Perform Project

A sophisticated multiparametric system for the continuous effective assessment and Monitoring of motor status in parkinson's disease and other neurodegenerative diseases.

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PERFORM PROJECT

Welcome to the 5th issue of the Perform Newsletter! This Newsletter aims to provide the latest information on the Perform Project and disseminate knowledge on related issues. The Perform newsletter is issued periodically to inform you about the latest news in our project. In this fifth issue of the newsletter you can find out more about the results of phase II. Moreover emphasis is given on the correctness and the accuracy of algorithms developed, due to the implementation of the confidence propagation mechanism. You will also find information regarding the implementation of the new device that offers many capabilities and the user friendly application that includes all the internal operations of the unit that will be placed in the patient's house and demonstrates the advanced phase of the algorithms.

We hope you will find this information useful and we encourage you to make suggestions on what you would like to be included in the future releases by sending us an e-mail at : perform@talanton.info

The Perform Project partners are:

SIEMENS, S.A.

MEDTRONIC IBERICA, S.A.

ANCO S.A.

POLITECHNIKA GDANSKA

LOGICOM LTD

THE UNIVERSITY OF WESTMINSTER

PAPASAVAS A.E.

UNIVERSITY OF IOANNINA

PATMOS S.R.L.

UNIVERSIDAD DE NAVARRA

TALANTON A.E.

Universidad Politecnica de Madrid

OXFORD COMPUTER CONSULTANTS LIMITED

Centro de Estudios e Investigaciones Técnicas de Gipuzkoa

Kingston Computer Consultancy Limited

Confidence Propagation Mechanism

Empahsis given on the correctness and accuracy of the algorithms implemented and for this reason a confidence propagation mechanism is developed. The Local Base Unit is one of the three subsystems of the PERFORM platform, responsible for the processing of the raw signals coming from testing and wearable devices and the identification and quantification of motor symptoms or the UPDRS evaluation of the patient.The algorithms provide highly accurate classification results even when less data are provided as an input (data from fewer sensors). Similarly, the events identification algorithms are developed too.

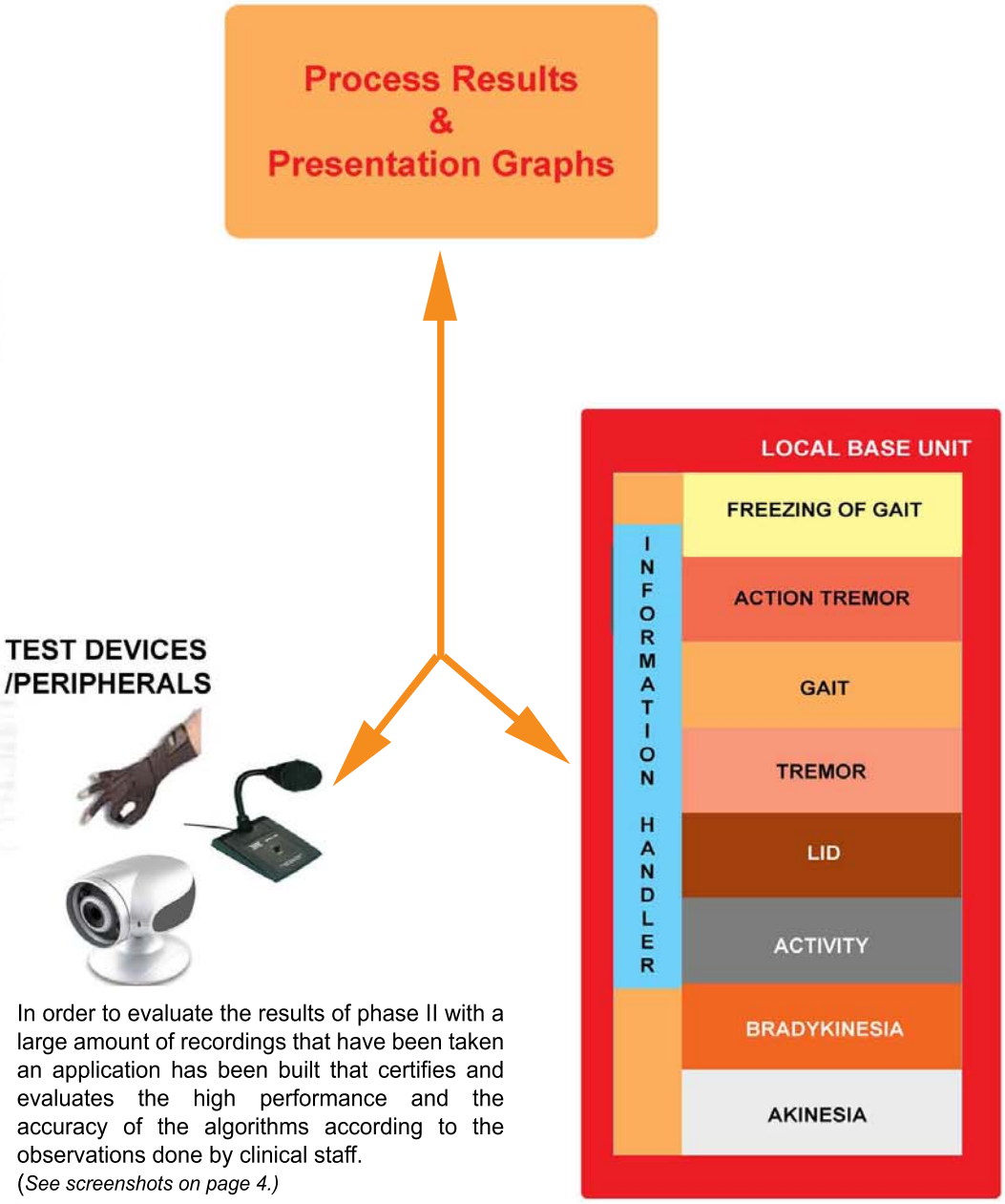
The confidence of each classifier and later on of the decision support modules can be calculated and communicated to the clinicians. In particular, the following recommendations are made:

