DIY Aquarium Automation 101

GWAPA
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Overview

- Consistent fertilizer dosing
- Tired of water changes
- Reliable temperature monitoring over time
- why not add .... :
  - lights scheduling
  - PH monitoring
  - CO2 control

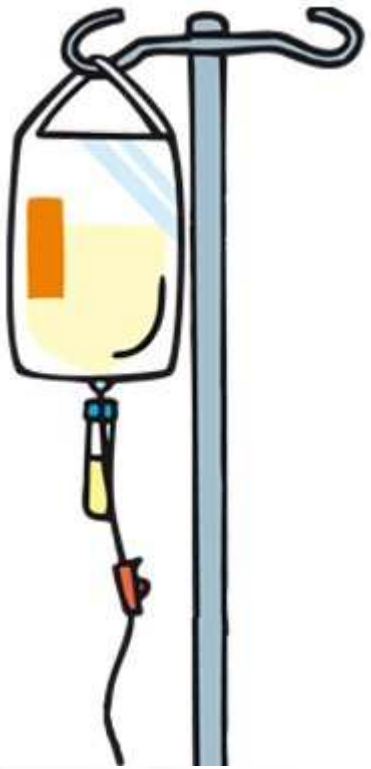
Dosing Fertilizers Manual

- Materials:
  - Measuring spoons for dry
  - Dosing bottle for liquid

- Pros:
  - inexpensive
- Cons:
  - Time consuming
  - Unreliable
  - I would rather watch the fish ...

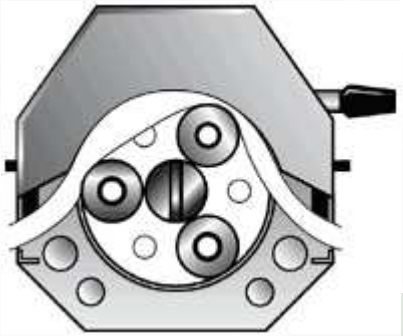
Dosing Fertilizers
Gravity drip

- Materials:
  - perfusion bag or any container
  - airline and valve
  - bubble counter
- Pros :
  - easy, inexpensive, reliable
- Cons:
  - ugly



Dosing Fertilizers
Peristaltic pumps

- Materials:
  - peristaltic pumps
  - special tubing
- Pros:
  - precise
- Cons :
  - expensive ...

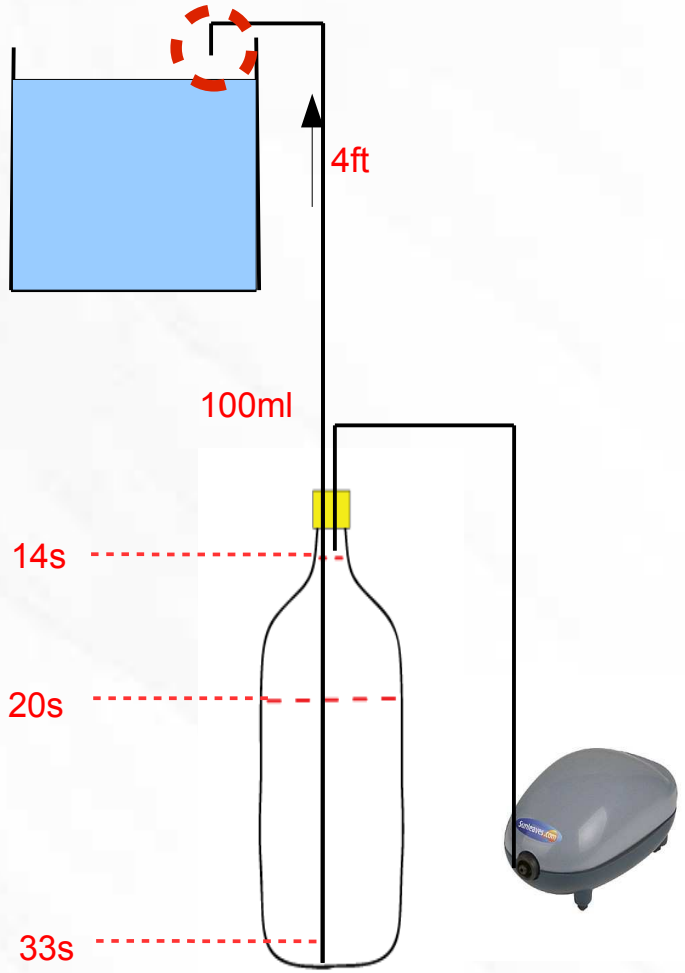


Dosing Fertilizers
Timers and pumps

- Materials:
  - see :Jeff's autodoser
    http://gwapa.org/wordpress/articles/fertilizer-auto-doser/
- Pros:
  - easy to setup, cheap ...
- Cons:
  - if you want to scale ... cost add up (30$ each)
  - pump head pressure

