

**LERU STudent REseArch Mobility Programme (STREAM)
Project proposal**



Host University:
Università degli studi di Milano



Field:
Information and Communication Technologies

Specified field, subject:
Computational intelligence

Research project title:
Intelligent Systems for industrial, environmental and biometric applications



Possible starting month(s):

Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
x	x	x	x	x	x	x	x	x	x	x	



Possible duration in months:

1	2	3	4	5	6
					x



Suitable for students in: 2nd cycle (Master students)

Prerequisites: Programming skills in any language

Restrictions: none



Description:

The project studies the use of computational intelligence and optimization techniques for intelligent systems a variety of applications (e.g., industrial manufacturing, biometric identification, environmental protection, smart cities, smart communities).

This project addresses the following three areas, among which the student can choose his/her preferred topic:

ASPECT 1) Optimization techniques for smart cities and communities. The project will study the development and testing of optimization algorithms in one of the many possible areas encompassed by the title Smart cities and communities. Some examples: optimization of public transportation systems, optimization in healthcare processes, optimization in freight transport.

A proposed research topic is the development and optimization of almost-real-time optimization algorithms for managing dial-a-ride transportation systems in which users can request a ride to be started in a matter of minutes. The problem involves both optimal assignment and optimal routing sub-problems and requires optimized computation on large scale geographical data representing road networks (e.g. OpenStreetMap).

Another proposed topic is the use of mathematical programming approaches for health care for several different purposes and at different scales: treatment



optimization for single patients, hospital logistics in health care infrastructures, optimal capacity planning of health care systems at a regional or national level. Proposed topics in the area of freight transport optimization include collaborative logistics, last-mile delivery and electric vehicles routing.

The specific supervisor of this research aspect is prof. Giovanni Righini (giovanni.righini@unimi.it).

ASPECT 2) Computational intelligence (in particular, neural networks and fuzzy systems) are fundamental technologies for building intelligent systems. This project will specifically focus on intelligent signal and image processing for industrial manufacturing, biometric identification, and environmental protection.

ASPECT 3) Computational optimization is essential for high-speed cryptography in a variety of applications.

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