, which may be selected by the user by exploiting images, visual or vocal cues.

The text composition software and the vocal synthesizer complete the functionality of system allowing it a maximum flexibility.

The distinctive fields of disability to which the product is intended, must also lead to a diversified usage of the product with different scenarios.

The standard scenarios envisaged are:

- Fixed workstation for home, office or an indoor environment.
- Semi- fixed Workstation for school or at an external use.
- Mobile Workstation for outdoors environments store, bank, post office, in a garden, etc.

The user individual requirements lead to the final configuration of the product in a distinctive mode and it is up to the medical and paramedical staff involved in the treatment to select and prepare it in a simple, personalized and intuitive final configuration.

In order to get a better picture of the specific potential of the system Miro, is possible to hypothesize some of the countless case studies:

a) A situation of a school age child visually impaired:

Requires a system that can be controlled and interact with voice commands allowing him a faster learning and the possibility to read texts, magazines, etc.

b) A situation of an elderly adult with hearing impairments:

Requires a device equipped with vocal synthesis and speech recognition to replace its hearing that allows him to read what other people say and write what he wants to say to others. This



device has been designed to grant these individuals to use the phone normally by making and receiving voice calls and reach out other in autonomy.

c) In the situation of a child hindered to express and with difficulties to relate with others, struggle to interact and express themselves: Need a voice communicator thorough images that suggest the words that describe its needs with the use of images and, in severe cases, is equipped with speech synthesizer.

d) Another situation are patients with mobility impairments with several degrees of severity:

The Need of a digital controller that allows him to interact with people and its surrounding space. In the case of severe paralysis, the eye tracker devise combined with the symbolic multiple-choice communicator or the scanning of images on time; facilitate the straightforward communication and interaction with others.

3) Digital Controller to implement the functions of home automation control

Persons with mobility impairments who need assistance more or less in a continuous basis. Perform simple every day actions can often become insurmountable obstacles or waivers.

Miro with its digital controller enables and interprets their needs interacting with the surrounding world.

A lot has be done: starting from the television remote control, passing through distant opening of a window or starting the heating, to arrive to be able to make a phone call send emails and text messages, control their physical environment ,create artwork, play computer games stay in touch with family and friends on Facebook or Skype . All of this are operation that today can and should be accessible to all.

Miro provides a software and hardware interface for home automation control, capable to activate through electronic actuators connected by Ethernet conveyed waves. This Ethernet network implemented by using the standard home electrical system and all the remote devices interfaced according to an X10 protocol. A person with reduced mobility can with the same tool adjust the inclination of the bed, call a friend or trigger an alarm by controlling their physical environment in autonomy.

4) Voice assistant to manage all commands

The voice assistant allows the user to send commands to the computer with the voice. Its task is to capture the intention in a word and activate the proper command. A word can activate either a simple or a very complex request without making a difference.



For maximum safety in the execution of commands, Miro accepts the voice commands but requests confirmation each time to be sure it has understood correctly and, in the case of delicate operations may require the pronunciation of a specific password.

5) Internet Interface to facilitate connections with Smartphone, Android tablet, iOS

The solution provides a web interface and specific native apps in Android systems and iOS. These apps allow the control of lights and electrical devices at home or even remoteness as if you were at home.

For example if the doorbell rings, your phone receives the notification and you can answer and talk to the person who rang the intercom at your front door. You can view him through the camera placed on the gate, and open the gate or door. Everything implemented by the adoption of protocols with maximum safety and discretion in full privacy compliance.

6) Gesture Motion for the recognition of hand movements

We designed Miro to have maximum flexibility, therefore provide an input /output, thanks to the multi-modal eye tracker, to the voice assistant commands, the writing, and touch platforms and speech synthesis. Finally, the interpretation of gesture motion for the recognition of movements made with hands as a precise command. All these systems offer the user the possibility to choose the type of interaction that prefers or needs and use within a given operation voice, typing, touch multi-modal touch, etc.



PARTNERS

We are pleased and proud that some Companies, Research Organizations, Institutions and Universities wanted to share and participate to the improvement of this project with us.

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