QTB PBR Hackathon

March 2–4, 2016

Contents

1 PBR Hackathon Projects

1.1 Gasometer (Gas Flux)

Extend the exisiting setup (co2meter+arduino+screen):

Sensor calibration routine via touch-screen (use PSI gas mixing system)

Add Aalborg mass flow meter (arduino hardware serial Tx3,Rx3) and/or

Valve control to measure several reactors (arduino software serial connections), perhaps attach to PSI Multicultivator

1.2 Spectrometer (Light Flux)

Simple measuring tool: AvaSpec-Mini2048l-U25 + arduino or raspi

Advanced: with LED for absorbance, reflectance, or fluorescence, built light paths and perhaps a reactor probe for online recording

1.3 Continuous Culture (Liquid Flux)

Balance and peristaltic pumps + arduino

Build simple reactor with gassing system measured by 1.1

Perhaps combine with 1.2 to make turbidostatic control

1.4 Microfluidics Device (Single Cell Biology)

Scratch microscope slide + 2-3 pumps + arduino/screen

Connect to Ilka's lab microscope

2 Program

2.1 Day 1 <12:00 : Building Bioreactors

Talks, 30-60 min:

2.1.1 Rob's DIY Reactor - The beginnings

The Captor - Arduino-controlled mini PBR

2.1.2 Dougie's DIY Reactor - 20 yrs later

2.1.3 Avantes - Spectrometry

Spectrometry applications, incl. NIR for metabolite measurements and OD

Software interface to Avantes spectrometers

2.1.4 CellDeg - Optimizing Photosynthetic Growth

Introduction to CellDeg's 2.5 k Euro algal growth setup (overnight 30 g/L cyano biomass)

2.2 Day 1 >13:00 : Hackathon I

Introduction to the gasometer: connecting sensors with Arduino, making an autonomous measurement device via Sainsmart's Touch Screen

Introduction to Rob's reactor: complete setup for photosynthetic growth

Self-organizing into teams: lab hardware (tubing etc.), control hardware (soldering etc.), software

2.3 Day 2 <12:00 : Photobioreactors in Research

Talks, 30-60 min:

Nir Keren, Hellingwerf, Jan Cerveny, Dougie Murray, something microfluidics?

2.4 Day 2 >13:00 : Hackathon II

Perhaps in teams, either by projects (1.1–1.4) or in software vs. hardware (soldering/tubing) vs. biolab (cell cultures), or – most likely – in dynamic self-organisation, working parallel on all projects.

2.4.1 Hardware I

soldering, tubing

2.4.2 Software I

probe/sensor/pump ⇔ arduino/raspi interfaces

2.5 Day 3 <12:00 : Hackathon III

2.5.1 Hardware II

Integrate projects 1.1,1.2&1.3 into a simple DIY reactor and/or with PSI FMT150 or Multicultivator

Integrate project 1.4 with the simple microscope in Ilka's lab, or a more advanced system (CAi?)

Visit HHU's fine mechanics and glas blower work-shops, place orders for stuff missing for above goals

2.6 Day 3 >13:00 : Consolidating

2.6.1 Software II

arduino/raspi ⇔ master/server interface

Standard formats and interfaces

Brain storming: relation of data and models

Beer: relation of data and models and beer