Air pump dosing

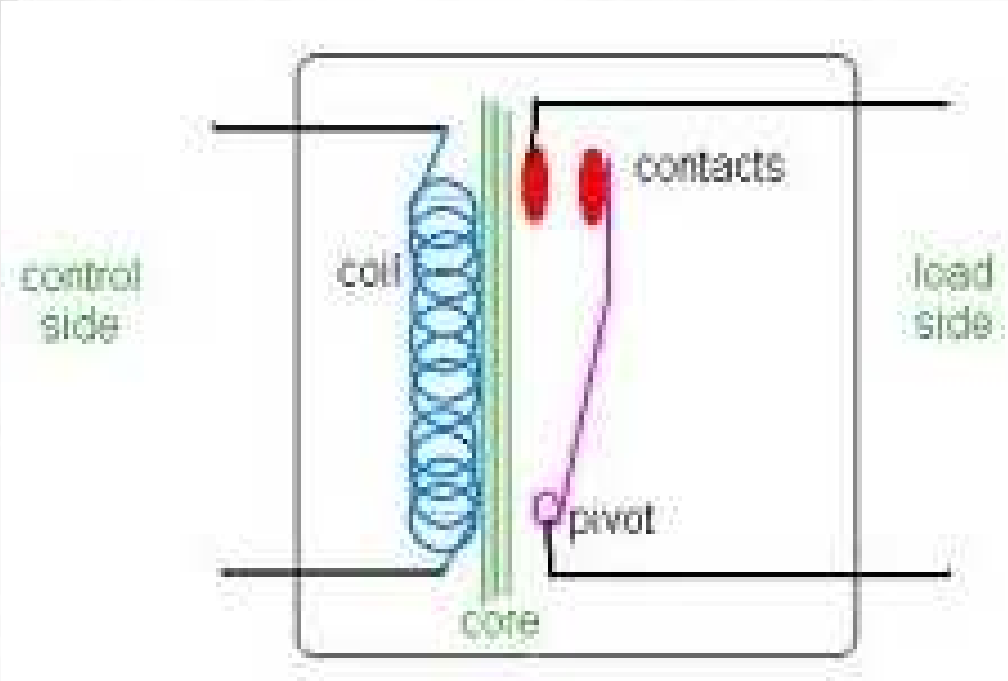
- Materials:
  - airpump, airtubing, soda bottle
- Pros:
  - a $5 air pump is better than a $15 mini pump
- Cons:
  - requires seconds or less timing precission
  - not constant in time (complex scheduling)



