PhD in INGEGNERIA DELL'INFORMAZIONE / INFORMATION TECHNOLOGY - 36th cycle

Research Area n. 2 - Electronics

Research Field: DEVELOPMENT OF AN ELECTRONIC NOSE FOR NON-INVASIVE CANCER DIAGNOSIS WITH LOW-NOISE SENSING AND DIGITIZATION

<table>
<thead>
<tr>
<th>Monthly net income of PhDScholarship (max 36 months)</th>
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<tbody>
<tr>
<td>€ 1250.0</td>
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</table>

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

Motivation and objectives of the research in this field

Interdisciplinary PhD Grant
The PhD research will be carried out in collaboration with research groups of the PhD programme in "Industrial Chemistry and Chemical Engineering". See http://www.dottorato.polimi.it/index.php?id=242&L=1 for further information.

The research group of Prof. Capelli has been working for a few years on the development of algorithms for electronic noses to detect prostate cancer from urine samples. The motivation behind this research is the low accuracy (about 58%) of current techniques for the diagnosis of prostate cancer, which besides adopt highly invasive techniques. To strengthen the research, the development of an accurate electronic system to measure resistance changes of various numbers of resistive gas sensors, as well as the apply real time calibration and compensation of sensors is required.

Methods and techniques that will be developed and used to carry out the research

The methods encompass the development of mixed signal (analog and digital) electronic boards with multi-channel, low noise resistive sensing, and integration of digital routines for data analysis, the final target being the development of a product prototype.
### Educational objectives

The objectives are to form a PhD with a strong background in Electronics, in particular in the area of low-noise sensing, together with basic skills in chemistry of gas sensors and in the analysis and processing of acquired data.

### Job opportunities

Given the more and more relevant impact of miniaturized sensors in our everyday life (especially in the health sector), job opportunities after the PhD include industrial R&D positions, similar positions in research centers, and the academic career (RTD-A).

### Composition of the research group

<table>
<thead>
<tr>
<th>Position</th>
<th>Count</th>
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</thead>
<tbody>
<tr>
<td>Full Professors</td>
<td>0</td>
</tr>
<tr>
<td>Associated Professors</td>
<td>2</td>
</tr>
<tr>
<td>Assistant Professors</td>
<td>0</td>
</tr>
<tr>
<td>PhD Students</td>
<td>1</td>
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### Name of the research directors

Giacomo Langfelder, Laura Capelli

### Contacts

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02 2399 3425  
laura.capelli@polimi.it

### Additional support - Financial aid per PhD student per year (gross amount)

<table>
<thead>
<tr>
<th>Housing - Foreign Students</th>
<th>1st year</th>
<th>2nd year</th>
<th>3rd year</th>
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<tbody>
<tr>
<td>1500.0 € per student</td>
<td>1000.0 € per student</td>
<td>1000.0 € per student</td>
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max number of financial aid available: 2, given in order of merit.

### Housing - Out-of-town residents  
(more than 80Km out of Milano)

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### Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

The activity will be carried on mostly at the DEIB department, but activities are foreseen also at the DCMIC department.

LIST OF UNIVERSITIES, COMPANIES, AGENCIES AND/OR NATIONAL OR INTERNATIONAL INSTITUTIONS THAT ARE COOPERATING IN THE RESEARCH: Humanitas Research Hospital.

INCREASE IN THE SCHOLARSHIP FOR STAYS ABROAD: Euro 566,36 per month, for up to 6
EDUCATIONAL ACTIVITIES (purchase of study books and material, including computers, funding for participation in courses, summer schools, workshops and conferences): financial aid per PhD student per year
2nd year: euros per student (1534)
3rd year: euros per student (1534)

TEACHING ASSISTANSHIP: (availability of funding in recognition of supporting teaching activities by the PhD student)
There are various forms of financial aid for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities, within the limits allowed by the regulations.

COMPUTER AVAILABILITY:
1st year: individual use
2nd year: individual use
3rd year: individual use

DESK AVAILABILITY:
1st year: individual use
2nd year: individual use
3rd year: individual use