

Medical engineering in Italy: SXT – Sistemi per Telemedicina (Lecco)

Made in Lombardy

On the south-eastern shores of Lake Como, a band of young scientists have established a medical engineering business. Their first product is a pocket device that monitors the health of elderly and sick people.



“That branch of the lake of Como, which extends toward the south between two unbroken chains of mountains, comes, almost abruptly, to contract itself and take the course and form of a river [...] Lecco lies not far from the bridge, by the lakeside...and from the heights to the shore, from one hill to the other there ran, and still run, however, lanes and pathways, more or less steep, or level; plunged at times, buried in between two walls, thence, raising your eyes, you discern but a chunk of sky and a few mountain tops...”

Nearly two hundred years after his first draft of the *I Promessi Sposi*, Italian poet and novelist Alessandro Manzoni could still describe Lecco with these exact words, reflecting what you still see today when arriving in the city for the first time. It is in this small and crowded city with its 47,000 residents, located not too far from chaotic Milan, that the SXT (Systems for Telemedicine) company was opened in 2001, designing wearable devices for human health and protection, that can be used in the remote monitoring of clinical research and in telemedicine.

A new research centre with cultural ambitions

In 1987 the Polytechnic of Milan opened the Lecco Campus as a new frontier for interaction between researchers and local companies. Some years ago, in 2001, the University of Milan decided to extend the campus, providing it with new laboratories and technological areas. But while

plans were undertaken to expand the original campus, researchers and students still needed a place to continue their work. So Campus Point was established as a temporary centre, next to picturesque old town buildings, made of deep red industrial containers surrounded by glass windows.

This new transparent landmark was the symbol of a new university research paradigm, open to industry and the city. Cultural events, such as concerts, art exhibitions and talks are often hosted inside Campus Point just to bring the university frameworks and activities into as much in contact as possible with the public. Here, inside the campus, SXT was thrown together with other small companies that had arisen from basic research.

SXT enters the market

This idea arose in 2001, too. It was the brainchild of five young researchers at the Polytechnic of Milan, Giuseppe Andreoni, Luca Piccini, Luca Maggi, Sergio Parini and Guido Panfili, that were already working together on the design of wearable devices that monitor patients' health.

“As the first prototype began to work well, and was ready to be patented,” says Giuseppe Andreoni, principal investigator at SXT, “we perceived the chance of putting in practice our work, introducing these devices in the market”.

When starting their business seriously, the Polytechnic of Milan became a partner of the small band of scientists. Microsys-

(above) The coat of arms of the city of Lecco. (below) Nice view: Lecco and the Lecco branch of Lake Como from the Piansciroia plain of Monte Barro, Lecco's local mountain.

tems S.r.l. from Milan, an electrical engineering company that produces and distributes electronic systems and software for industrial automation and image elaboration, undertook the commitment to support the young SXT founders as a kind of mentor. The young Italians' everyday's job, however, goes on in the Sensibilab laboratory, located inside Campus Point. Here, at Via Ghislanzoni 24, the researchers design and test their wearable devices. For small orders, they build each system, soldering their own electronic components.

But how has the change from pure research to the business world been? Andreoni considers the fact that “being a small company between research and industry is not simple. We would like to save our freedom and independence, as it is typical of a public research centre, but the business has its deadlines. Thus, we decided not to have different roles in the company, but just work together trying to keep our work as much collaborative as possible, and keep ourselves off of the static business hierarchy. Working in a small city, where people can meet and have lunch together, on the lakeside, is something that helps us. It would be really different if we would have to stay in the big and busy Milano!”. This

seems to be the basis of the familiar and personal atmosphere that visitors notice at SXT's premises.

You move, we follow

SXT's main products are wearable systems for telemedicine. "Imagine you're sixty and you have to keep your life parameters constantly monitored: the ECG, the cardiac output, your breathing activity, for example. If you want to use the standards available today, you would have to move around with three big different devices, not so easy to be carried," explains Andreoni.

"What the SXT is working on, are small and wearable polygraphs (the devices Phedra and Dahlia) that could be easily inserted into the pocket of a t-shirt, specifically designed, and that can perform signal processing, onboard data-storage and wireless transmission to an outstation set some kilometres far from you. Here, an operator would keep you supervised and reach you at home if you need medical assistance".

The development of such a system has been possible thanks to the miniaturisation that electronic components have seen in recent years, with their capability of assem-

bling more than one sensor array inside a small box. The polygraphs are also equipped with a keyboard as a user interface.

Moreover, biomedical sensors are rapidly evolving and with new textiles functioning as sensors, a shift towards the telemedicine systems designed by SXT in wearable and "hidden" devices, may become reality in the near future.

