

Welcome to the seventh of the six monthly newsletters for the CuPID project.

### Farewell to CuPID

In this 7th and final Newsletter, congratulations go to the CuPID project partners for all they have achieved during the project's lifetime. Thanks for all the hard work, especially to Dr Lorenzo Chiari, University of Bologna (UNIBO), for co-ordinating the project. We would like to thank patients groups and organizations, their input and advice was key to the success of the project.

The first Technical Review saw CuPID making good progress towards achieving its objectives and technical goals; it highlighted the high quality of the documents and reports produced.

The final Technical Review was overall very favourable reporting that the project had achieved most of its objectives and technical aims with good progress made.

We've presented CuPID to conferences, at exhibitions, trade fairs, and contributed to papers; it has featured in articles, and won quite a few prizes along the way. With Consortium meetings across Europe and in all weathers!

### CuPID – our objectives and results!

CuPID started in October 2011 with the ambitious aim of providing personalised rehabilitation exercises for people with Parkinson's disease in their own home through innovative technology. The objectives in our own ID card are to:

- Produce clinical guidelines for developing tailored therapy using technology
- Create a home-based rehabilitation system (wearable sensors and local processing)
- Build a telemedicine infrastructure for remote supervision of the rehabilitation

### Partners:

Università di Bologna (Italy)  
Tel-Aviv Sourasky Medical  
Center (Israel)

Eidgenössische Technische  
Hochschule Zürich  
(Switzerland)

KU Leuven (Belgium)

Oxford Computer Consultants  
(UK)

ST Microelectronics (Italy)

EXEL (Italy)

Fundació Illes Balears  
Innovació Tecnològica (Spain)

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## Closed-loop system for personalized and at-home rehabilitation of people with Parkinson's disease

Issue 07

Page 2

We're proud to say we have achieved all of these and a start-up company is being formed which will take some of results further. But most of all it's about benefit to people with Parkinson's disease. We concentrated on the area with most potential: using closed-loop exercises for the support of walking. Here's an extract from a project report comparing a CuPiD-exercise group with a control group:

"The results showed that overall the primary outcome of the study, gait speed under usual and dual task conditions, improved equally in both groups and were retained after 4 weeks follow-up without training. ... These results are the more notable, considering that total training time was considerably lower in the CuPiD group. This may indicate that the CuPiD smartphone applications had a better training efficiency. Furthermore, the effect sizes of the CuPiD group exceeded these of the RESCUE trial: a large EU-funded study on the effect of cueing.



CuPiD Validation

We conclude that overall CuPiD was successful in developing a clinically useful tool to stimulate walking behaviour, which was at least as effective as conventional physiotherapy input. There are strong indications that CuPiD even offered a small extra benefit currently not statistically confirmed in this phase II study. A notable trend for additional training efficiency with CuPiD was shown for dynamic balance parameters and cognitive function. These benefits are the more striking given the shorter training duration with CuPiD, illustrating that the on-line feedback model provided by CuPiD offered an efficient training modality. Further developments are indicated to CuPiD the system."

### Exploitation and mHealth Technologies Srl

In total, we identified 19 exploitable results from the project including exergames and telemedicine infrastructure. Each of the partners is taking their own results forward, often in co-operation with each other, but the most exciting development is the launch of mHealth Technologies Srl. mHealth Technologies (mHT) is a spin-off company at the University of Bologna specializing in providing clinical support by means of wearable sensors for the monitoring, diagnosis and rehabilitation of posture, gait and motor skills of people with motor disorders. mHT will build directly on the results of CuPiD and extend them and will finalize this tool for home use and conduct large scale trials with.



## Closed-loop system for personalized and at-home rehabilitation of people with Parkinson's disease

Issue 07

Page 3

The vision at mHT is for ICT to promote healthy and active lifestyles and directly involve individuals in the clinical management of their own wellbeing.

The mission of mHT is to uncover the potential of the new generation of wearable sensors, including CuPiD's, that makes them usable anywhere, easy to wear and easy to manage. With these types of sensors mHT will develop high-end applications and personalized services that on the one hand will foster the interchange between citizens of motor performances, experiences and knowledge on health data, while on the other hand will deliver the clinical decision making process into the hands of consumers, with simplicity and the cost of an app.

mHealth Technologies Srl will leverage the following three strategic lines of action:

- prevention, screening and early diagnosis
- service and care
- active ageing and autonomy

Underlying this entrepreneurial idea is an awareness of the direction that innovation should follow in the e-health market and the requirements that technology needs to be able to support this vision.

