

# **1 PBR Hackathon 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) 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**

#### **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 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 Cervený, 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  $\Leftrightarrow$  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  $\Leftrightarrow$  master/server interface

Standard formats and interfaces

Brain storming: relation of data and models

Beer: relation of data and models and beer