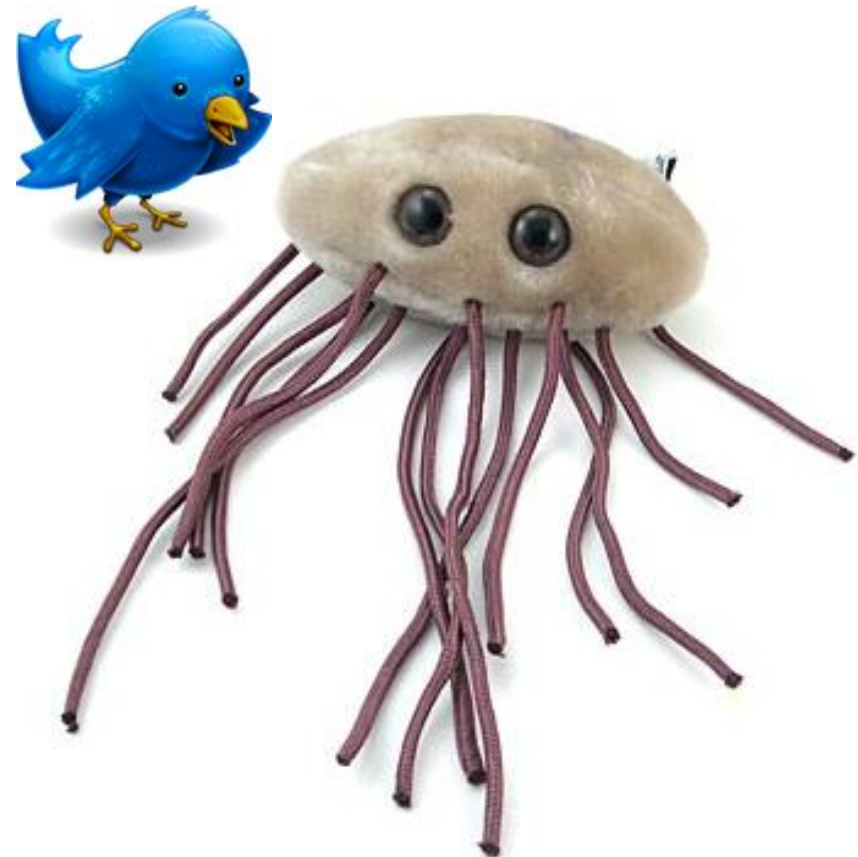


# *Twitteria coli*

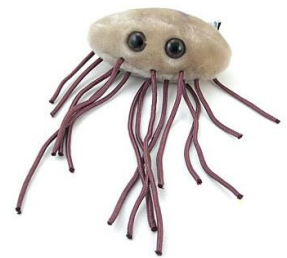
16 July 09

*Charles, Royah, David,  
Tianyi*

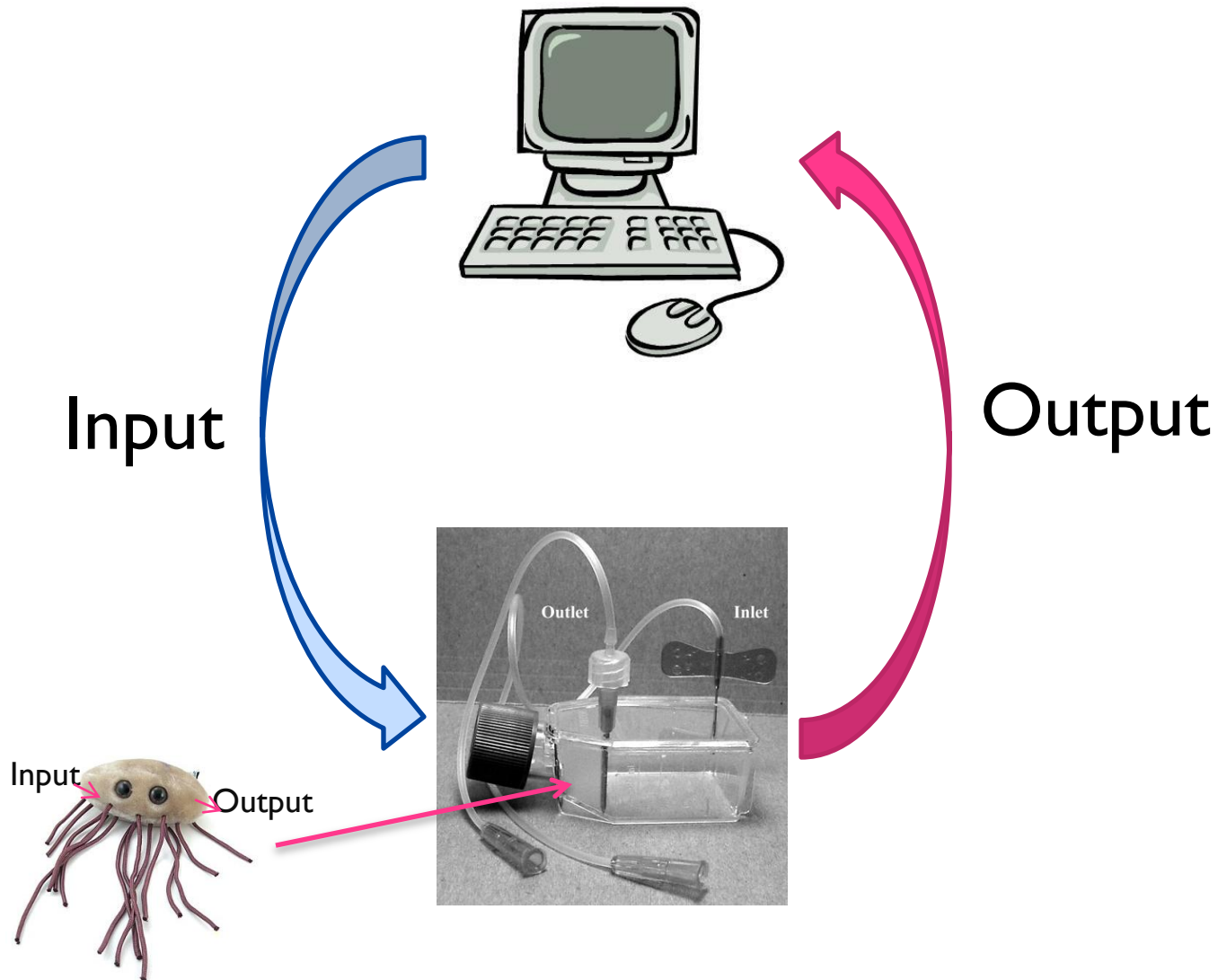


