QTB PBR Hack‘a’thing

March 2–4, 2016

Contents

1 PBR Hack‘a’thing Projects

1.1 Gasometer (Gas Flux)

Extend the existing 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)

Add 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 (e.g. Mettler Toledo PBK785-3XS/f) 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 Water Bath (Heat Flux)

A Julabo water bath, e.g. F25-ME + arduino

1.5 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 : Hack'a'thing 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 : Hack‘a’thing II

Perhaps in teams, either by projects (1.1–1.5) 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 : Hack‘a’thing 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 1.5 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