

EUREKA EUROSTARS PROJECT 8277 HANDINMIND



ROBO HAND

A European consortium found a way for stroke patients to recover dexterity in affected hands and arms.

It's frustrating not being able to hold your own cup of coffee while having a conversation, but that's a daily reality for many people who have had a stroke and lost brain cells from the interruption of the flow of blood to the brain. What if a robotic glove could help grip and lift things while also helping the person practise those tasks, in order to rewire the brain and repair the damage done by the stroke?

Researchers at small Swedish company Bioservo Technologies set out to develop such a glove and, thanks to their partnership with Swiss company Hocoma and Dutch research institute Roessingh Research and Development, produced the first prototypes on Eureka project HandInMind.

Founded in 2006, Bioservo already sold a glove that helped perform tasks called the SEM Glove, which stands for "Soft Extra Muscle", but wanted to develop another that would also help stroke patients with rehabilitation. "Lots of rehabilitation equipment is large and expensive and can't be used at home. We wanted to save people from lots of trips to hospital," explained Bioservo's Development Director Martin Remning Wahlstedt.

For a company of about 15 staff, R&D was a major investment, but, backed by Eureka, Bioservo secured funding from Sweden's VINNOVA. It partnered with Swiss firm Hocoma, which sells mainly large devices for physical therapy and was keen to add smaller products to its catalogue. Roessingh

Research and Development, which focuses research on rehabilitation technology, assessed patients' needs and tested the prototypes developed at rehabilitation clinics.

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Game on

Bioservo added six extra employees to its team, many spending much of their time developing the robotic glove. Tailors at Bioservo designed a grey glove, powered by a battery pack worn around the waist. Sensors embedded in the glove's fabric connected finger movements to moves in computer games.

Hocoma devised games to meet some of the most common therapeutic goals for patients. In one, the player is in a submarine and each finger controls a different tentacle on it to pick up underwater objects. In another, birds sit on different powerlines and the player has to pinch different fingers and their thumb together to stop bugs getting them. "These were playful ways to motivate people to do repetitive movements," explained Lars Lünenburger, Hocoma's chief specialist for core technologies. "People don't want someone holding their arm all the time. This is about empowering them. We regard the therapist's role as moving towards that of a coach."

The developers hit obstacles along the way. Some stroke patients couldn't even put the

first models of the gloves on because they had hypertonia - where muscles stiffen.

Roessingh's senior rehabilitation technology researcher Gerdienke Prange helped oversee focus groups and tests with patients in Sweden and the Netherlands. Over five weeks, some simply wore the gloves to assist them in everyday tasks while others wore the glove during specific rehabilitation exercises and did the games. Remarkably, both groups reported improvements in the way their hand functioned without the glove in tests like pinching, turning cards over or lifting cans onto a platform. "These were really promising results," says Prange.

One of the clever parts of the glove design is that the glove provides resistance so that even while assisting wearers in tasks, it is still helping them train their muscles.

With pressure on health systems as the population ages, the project has demonstrated the huge potential for small devices patients can use at home in daily routines. Bioservo incorporated some of the developments from HandInMind to the launch of a new generation of its assisted glove: Carbonhand. Hocoma is now selling ArmeoSenso, a rehabilitation hand device that works with games on a laptop.

The consortium achieved such tangible results, because all the partners believe technology can revolutionise people's daily lives. "The hours of practice people could do at home on devices like these could never be matched in a rehabilitation centre - not unless health systems could hire eight times the number of therapists," says Prange.

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TOTAL R&D INVESTMENT

€ 1.7 million

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COUNTRIES AND NATIONAL FUNDING BODIES INVOLVED



VINNOVA



RVO



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