# Overview

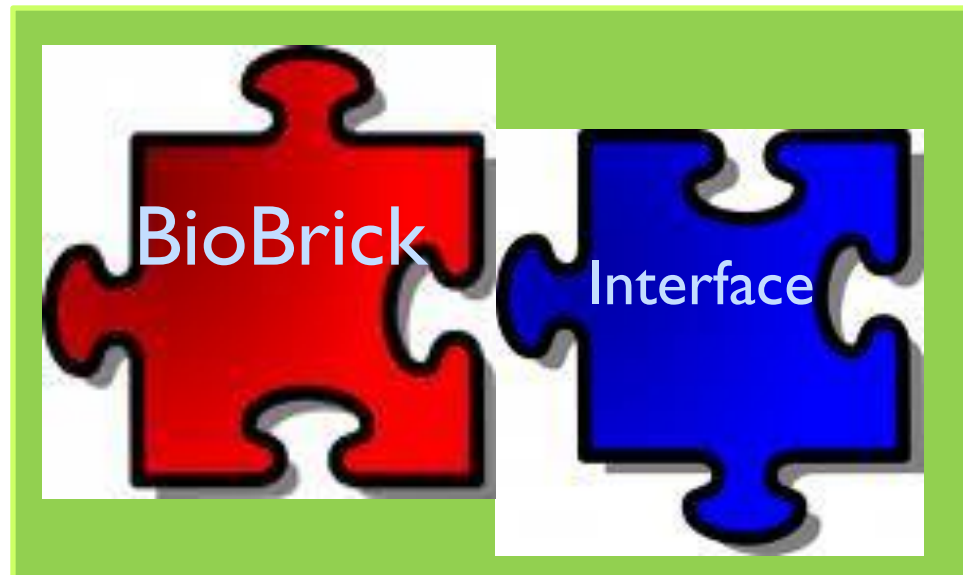
- Project description
- Background
- Application
  
- Solution
- Core pathway + bioconsiderations
- Engineering - constrains
- Data analysis
  
