

HeartCycle

// Compliance and effectiveness in HF and CHD closed-loop management //



ISSUE 2

SEPTEMBER 2010

SPECIAL POINTS OF INTEREST:

- GEx shirts
- New Partners
- Conferences

INSIDE THIS ISSUE:

Welcome	1
Dissemination	1
GEx shirts	2
2 nd Review	3
New Partners	3
Project Details	4
Consortium	4

Welcome to our 2nd newsletter

We have already entered the third year of our project. First development outcomes are now available. The first prototypes for the two HeartCycle systems, the **Heart Failure Management** and the **Guided Exercise** have become available and were demonstrated during the 2nd review. The development of other sensor and software has progressed, whereas a number of publications have been produced. In overall, the 2nd year of the project has been according to plan and all major milestones defined for securing the proper development of the project have been achieved. The HeartCycle consortium has organised special "concept enrichment workshops" to discuss, focus and finally agree on the ultimate definition of the Heart Failure Management (HFM) and Guided Exercise (GEx) concepts. In addition, the process to define the clinical validations has started and sensor development has produced first prototypes ready to be used in clinical environment (pre-trials).

HeartCycle meets experts around the world

With the aim to raise awareness about the project in the clinical community, the HeartCycle consortium has participated and presented their work in many conferences around the world. HeartCycle participated with its own session at the pHHealth 2010 conference providing an excellent opportunity for disseminating the project to scientists from ICT, medical doctors, and policy makers from the healthcare and hospital administration professionals.

The HeartCycle Team, jointly with the European commission, Unit "ICT for Health", organized an exciting programme related to telemonitoring at the Heart Failure Congress 2010 in Berlin, the annual specialist meeting on this topic run by the European Society of Cardiology. A series of symposia dealt systematically with the complex issues surrounding the deployment of telehealth for patients with heart failure. These also informed cardiologists and other stakeholders about the HeartCycle project as well as advances in other devices and technologies for the management of HF.



HeartCycle achievements were also presented in the following conferences:

- ◆ 32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society – EMBC2010 (August 2010 in Argentina)
- ◆ European Society of Cardiology – ESC2010 (August 2010 in Sweden)
- ◆ 12th Mediterranean Conference on Medical and Biological Engineering and Computing – MEDICON 2010 (May 2010 in Greece)
- ◆ German Cardiac Society Meeting – DGK2010 (April 2010 in Germany)
- ◆ 29th Annual Scientific Meeting of the Belgian Society of Cardiology – BSC (January 2010 in Belgium)
- ◆ World of Health IT (March 2010 in Spain)



This work has received funding from the European Community's Seventh Framework Programme under grant agreement n° FP7-216695



GEx shirts

The **Guided exercise (GEx)** system consists of the shirt with embedded electronics, the PDA for the patient, and the NOHMAD platform with multi-parametric analysis and decision support software for the professional. The purpose of the system is to support the patient in his recovering exercises. Development of the GEx shirt has been a challenge. Due to the embedded electronics, it stores the raw data locally and then transmits them together with other extracted features to the PDA during the prescribed exercises.

The GEx shirt, developed by Clothing+, follows the style of a normal sport T-shirt but has two embedded electrodes for ECG lead A-I (heart rate extraction), respiration (breathing rate extraction), and acceleration (posture and activity extraction). The electrodes of the GEx system are easy to snap into place after having dressed the T-shirt. Due to the snaps, the electrodes are also easy to remove, when the shirt needs to be washed. Electrode boxes have small size and skin-friendly surface.

The wireless communication between the IMAGE module and the PDA or the PC used 802.15.4 standard for the prototype at month 24. However, the lack of radio modules compliant with the latter standard interfacing the PDA and the non-availability of a small PDA supporting this standard have led to reconsider the preferred choice; a new version of the IMAGE electrodes using Bluetooth communication instead has been built in order to prepare the final version for the trials.



Male vest; embedded electrodes communicate via Bluetooth with the PDA

The purpose of the garment is to guide the electrodes to the correct position and keep them in place during the monitoring. T-shirts are used while exercising so they

reach for sporty impression. In addition, they are made of sporty material, which means a functional polyester knit, which offers better comfort for the user during sport as it moves the moisture away from the body, but allows air to flow through.

Male vest Female vest

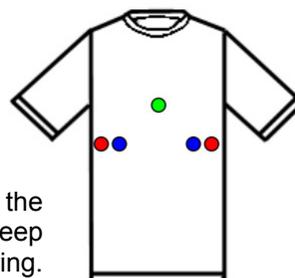


CAD on-body module and electrode placement; electrodes A and I for ECG lead A-I and respiration, electrode A for 3-axis acceleration

Design has been optimized to offer good stay put for the electrodes. To take into account the body differences, female and male users have their own models. Both models exist in seven sizes: S, M, L, XL, 2XL, 3XL and 4XL. Female model has two layers: inside bra and outside shirt. Inside bra includes tight, but soft and adjustable, wide elastic band, which keeps the sensor boxes in good skin contact and allows the outside shirt to be widened to add user comfort.

