2018-00458 - PhD: Estimation and control methods for microbial communities (M/F)

Contract type: Public service-fixed-term contract
Level of qualifications required: Graduate degree or equivalent
Fonction: PhD Position

About the research centre or Inria department

The Inria Lille - Nord Europe Research Centre was founded in 2008 and employs a staff of 360, including 300 scientists working in sixteen research teams. Recognised for its outstanding contribution to the socio-economic development of the Nord - Pas-de-Calais Region, the Inria Lille - Nord Europe Research Centre undertakes research in the field of computer science in collaboration with a range of academic, institutional and industrial partners.

The strategy of the Centre is to develop an internationally renowned centre of excellence with a significant impact on the City of Lille and its surrounding area. It works to achieve this by pursuing a range of ambitious research projects in such fields of computer science as the intelligence of data and adaptive software systems. Building on the synergies between research and industry, Inria is a major contributor to skills and technology transfer in the field of computer science.

Context

IPL COSY (see https://project.inria.fr/iplcosy) takes up the challenge to develop a whole new paradigm for the real-time control of synthetic microbial communities. It accounts for microbial heterogeneity and diversity for the optimal accomplishment of prescribed goals. Based on top-notch experimental technology and state-of-the-art modelling and analysis of microbial dynamics and interactions, two challenging applications are addressed. In the first application, the control of a population of Escherichia coli bacteria displaying two different and switchable phenotypes is considered. Goals of the control, directly related with real-world problems in microbial ecology and biotechnology, are the regulation of the relative composition of the population and the optimized production of biomolecules of interest. In the second application, a population of yeast Saccharomyces cerevisiae cells of different types is analyzed. The control objectives are robust maintenance of the two subpopulations and optimization of the biological process.

Assignment

Assignments

The proposed PhD position will be shared among Non-A POST team and BIOCORE team, both belong to the consortium of IPL COSY. The subject of PhD deals with the control and estimation algorithms design for these two applications.

Location: Inria Lille, with visits to Inria Sophia.

More informations:

NON-A POST team: https://team.inria.fr/non-a/

BIOCORE team: https://team.inria.fr/biocore/

Main activities

The principal activities will include analysis of the models describing the applications studied in IPL COSY, design of identification, estimation and control algorithms. Validation of the obtained solutions will be done on the experimental platforms available in the project.

Skills

Knowledge of stability theory, Lyapunov method; programming in Matlab and Python.

General Information

- Theme/Domain: Optimization and control of dynamic systems
- Town/city: Villeneuve d'Ascq
- Inria Center: CRI Lille - Nord Europe
- Starting date: 2018-09-01
- Duration of contract: 3 years
- Deadline to apply: 2018-05-31

Contacts

- Inria Team: NON-A
- Recruiter: Efimov Denis / denis.efimov@inria.fr

The keys to success

The required competencies are a good knowledge of nonlinear control and estimation/identification theories, stability analysis of nonlinear dynamical systems and the theory of optimal control. A strong motivation to work on applications in biology is also necessary.

About Inria

Inria, the French National Institute for computer science and applied mathematics, promotes "scientific excellence for technology transfer and society". Graduates from the world's top universities, Inria's 2,700 employees rise to the challenges of digital sciences. With its open, agile model, Inria is able to explore original approaches with its partners in industry and academia and provide an efficient response to the multidisciplinary and application challenges of the digital transformation. Inria is the source of many innovations that add value and create jobs.

Conditions for application

Candidates will be treated in priority with a complete file: CV + letter of motivation + one or more letters of recommendation + transcripts from previous years.

Defence Security:

This position is likely to be situated in a restricted area (ZRR), as defined in Decree No. 2011-1425 relating to the protection of national scientific and technical potential (PPST). Authorisation to enter an area is granted by the director of the unit, following a favourable Ministerial decision, as defined in the decree of 3 July 2012 relating to the PPST. An unfavourable Ministerial decision in respect of a position situated in a ZRR would result in the cancellation of the appointment.

Recruitment Policy:

As part of its diversity policy, all Inria positions are accessible to people with disabilities.
Benefits package

Benefits
- Subsidised catering service
- Partially-reimbursed public transport
- Social security
- Paid leave
- Flexible working hours
- Sports facilities

Remuneration

Remunerating

1982€ gross monthly salary for the 1st and 2nd year

2085€ gross monthly salary for the 3rd year

Warning: you must enter your e-mail address in order to save your application to Inria. Applications must be submitted online on the Inria website. Processing of applications sent from other channels is not guaranteed.