- Setup/ implementation
  
- Feasibility
- Expertise/resources needed
- Constraints



# Project description

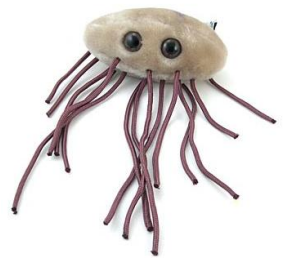


# Integrating BioBricks with computational interface



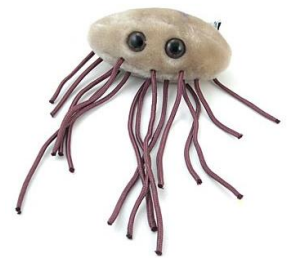
- Creation of a library of new tools

- Input – Microfluidics
- Output
  - pH
  - Optical density
  - Fluorescence
- Self-automated platform for interfacing input and output to a processor



# Background

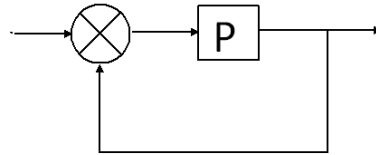
- Multiple inputs and outputs
- Outputs of cultures are detected
- Processing by computer
- Corresponding action taken
  - Change in pH – add H<sup>+</sup> or OH<sup>-</sup>
  - Change in colour of culture media – add new media
  - Temperature sensor
  - Sky's (or our abilities is) the limit
- Biology and computational engineering integrated system



# Application I – automated cell feeder



Active feedback



1. pH probe – (senses change of pH)  
2. Processor – automated changing of culture medium. Twitters

1. pH probe – senses that pH is back to normal  
2. Processor – records this and twitters

Now I can go on my holiday without worrying about my cells dying!!!



Login Join Twitter!



Hey there! **e. coli** is using Twitter.

Twitter is a free service that lets you keep in touch with people through the exchange of quick frequent answers to one simple question: What are you doing? .

**Join today!**

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## e. coli

We're stressed and hungry. Our mummies in the blue broth to make some food for us!!!

about 6 hours ago from Tweetie

---

@CalvinBrancheau Phew!  
about 14 hours ago from Tweetie in reply to CalvinBrancheau

---

@rigsy Tweeted about it last month. Excellent album.  
about 14 hours ago from Tweetie in reply to rigsy

---

@CalvinBrancheau So I'm not busy enough, eh?! have to speak it into a microphone to please you. Anything else? Sorry to FAIL. Schocking of me.  
about 14 hours ago from Tweetie in reply to CalvinBrancheau

---

Oh, I posted that speech I made at Lord's last night, in case you're interested. <http://tinyurl.com/cricketfry>  
about 15 hours ago from Tweetie

✓ *Verified Account*

Location London, England  
Web <http://www.stephe...>  
Bio British Actor, Writer, Lord of Dance, Prince of Swimwear & Blogger

54,878 following 657,458 followers

Updates **3,408**

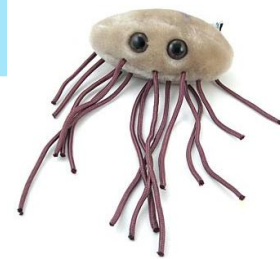
Favorites

Following



View All...