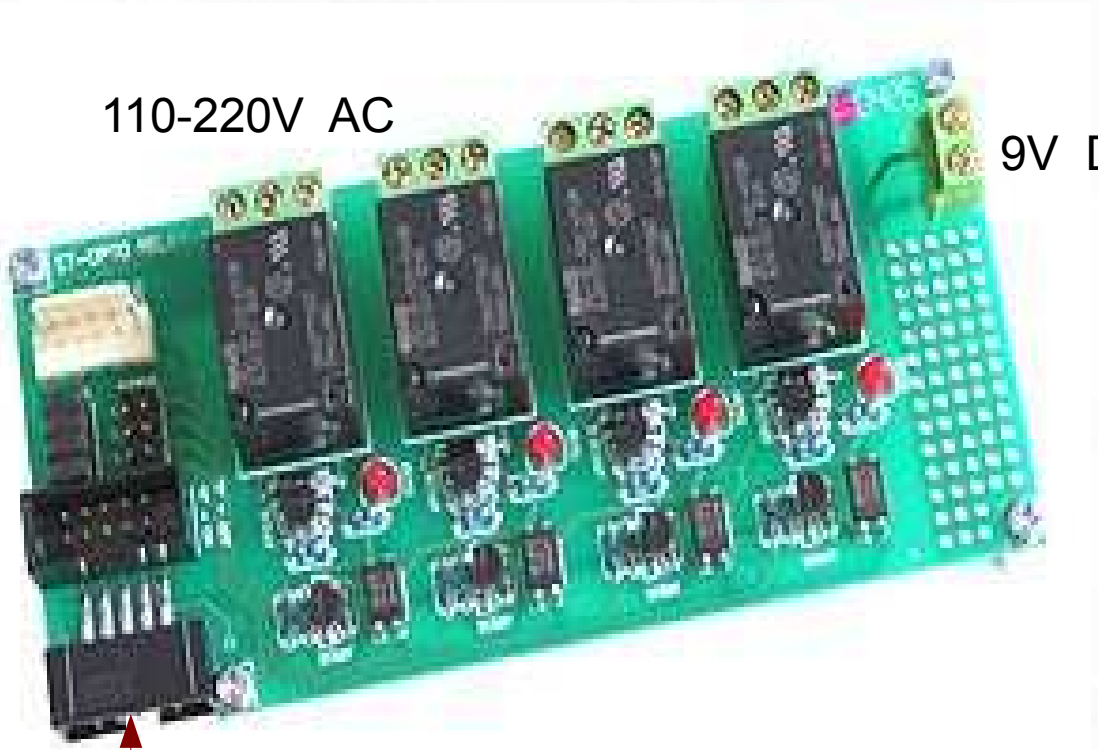
Computer controlled power

day 1 14s
day 2 15s
...
day 10 23s
...
day 20 33s

Relays



Relays

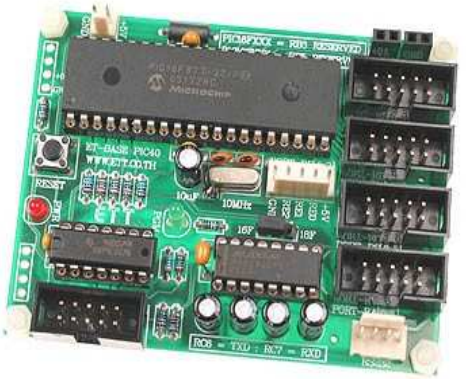


* Look for a opto-isolated relay board (to avoid electromagnetic feedback from motors, fluorescent lights etc, might going into your 5V TTL circuitry)