CuPiD wishes mHT every success!

### Israel Media

CuPiD has recently appeared several times in the Israeli media, including the evening

news on Israel TV channel 1 and articles in Maariv and Yated Neeman newspapers.

### Presentation to Indian Institute of Science Seminar, Bangaluru

Laura Rocchi, University of Bologna, recently presented the CuPiD project to the Robert Bosch Centre for Research in Cyber Physical Systems at the Indian Institute of Science (IISc) in Bangaluru. The Robert Bosch Foundation launched the Robert Bosch Centre at the IISc in 2011. The presentation was given to a combined audience of engineers, PhD students, physicians and neurologists, who all showed great interest in CuPiD.

Laura put forward the suggestion that new neuroscience and clinical approaches are showing evidence that by using the plasticity that is still present in the brain, it is possible to enhance motor learning in PD patients.



Laura Rocchi - University of Bologna

Laura demonstrated the portable device developed by CuPiD which includes MEMS sensors (accelerometers and gyroscopes), real-time data processing and real-time feedback restitution to patients. The device



## Closed-loop system for personalized and at-home rehabilitation of people with Parkinson's disease

Issue 07

Page 4

aims to show that a patient's quality of life can be increased by administering closed-loop rehabilitative exercises in an automatic and reliable manner.

### CuPID the prizewinner

At the IEEE international Conference on Pervasive Computing and Communications in March 2014 members of the CuPID project won Best Demonstration Award for their Gait Assist: A Wearable Assistant for Gait Training and Rehabilitation in Parkinson's Disease.

There has been good feedback from patients using Gait Assist for training and who reported a high level of satisfaction with improvements in walking speed, step length and a 2 minute walk.

### Recent accolades

Alberto Ferrari, University of Bologna, recently participated in a local competition for young researchers and won an award for the Audio-Biofeedback software developed for the CuPID project. Innovators Under 35 Italy is part of a global award by MIT Technology Review that promotes the spread of emerging technologies and analyses their impact from different viewpoints: scientific, commercial, social and political.

### Mobile Health & AAL (Ambient Assistive Technology) Challenge Award

The Mobile Health & AAL App Challenge Award took place at the prestigious international Conference, MobileMed 2014

(Conference on Mobile and Information Technologies in Medicine) in Prague, Czech Republic, in November 2014.

This is a technical competition aimed at students and mHealth StartUps, small SMEs and entrepreneurs developing smartphone apps in the field of Ambient Assistive Technology and applications for mobile health.

The functionality, aim and design of mHealth apps, whose aim is to improve the delivery of healthcare at either the patient, physician or community levels, were judged and evaluated over the two days of the conference.

The first prize (Gold Award) and the Audience Award (a special award voted for by the participants at the conference) went to Alberto Ferrari for the Cupid app: Intelligent tutoring system for gait rehabilitation of persons with Parkinson's disease.



Alberto Ferrari receiving first prize gold award



## Closed-loop system for personalized and at-home rehabilitation of people with Parkinson's disease

Issue 07

Page 5

### Wired Audi Innovation Award

Alberto Ferrari also won first prize for the Wired Audi Innovation Award dedicated to Italian innovators, at Audi City Lab, Milan. This award is promoted by the international magazine, Wired, in partnership with the automobile manufacturer, Audi. Wired magazine is a monthly magazine which specializes in reporting how emerging technologies affect culture, the economy and politics. The Award is given for excellence to the brightest and best talents in Italy with the objective of finding the people and business models that will change the country. The Wired journalists spent all of 2014 searching for candidates to shortlist for the Award. They examined dozens of innovative companies, researchers, and innovators under 35. Their stories were the subject of a special article in the December edition of Wired. The two winners were selected from a shortlist of two hundred.

Alberto is one of two winners in the under 35 category and his Award was specifically for the system that was developed for CuPID.



Alberto Ferrari receiving first prize

### From snow to sun

At the first CuPID consortium meeting in Leuven, Belgium, there was deep snow on the ground which covered most of Europe, and CuPID's Italian partners were missing. The meeting in early 2014 in Majorca was a sunny affair allowing the consortium members to play outdoors.



CuPID Partners in snow and sun

Thank you for your interest in the CuPID project.

**CuPID receives funding from the European Union - Seventh Framework Programme (FP7/2007-2013) under grant agreement n° 288516 (CuPID project)**