- Handling the concepts for dealing with uncertainty. This means that confidence values of the classifiers are propagated throughout all the modules and consequently uncertainty is evaluated in all modules .

- As far as uncertainty is concerned not just the classifier confidence, but also meta- information on the quality of the classifier is propagated.

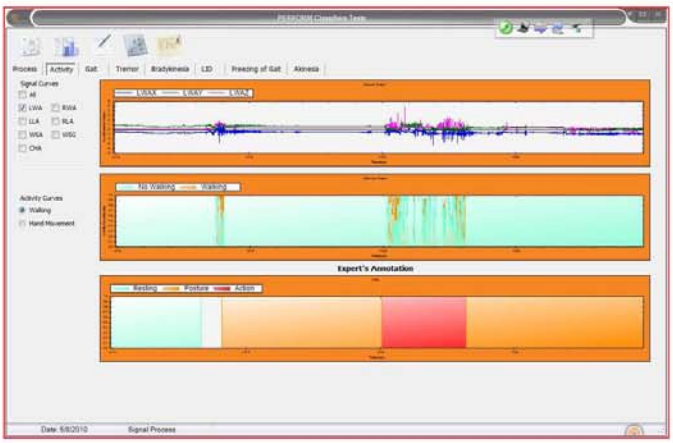
The results proved that the algorithms used execute their operations with high accuracy in comparison with collected clinical annotation.

Phase II Evaluation Application Architecture

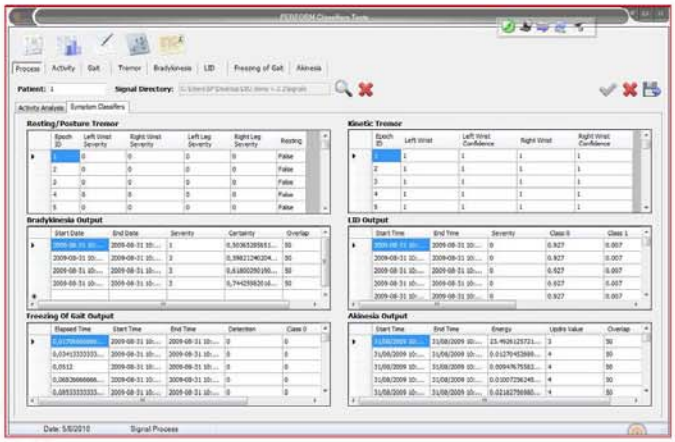


In order to evaluate the results of phase II with a large amount of recordings that have been taken an application has been built that certifies and evaluates the high performance and the accuracy of the algorithms according to the observations done by clinical staff.
(*See screenshots on page 4.*)

Application Screenshots



Graph representation



Application Results

Conclusions of Phase II

The proposal to replace the shirt solution with other appliance (especially for chest sensor attachment) was further investigated by research partners. A sticker approach was employed, making the attachment and detachment of the sensor easier, but it proved to be inappropriate solution for continuous use since the adhesive material provoked issues of skin irritations and allergies.

A clear preference on the belt sensor (instead of chest) was reported by both healthy individuals and patients group.

From the results in the evaluation of the PERFORM system with the patients we can conclude that the sensors do not change the posture of the patient and that they are generally not causing significant problems to the patients. The current appliance methodology remains still a question, mostly regarding the shirt solution. However, it is also apparent that some patients accept to wear the current appliance, even for everyday usage. On the other hand legs and wrist bands are generally very well accepted, with current design. This evaluation study was performed during the Phase II PD trials, in which the involved participants had to wear the device for only a few hours (during the data collection protocol procedure).

More concrete and reliable results about the wearability and the algorithm precision of the PERFORM system are expected to be collected during the Phase III of the PD trials (3A and 3B evaluation cycle).

In these phases the Daily Monitoring PERFORM prototype will be evaluated from 10 healthy subjects and 10 patients respectively, who will wear the devices in a continuous basis (12h every day) and use the system in everyday life. 3A evaluation cycle starts on September 2010.

Dissemination

The Consortium continues the dissemination activities in selected industry events. You are most welcome to meet us in the following events where Perform will have a presence:

- *32nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 31 August - 4 September 2010, Buenos Aires, Argentina*
  (http://embc2010.embs.org)

- *World Parkinson Congress 2010, 28 September -1 October 2010, Glasgow, Scotland, U.K.*
  (www.worldpdcongress.org)

For more information on other current dissemination activities please refer to the project website www.perform-project.com