Controller

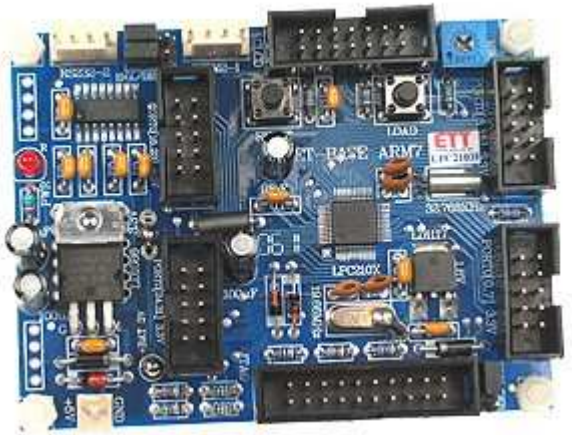
Arduino 25$

TI Lauchpad 5$



PIC16F877 $26

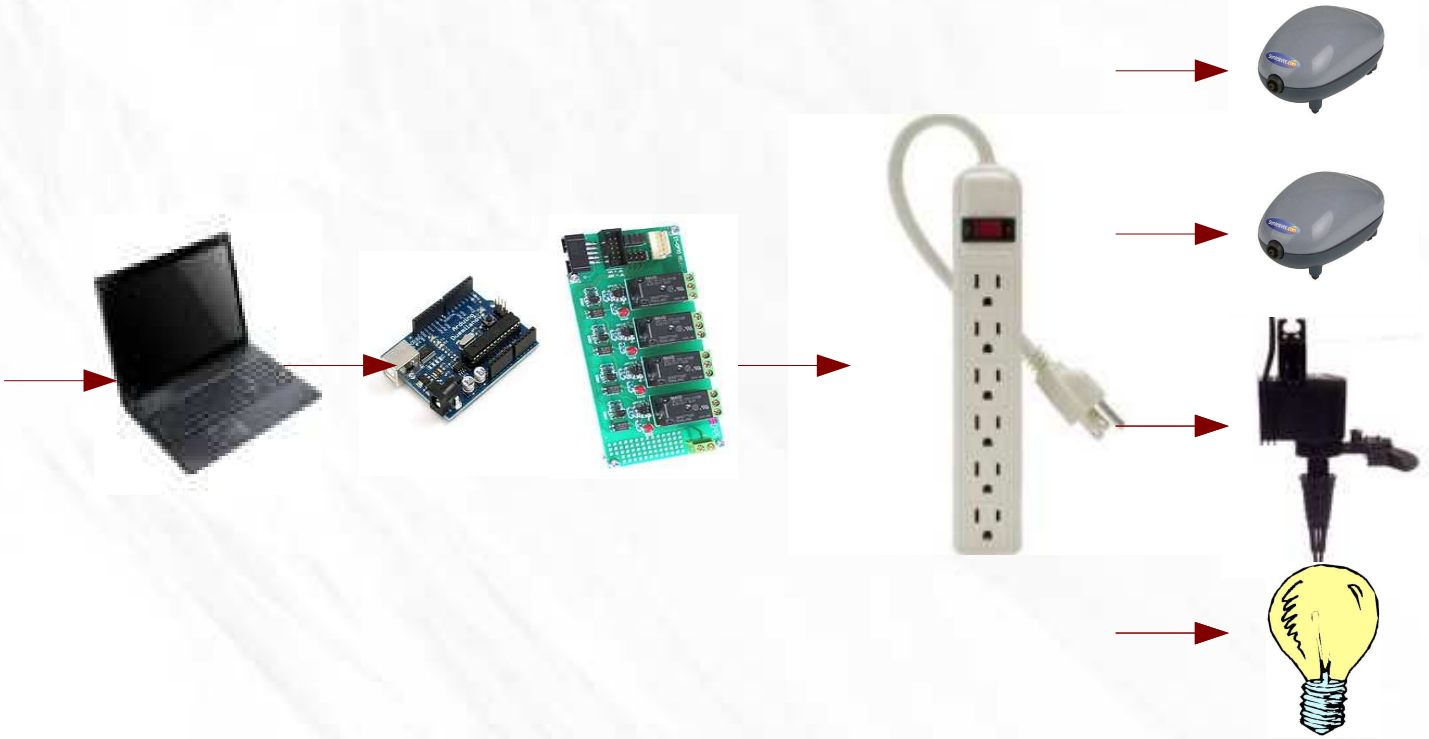
CanaKIT 60$



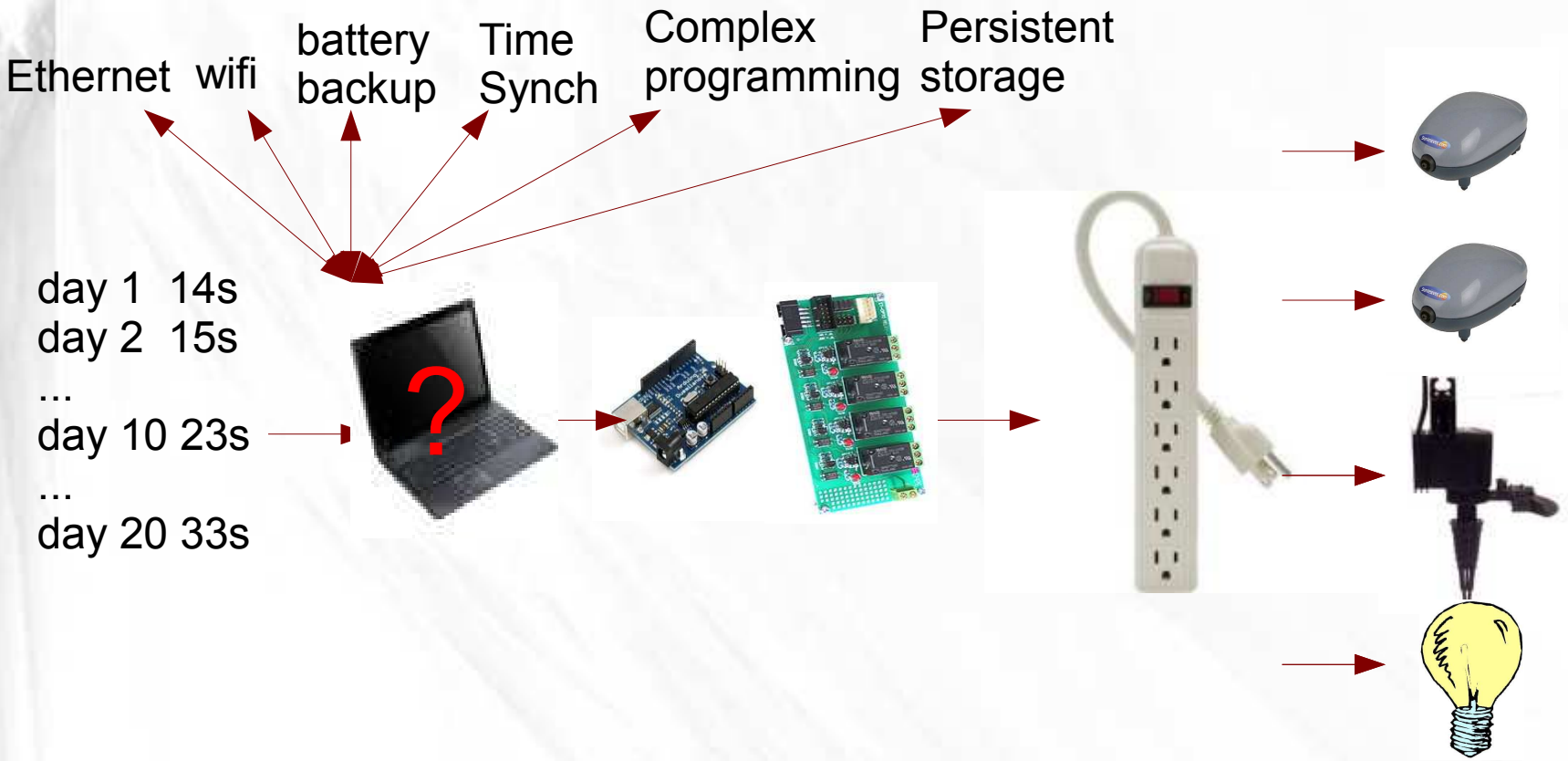
futurlec – ARM2103 $30

Computer Controller Power

day 1 14s
day 2 15s
...
day 10 23s
...
day 20 33s



Computer controller



Computer controller

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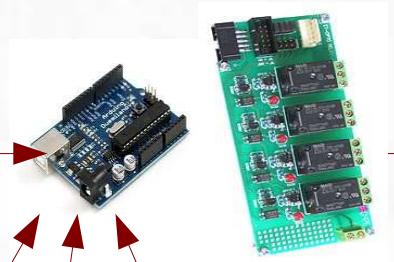
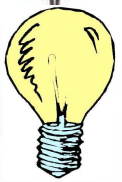
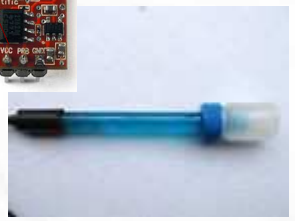
...
day 20 33s



