

# QTB PBR Hack‘a’thing

March 2–4, 2016

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# **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 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 Cervený, Dougie Murray, something microfluidics?

## **2.4 Day 2 >13:00 : Hack‘a’thing 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  $\Leftrightarrow$  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 1.4 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  $\Leftrightarrow$  master/server interface

Standard formats and interfaces

Brain storming: relation of data and models

Beer: relation of data and models and beer