Male model can be dressed as a vest due to the zipper in front. Sensor boxes are easy to fasten, when the zipper is only partly closed. Elastic belt can be fastened on top of the sensor boxes to guarantee good skin contact despite the body type.

The GEx system will be tested by coronary artery disease patients during the year 2011. Testing will take place at German, Spanish, and British clinics.



Studies for the next generation system have already started. The current GEx system requires the red and blue marked measuring spots; the green spot might be included in the future.



2nd Project Review



The **2nd Annual Review** of the Project was successfully completed in May 2010. The meeting was held in Brussels and was hosted by Philips, on the 18th and 19th of May 2010. All the second year deliverables, demonstrations on sensor development, posters, and the overall project progress were presented. The second review meeting demonstrated that HeartCycle has made progress overall and the team has ensured that previously-raised concerns have been addressed and existing sensors have been improved upon and validated.

Strengthening the Consortium

The HeartCycle consortium has invited three new partners to join the project, whose contributions will strengthen resources and knowledge to manage the research objectives in HeartCycle :

- ◆ National Health Service Lothian from UK who developed the Heart manual; a home-based cardiac programme shown to be effective in a number of randomised control trials. In Britain, it is highlighted and recommended in Scottish Intercollegiate Guideline Network (SIGN) and National Institute of Clinical Excellence (NICE) guidelines. NHS Lothian will provide electronically, educational and motivational material for the rehabilitation and self management of patients with coronary heart disease. In addition, NHS Lothian will advise and support the development and adaptation to the needs of the patient loop.
- ◆ University of Linköping from Sweden; Prof. Tiny Jaarsma is an international expert for patient interactions. She will focus on providing advise on patient communication and collecting additional data for improving the knowledge on self-care behavior and adherence.
- ◆ University Clinics of Heidelberg; Cardiologist Zugck (cardiologist) will participate in the preparation and the operation of the final Heart failure clinical study. He has been active in several worldwide studies in heart failure and disease management programmes via telemedical devices, especially in Germany.



UniversitätsKlinikum Heidelberg

Cardiology Experts form the Advisory Board

The HeartCycle algorithms developed so far have been presented and debated in detail to the medical professionals at the HeartCycle Cardiology expert meeting in Amsterdam in January 2010. It has been a fruitful and productive discussion between the HeartCycle medical experts and the members of the Advisory Board.

From left to right: Prof. Voors, Prof. Cleland, Prof. Zugck, Prof. Dickstein, Dr. Bover



This work has received funding from the European Community's Seventh Framework Programme under grant agreement n° FP7-216695



Project Details

Contact Details

Project Coordinator: Harald Reiter
Address: Philips Research Labs
 Aachen, Germany
Tel.: +49 (0)241 6003 246
Fax.: +49 (0)241 6003 442
E-mail: harald.reiter@philips.com

Full Title: "Compliance and effectiveness in HF and CHD closed-loop management"
Project Identifier: FP7 – 216695
Start Date: 2008-03-01
End Date: 2012-02-29
Duration: 48 months
Contract Type: Collaborative project
Project Cost: 21.99 million euro
Project Funding: 14.1 million euro

Consortium

Industry

Philips (Coordinator) www.philips.nl
 Medtronic Ibérica S.A. www.medtronic.es
 T-Systems ITC Iberia www.t-systems.es

SME's

Clothing+ www.clothingplus.fi
 Empirica www.empirica.biz

Clinics

Clinic Hospital San Carlos www.hcsc.es
 Aachen (RWTH) www.rwth-aachen.de
 NHS Lothian www.nhslothian.scot.nhs.uk

Research Organizations

VTT www.vtt.fi
 ITACA www.itaca.upv.es
 CSEM www.csem.ch

Universities

Aristotle University of Thessaloniki www.auth.gr
 University of Hull www.hull.ac.uk
 FCTUC University of Coimbra www.fct.uc.pt
 Polytechnic University Milano (POLIMI) www.polimi.it
 RWTH Aachen University www.rwth-aachen.de
 Polytechnic University Madrid/LST www.lst.tfo.upm.es
 University of Linköping www.liu.se
 University Clinics of Heidelberg www.heidelberg-university-hospital.com



PHILIPS



Medtronic



CLOTHING+
REDISCOVERING TEXTILES

csem

T-Systems



empirica

NHS
Lothian

RWTH



UniversitätsKlinikum Heidelberg



This work has received funding from the European Community's Seventh Framework Programme under grant agreement n° FP7-216695