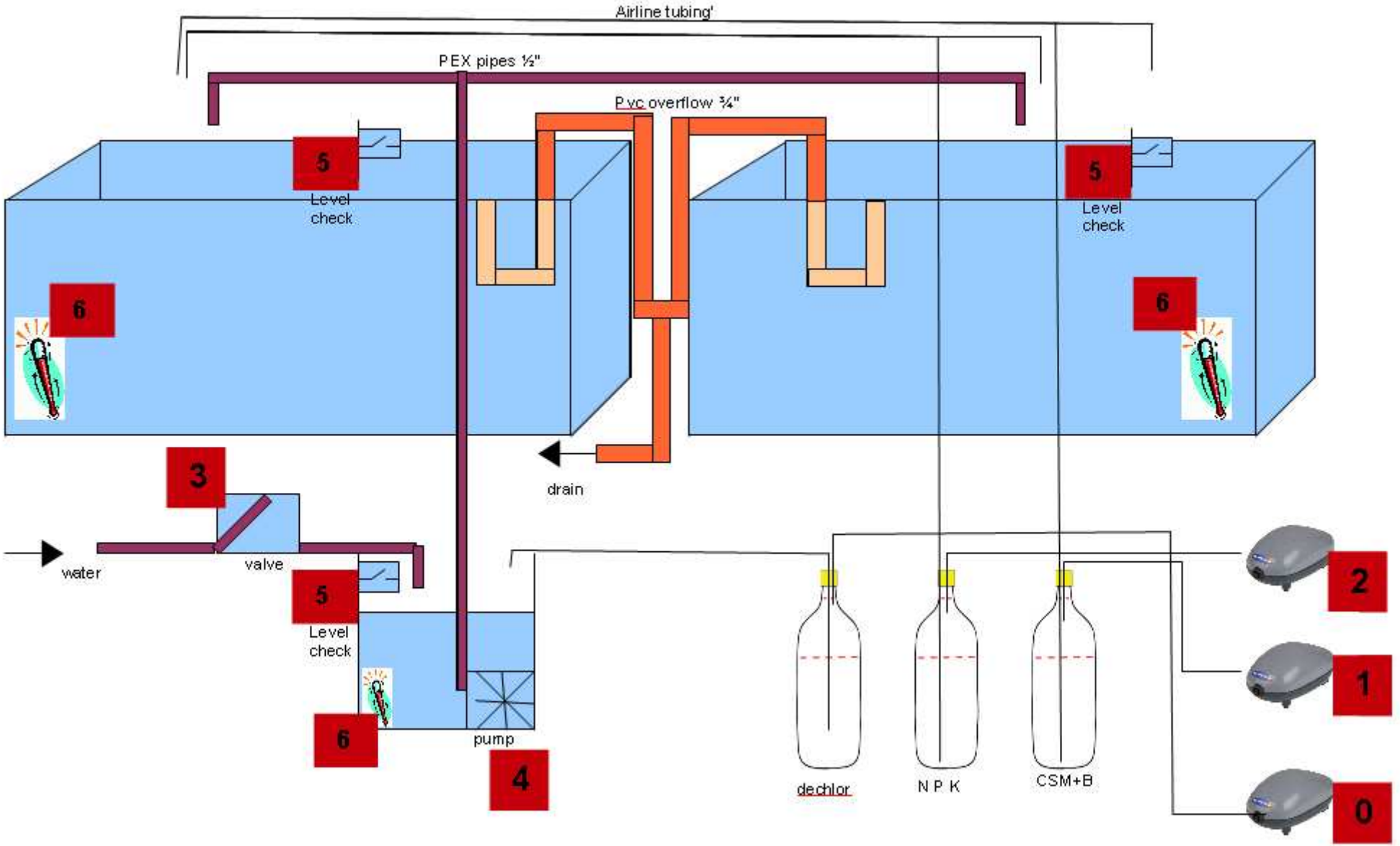


temp

water level



PH sensor


Airline tubing'
PEX pipes ½"
Pvc overflow ¾"
5
Level check
5
Level check
6
6
3
drain
water
valve
5
Level check
6
pump
4
dechlor
N P K
CSM+B
2
1
0

VNC, SSH, HTTPv

Phone in
- receive alerts
- check parameters
- perform actions (waterchange)

Google data API
(publish temperature graph)
PH, stats etc

- all scheduling logic
- command line interface
- telephony server
- http api

USB

Temperature sensors ds1820

6

One Wire

Water level check

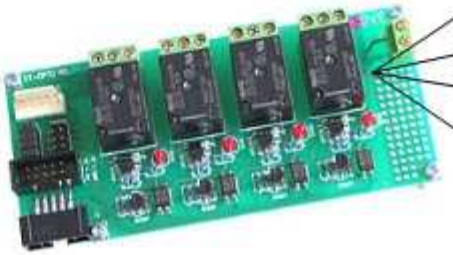
5

TTL 0-5V

A/D

Ph ? (to do)

TTL 0-5V



110V

1

2

3

4

Monitor Parameters Online

Parameter Tracker

This is a chart, part of a prototype for an aquarium controller that I am working on. The controller will record various tank parameters (temperatures, ph, level, etc) and create nice visual charts, that are easy to navigate, can be marked with notes (like fish breeding), etc. More to come.

Don't want to DYI ?