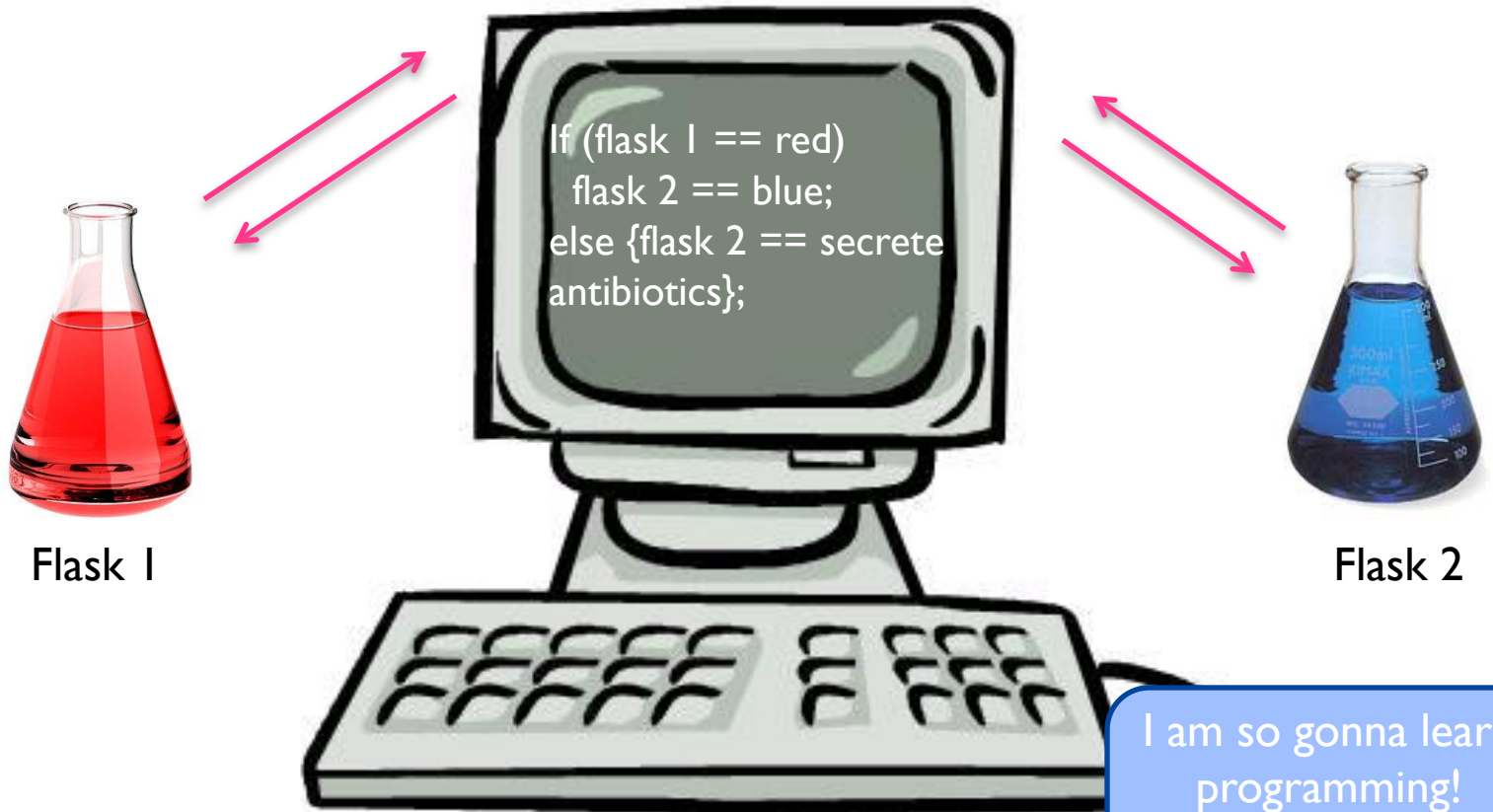
RSS feed of stephenfry's updates





# Application 2– Information transfer

Example program:

