Biologically inspired computation for chemical sensing

From 2008-01-01 to 2011-06-30, closed project

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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</thead>
<tbody>
<tr>
<td>EUR 2 856 601</td>
<td>ICT-2007.8.3 - Bio-ICT convergence</td>
</tr>
</tbody>
</table>

EU contribution: EUR 2 150 000

Coordinated in: Spain

Total cost: EUR 2 856 601

Topic(s): ICT-2007.8.3 - Bio-ICT convergence

Objective

Biological olfaction outperforms chemical instrumentation in specificity, response time, detection limit, coding capacity, time stability, robustness, size, power consumption, and portability. This biological function provides outstanding performance due to a large extent, to the unique architecture of the olfactory pathway, which combines a high degree of redundancy, an efficient combinatorial coding along with unmatched chemical information processing mechanisms. The last decade has witnessed important advances in the understanding of the computational primitives underlying the functioning of the olfactory system.

NEUROCHEM will develop novel computing paradigms and biomimetic artefacts for chemical sensing taking inspiration from the biological olfactory pathway. This project proposes to build computational models of its main building blocks: olfactory receptor layer, olfactory bulb, and olfactory cortex. To reduce the model complexity, models, they will go through an abstraction stage in which their processing capabilities are captured by algorithmic solutions. To demonstrate this approach, a biomimetic demonstrator will be built featuring a large scale sensor array mimicking the olfactory receptor neuron layer. In addition, abstracted biomimetic algorithms will be implemented in an embedded system that will interface the chemical sensors. This research will provide a radically new way to process chemical signals, and it will bring performances exceeding the current state of the art provided by chemometrics.
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EU contribution: EUR 360,611

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Subjects
Biotechnology - Electronics and Microelectronics - Information Processing and Information Systems - Medicine and Health - Telecommunications

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