Editorial

POSETE: Pollutants Sensing Techniques for Human Health Damages Estimation

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Introduction
Exposure to household chemicals such as organic solvents from paint, cleaners, air fresheners, insect repellents, etc., or to pesticides, herbicides and other contaminants in the food and water is exponentially increasing. Pollutants menacing our health are nowadays closely surrounding us albeit still very insufficiently underestimated.

More affordable quality sensors are becoming increasingly available to the market, favoring their direct adaptation to pollutants detection. Cell phone based applications coupled with specific embedded sensors may allow users to consult their individual exposure to various toxins in near real time. This information is of capital importance helping users to modify their daily routines accordingly. Besides collection of multi user data may permit to create pollutants concentration maps, to help in establishing correlations between pollutant type and disease type.

Special session scope
This special issue of the CENTRIC 2016 conference aims to invite articles on the most up to date, emerging or new technologies to quantify, estimate, model and possibly limits exposure of various pollutants present in our household environment. Embedded applications in pollutants detection, communicating with users phones are particularly highlighted.

Most particularly two user cell phone applications for pesticides everyday contamination and for food pesticides monitoring will be discussed.

Discussed papers:

- "User Blood and Organs Pesticides Concentration Estimation System Based on Two Compartments Parmacokinetic Models", Umberto Cerasani, Dominique Bedra
  Estimating blood and other tissue pesticides is very challenging, partial, limited to a few compounds and most of the time highly speculative or inexact. Physiologically Based Parmacokinetic (PBPK) models which were selected to estimate user exposure. Based on general user information, including its mean food consumption, general data location and

profession, a specific type of PBPK model was selected and pesticides daily exposure was estimated. Moreover user specific pesticides accumulation per year were speculated, based on mathematical models. Two types of user based systems have been developed: (1) the first requires user connection to an interactive website, (2) the second system is a smartphone apps.

The parameters of the PBPK mathematical models developed were extrapolated from organophosphates body kinetics. Since other pesticides may have very different kinetics and possibly much more elevated body accumulation, constructing PBPK models based on other pesticides types may help to better assess personal intoxication. Ultimately pesticides biomarkers studies should be confronted to our model for results validation. Finally pesticides blood and tissue concentration per year for an average user was estimated to 25 mg, which however gradually grows with respect of time, possibly explaining the long development time of certain diseases before symptoms appearance.

- "Light Reflection Spectrum Comparison of Pesticides-free Foods, Organic foods and Conventional Farming Foods for VIS NIR Filter Creation", Oumy Diop, Umberto Cerasani

  In this paper, the spectral characteristic of pesticides contamination using Vis-NIR reflectance spectroscopy is investigated first. Since there are several thousand of different active pesticide molecules reported, current pesticides detection is limited to few types of pesticides chemical and does not ascertain pesticides free products. By comparing the spectral information obtained from pesticides free and pesticides contaminated foods, particular traces characteristic of pesticides contamination were under study. Although the results were limited to only three types of different vegetables, spectroscopic analysis of food in the Vis-NIR wavelength range, seems to permit food quality estimation in a certain interval range. However method limitations still remain challenging to address. For instance, modification of the internal food coloration, including food maturity levels or seeds number, can lead to different light intensity spectral analysis, generating important unpredictability in the reference spectral data.

  Besides the proposed method can be easily implemented in a portative device, with an embedded spectrometer. Such device could allow user to estimate various food contaminants. For easier user data reading, a wireless communication device (such as WIFI module) was integrated in the embedded system for user's smartphone communication. A specific smartphone application was created for embedded spectrometer results monitoring. To diminish the costs of the overall device, sunlight was used as the spectroscopic light source, limiting device utilization in bright areas.

Conclusion:

Although embedded system solutions development and embedded device programming has been made more accessible and less time consuming, everyday contaminants estimation and exposure limitation solutions from an user perspective hardly exit. Recently, favored by the increasing demand for a high quality agricultural products and household environment, new quality and safety control user personal devices are being investigated. Such devices may help the user to analyze and understand the various sources of harmful pollutants surrounding him, helping him to modify his lifestyle and to make healthy choices.