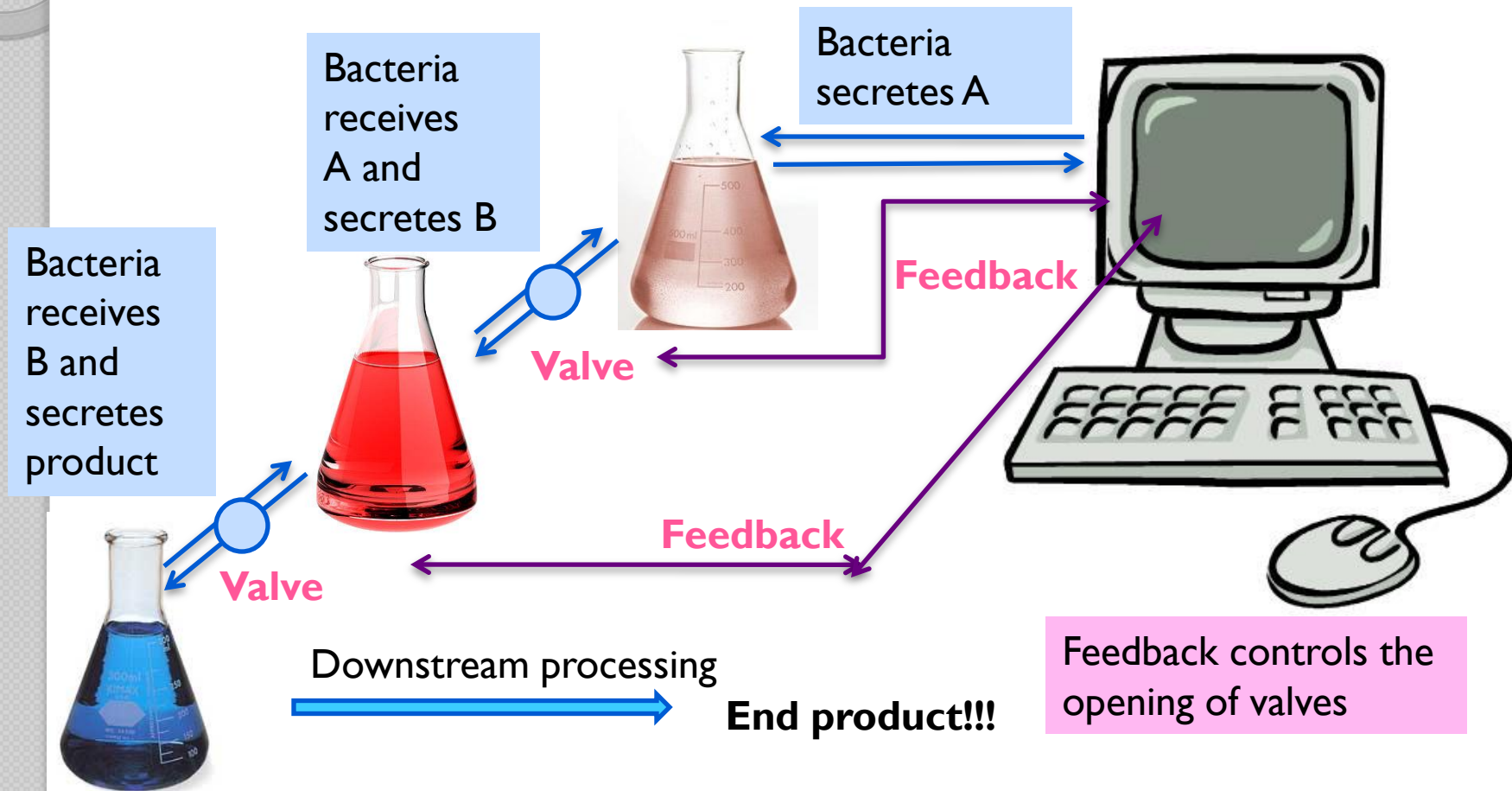


The bacteria have a preset number of generic inputs and outputs, programmable through the computer

