Research Internship
Automated Raman Sampling System for Bioreactor Farm

Topic profile

coding

embedded sys.

Tags

#prototype

#RaspberryPi

#fluid system

#Python

#Raman

Supervision

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We are looking for

We are looking for a Master's student that is interested to create a prototype for an automated cyclic fluid sampling system for a farm of bioreactors. The system will be used for the production of biofuel among others.

An ideal candidate for this topic is self-driven, autonomous, has experience in coding in Python (and can code on a Raspberry Pi), and is interested to assemble a small prototype. The task requires a high level of autonomy (choice of components that we will order is yours) and requires a dedication to engineering electro-mechanic systems (experience with controlling periphery from a uC or Pi is ideal).

Since this task requires ordering components, a minimum internship duration of 2 month is required.

The team

You will be part of an interdisciplinary research team at Laboratoire Méthodes Formelles located at ENS Paris-Saclay, near Paris, working at the interface between artificial intelligence, synthetic biology, distributed computing and circuit design.

Research

The production of biochemical compounds in bioreactors is a promising way to manufacture complex pharmaceuticals such as viral vectors or biofuel, among many other products. Typically, early-stage experiments require large-scale farms of bioreactors to generate data under different conditions and to de-risk contamination of a large volume. However, specialized measurement equipment like Raman spectroscopy is expensive and needs to be shared between bioreactors. In this research project you are going to prototype a measurement system that cyclically measures 3 bioreactors, with decontamination steps in between two measurements.

Concretely, your task is to conceptualize, choose components, assemble, and test an automated measurement system that has: (1) 3 liquid inlets, (2) 1 washing liquid inlet, (3) controllable peristaltic pumps and (contamination-aware choice of) valves, (4) an existing Raman spectroscopy interface that can be controlled by Python and that measures in a flow-cell, (5) a Raspberry Pi that uses pumps and valves to sample liquid from an inlet into the flow-cell, perform the measurement, and wash the system with the washing liquid, repeat for the next liquid inlet. (6) additional interconnecting boards and wires from the Pi to pumps and valves.

You are interested or would like to join us?

Please mail your questions or, in case you would like to apply, a short statement of interest and a CV to Matthias FÜGGER (mfuegger@lmf.cnrs.fr) and Thomas NOWAK (thomas@thomasnowak.net).