- Aqua Controller Apex Jr System

Starting at $149.95

- Reef Angel Controller

Starting at $219


12:49 AM
My Photo
Browser
My Video
App Market
My Music
Camera
Settings
File Browser
Youtube
Picture Cap
Wi-Fi setting
00:49
16

$70-$90 on eBay


7"ePad
Full support flash
Android 2.2
Google
WiFi
2.2
Tablet PC
7" MID
Android 2.2 VIA8650 MID
Free
ePad
2GB
WiFi
7"Google EPAD
WiFi
Android 2.2
market
3G

Interface

Aquarium Controller

water level low	water level low	water level low
23.5°C | 74.30°F	25.5°C | 77.90°F	27.37°C | 81.27°F

Dechlor	CO2	Lights 2	Lights 1	Fertilizers - CSM+B Iron / AIR PUMP	Fertilizers - NPK / AIR PUMP	Fresh Water From Tap / VALVE	Treated Water Into Tanks / PUMP
on5	on6	on7	on8	on9	on10	on11	on12
off5	off6	off7	off8	off9	off10	off11	off12

WaterChange

NPK: 13/20 Iron: 13/16 Dechlor: 14/40 PH:6.64

Reset : NPK | Iron | Dechlor

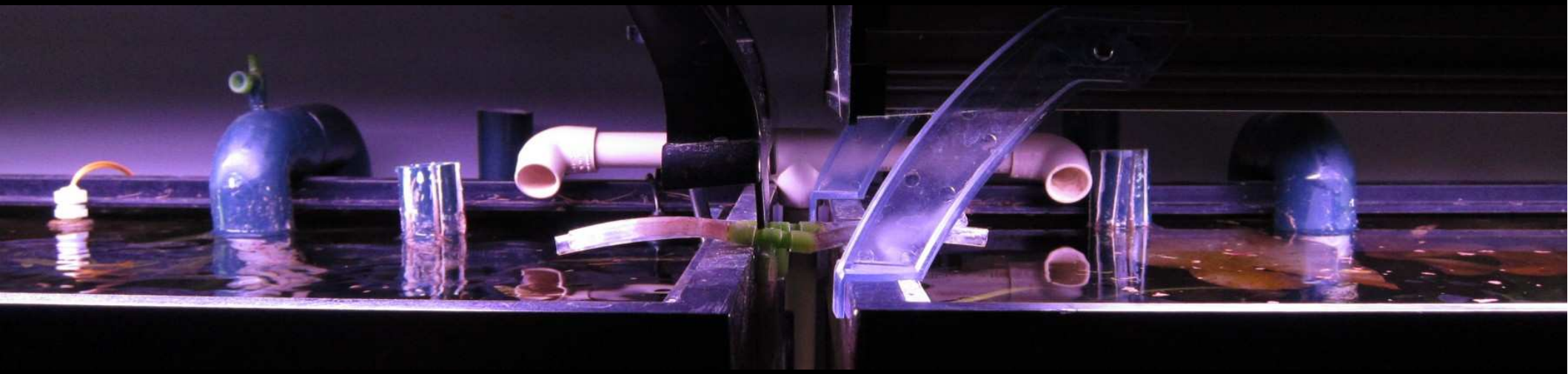
Parts and costs

Arduino	$25	1	$25	http://www.amazon.com/gp/product/tags-on-product/B001VK18HC
Relay Board(4 relays)	$15	2	$30	http://www.futurlec.com/Opto_Relay_4.shtml
Temp sensors	$5	3	$15	ebay - onewire ds1820
Breadboard	$6	1	$6	RadioShack, ebay
Wires, resistors, etc	$10	1	$10	futurlec, adafruit, ebay
Ph Probe	$20-$80	1	$25	
Ph Stamp	$25 (was $15)	1	$15	https://www.atlas-scientific.com/Embedded_Solutions.html
Water level sensors	$2	3	$6	ebay
Air pumps	$6	3	$18	dr foster and smith
Water solenoid	$12	1	$12	ebay
Power strips	$5-$7	2	$10	Home Depot
9V DC power supply	$6	1	$6	
Plumbing: PVC, PEX, fittings, bucket, hose, etc	$~50		$50	HomeDepot , Lowes

May I use your code ?

- Yes
- via SVN repository
  - Arduino code
  - Java code for the controller
  - USB drivers and documentation
  - Configuration files
- email (eugen@gwu.edu or PM on gwapa forum) and I will grant access to the code if you need it

http://www.cvreefers.org/showthread.php?8073-DIY-Overflow




Chocolate


BELKIN