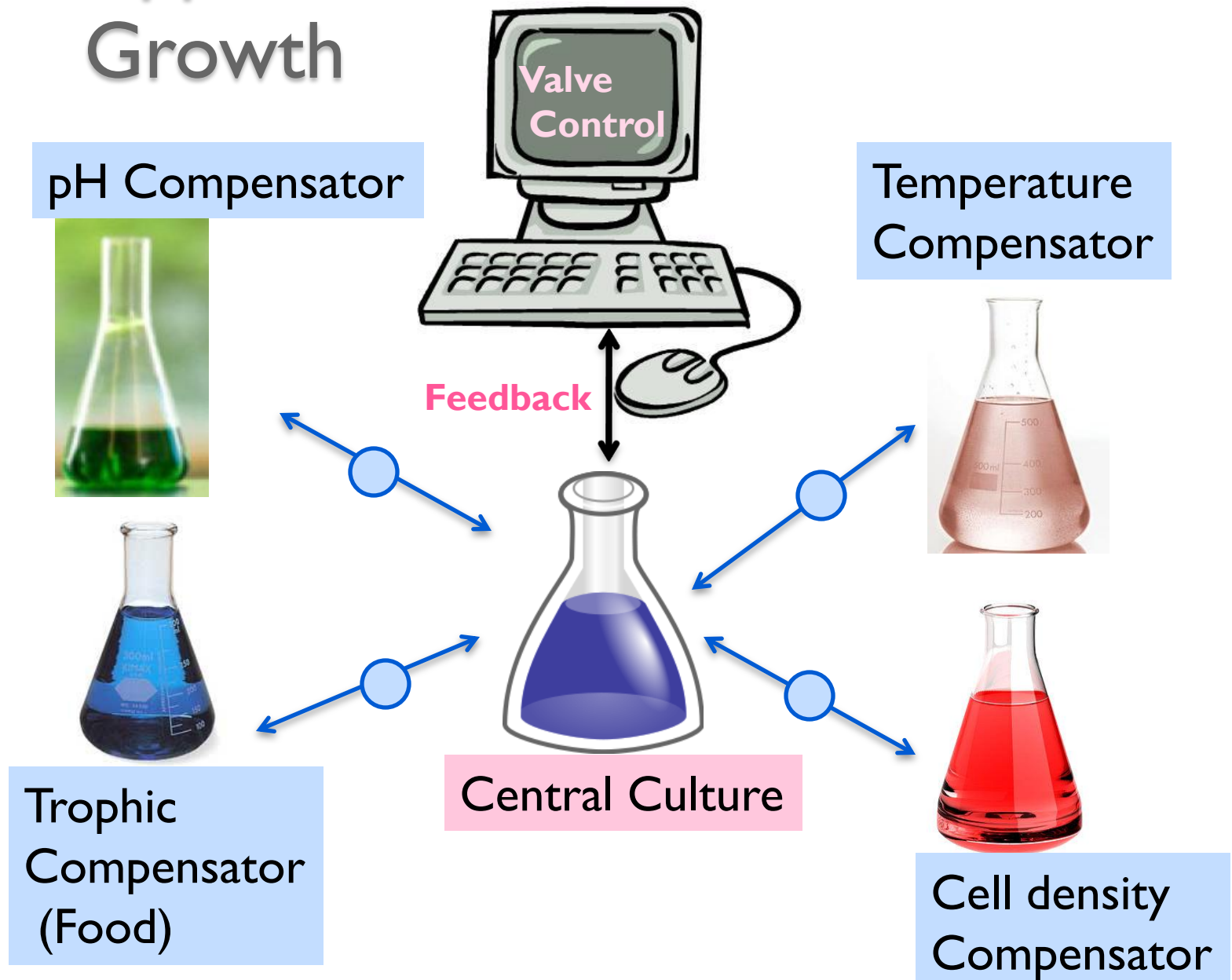


I am so gonna learn programming!  
Makes my life much easier! 😊

# Application 3 – Production line



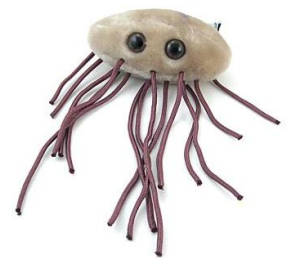
# Application 4 – Centralised Assisted Growth



Variable	Reporter	BioBrick	Computational Sensor	Type	Registry Ref	Notes
Lack of glucose / switch to lactose metabolism	pH	placZ + EPA <sub>synth</sub>		Detection of EPA when switching to lactose metabolism in deficiency of glucose.	New BioBrick can be created	<a href="https://doi.org/10.1007/s10529-008-9809-z">doi:10.1007/s10529-008-9809-z</a>
Cell growth	Optical density	N/A	Spectrophotometer	Computational	N/A	Needs sample in existing equipment - custom build something/adapt existing equipment?
Temperature	Light	RNA-thermometer	Lightmeter	Sensing luciferase	BBA_K115035	Under arabinose promoter
Temperature	Temperature	N/A	Thermometer	Computational	N/A	
QS/Cell growth	Fluorescence	pluxR + FP	Fluorometer	Sensing fluorescence	BBA_K131026 / BBA_I13272/3 / BBA_I731014 / pluxR = BBA_K091156	AHL inducible GFP, activated under presence of HSL
Cell growth	Turbidity	N/A	Turbidity sensor	Computational	N/A	

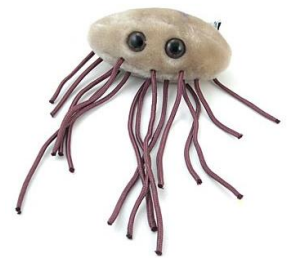
# Pathways

- Charles & Royah!!!



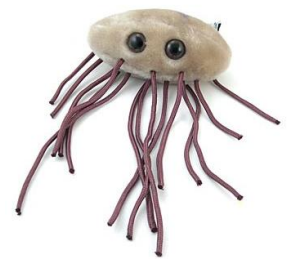
# Engineering

- Programming
- Analysing output of sensors and act corresponding
- Creation of Biology integrated Brick (BiB)



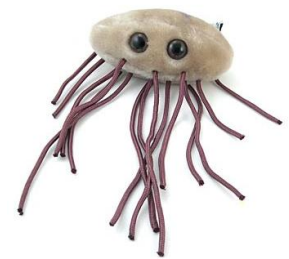
# Data Analysis

- Done by computer



# Feasibility

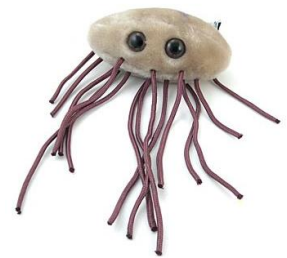
- yayee





# Expertise/Resources

- BioBricks for sensing outputs e.g. pH, temperature
- Existing infrastructure for automation



# Constraints

- Software processing time
- Compatibility restrictions??
- Writing a robust program