Moving frantically from one room to another, Andreoni searches his Phedra prototype to show me its potential. "Here is the t-shirt, here the devices... we just have to connect it wireless to the PC and there you can follow the response graph relative to my movements and parameters. Consider that these systems are much cheaper and easier to handle than the standards, even for inexperienced users. Moreover, a key feature is that the device is small, light and goes completely unnoticed... That is important, if you think that no one wants to share his health personal matters!"

But the potential applications of the SXT polygraphs are not restricted to medical care. Beside their obvious uses for patients with chronic disease, Dahlia and Phedra could also assist the emergency servic-

es, allowing the steady control of firefighters and other rescue units that need to be followed and monitored during tricky situations.

Big Brother is waiting to help

It's an encouraging thought that, in the future, a family doctor will have the option of supervising patients by remote control, without the burden of continuous checkups. But is it really so easy to imagine? Taking a look at the present situation, it seems that a revolution in healthcare is unlikely. The widespread use of wearable systems with wireless transmission implies the existence of a well organised health care system, ready to allocate decentralised workstations for the constant supervision of patients.

Moreover, we would need carefully prepared health care providers that pay special attention to patients' needs and risks. Indeed, in the last few years, Italy and other

Five young entrepreneurs from the Polytechnic of Milan comprise SXT (from left to right): Sergio Parini, Guiseppe Andreoni, Guido Panfilì, Luca Maggi and Luca Piccini.



ropean countries have started to work on a new, more logical structure and the management that this deserves. It is not hard to understand that wireless technology will have a great impact on reducing the cost of hospital stays and healthcare in general. There will be no more need for extended hospitalisations and never-ending queues at the doctor's office, but a comfortable return home with the certainty that someone will be ready to help if you need it.

Well hidden in the Web

"We have already started a collaboration with doctors in hospitals and private clinics," continues Andreoni, "a lot of work still remains to be done, but I am optimistically convinced that things are changing and will be ready to work well".

A major barrier for the young Italian company is the official approval that each device needs, before it can be used for medical applications. Andreoni underlines that, "this is an excruciatingly long process that needs to be made easier."

Something else to do with SXT urgently needs to be made easier, too – and would



Photo: Francesca Ceroni

The futuristic Campus Point is serving as the symbol of a new university research paradigm, bringing the university's activities into contact with the public. Here, SXT was thrown together with other small companies that had arisen from basic research.

be a bagatelle to obtain. At the moment, you don't stand a chance of finding SXT with a Google search. Entering "SXT" links you to the Yohkoh Solar Observatory, to the Sixt Rent-a-car page and to a Wikipedia

entry on the antibiotic sulfamethoxazole.

But *Lab Times* can help. Just enter www.sxt-telemed.it in your browser's address bar, and you'll get straight there.

FRANCESCA CERONI

Lombardian biotech companies

New Blood is Rising

A selection of biotech and medical engineering companies around Milan, mostly under five years old.

Alltox, a spin-off of Science Park Raf (Milan), was founded in 2003. Alltox provides testing on the *in vitro* prediction of allergic sensitisation, maintaining to provide the only test which is validated for the prediction of sensitisation.

Bio3 Research (Milan), founded in 2001, develops drugs for cardiovascular disorders as well as skin and renal diseases. In addition, the company works with research institutions and early-stage companies to identify, patent and merchandise commercially promising projects. *Lab Times* featured the company's founder and president, Francesco Paolo Pilato, in issue 2-2007.

Bioxell (Milan), founded in 2002, develops drugs to treat urological and inflammatory disorders. The company is a spin-off from Roche and employs 58 people. Bioxell's lead compound is in Phase

II clinical trials. In 2006, Bioxell listed its shares on the Swiss Exchange.

Cell Therapeutics (Seattle/USA and Bresso/ITA), founded in 1998, is one of the rare examples of a successful Italian biotech company. The Italian subsidiary was originally named **Novuspharma** and was taken over by Cell Therapeutics in 2003 for about €180 million in stock. The company develops oncology products.

Clonit (Milan), founded in 1987, produces molecular biology diagnostics.

CTG Pharma (Milano), founded in 2004, is an early-stage pharmaceutical company that discovers new chemical entities derived from established drugs.

Ktedogen (Milan) discovers novel microorganisms and the bioactive molecules they produce, with a focus on

anti-infectives with novel structures and unprecedented mechanisms of actions.

Leaf Bioscience (Milan), founded in 2003, provides IT support, bioinformatic software development and consultancy to life science companies.

Need Pharma (Milan), founded in 2004, is engaged in the discovery and development of novel anti-infective drugs.

Sekmed (Milan), founded in 2002, operates on immune system related disorders.

Sulfidris (Milan), founded in 2005, is a spin-off of Milan University focused on the R&D of new drugs for cancer.

Tethis (Milan), founded in 2004, is a nano-biotechnology company that designs and sells nanoparticles.