

## Weekly Assignment 7, Clare Churchouse – photocell sensor project

Recording light change over day-time on windowsill to find optimal light/placing for edible plants. Inspired by attempts to grow plants at home with buildings going up across the street. Also by recent coverage of Farmshef at NewLab (*“Turning your living room into a farm via advanced hydroponic agriculture”*) and Gotham Greens rooftop urban agriculture.

One of Gotham Green’s farms on rooftop in Greenpoint, Brooklyn, NYC



Grow edible plants indoors – many benefits:

Health – choose not to use fertilizers, pesticides, and herbicides – result is chemical-free vegetables right at your fingertips, organic, fresh, ready to pick and eat

Ecological - lower environmental footprint - reducing the carbon emissions and waste created by shipping and packaging vegetables

Best plants to grow indoors and how to grow them:

<http://greatist.com/health/best-plants-to-grow-indoors>

Light level in NY apartments – do apartments get enough light to grow edible plants? Use a photocell sensor to measure light during the day in different places.

Questions:

1. what times of day do the plants get light?
2. when there is sunlight is the reading bright or very bright?
3. what is the light reading when the sun is blocked out by buildings?
4. which windowsill is brighter / can all the windowsills be used for growing plants?
5. overall assessment of light during the day - is there enough light to grow edible plants indoors?

Data collection: collect data from 3 windows – 1, 2 and 3 - during daylight hours (6.30am – 6.30pm) over 3 weeks. w1: day 1; w2: day 2; w3: day 3; w1: day 4; w2: day 5; w6: day 6. Repeat for 2 more weeks. Collect light reading and time, 5000 delay, to plot light against time. Checked light against readings to group brightness into very bright; bright; light; dim; very dim; dusk; nearly dark; night.



Plants on windowsill



Windows 1, 2 & 3 – sun going about to go behind window 1 – same time view from windows 2 & 3



```
sketch_oct23a_light3 | Arduino 1.6.12

// initialize the serial port
// and declare inputs and outputs
void setup() {
  pinMode(LDR, INPUT);
  Serial.begin(9600);
}

// read from the analog input connected to the LDR
// and print the value to the serial port.
// the delay is only to avoid sending so much data
// as to make it unreadable.

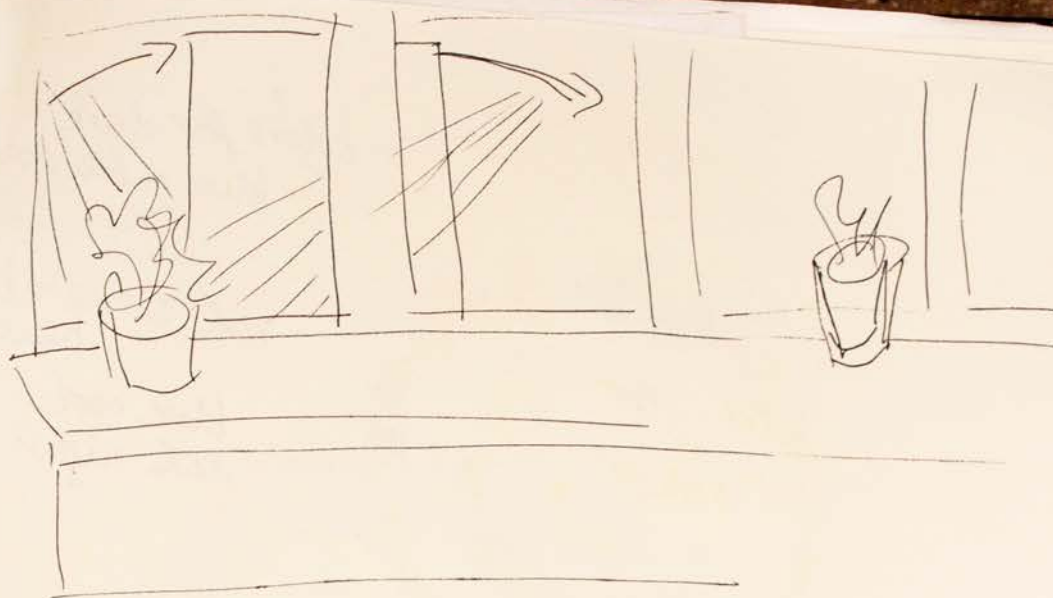
void loop() {
  int photocellReading = analogRead(photocellPin);
  // Serial.println(photocellReading);
  int v = analogRead(LDR);
  Serial.write(" ");
  Serial.println(v);

  if (photocellReading < 50) {
    Serial.write(" Night:");
  } else if (photocellReading < 200) {
    Serial.write(" Nearly dark:");
  } else if (photocellReading < 350) {
    Serial.write(" Dusk:");
  } else if (photocellReading < 500) {
    Serial.write(" Very dim:");
  } else if (photocellReading < 650) {
    Serial.write(" Dim:");
  } else if (photocellReading < 800) {
    Serial.write(" Light:");
  } else if (photocellReading < 950) {
    Serial.write(" Bright:");
  } else {
    Serial.write(" Very bright:");
  }
  delay(5000);
}
//startTime 6.30am, endTime 6.30pm
```

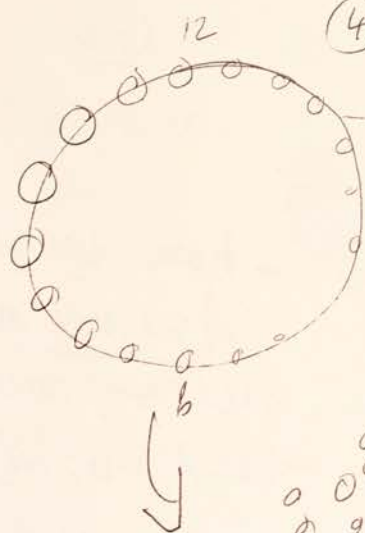
Data visualization: since collecting data in the Fall, can use 12-hour time circle to show data. Looked at Georgia Lupi , NYT visualization, and other examples, e.g. [http://www.nytimes.com/interactive/2012/10/15/us/politics/swing-history.html?\\_r=0](http://www.nytimes.com/interactive/2012/10/15/us/politics/swing-history.html?_r=0)

Drawing ideas below – circles – each circle representing 12 hours, each concentric circle for each week. Three circles, one for each window.





- ① What times during the day does a plant get light?
- ② Is the sunlight bright / very bright?
- ③ What is the light <sup>reading</sup> when the sun is behind the new building?



- ④ Which windowsill is brighter / can they all be used for plants?

12 hrs period - 1 day  
size of circle / strength sunlight

- ⑤ Is there enough sun to grow plants indoors?



x several ~~to~~ days  
spread circles out  
/ more 3D pattern



Assign color to each group – yellow for very bright – to red for dark. Or through green to dark blue / black?

Hover over dot to get reading – when cursor highlights dot, the whole timeline for that day is highlighted as well. Or have dots being shown in real time as each reading is logged – sequentially around the circle, completing one complete circle per 12 hour day. Each concentric circle for each week so dots overlap to an extent. Use semitransparency so stronger color where overlap. Consider, instead of dots, having lines that are longer if light reading is higher, i.e. brighter – might look of sunlight to circles.

colors for dark -  
blue rather than  
red

red connects  
heat

blue cool  
dark "night"



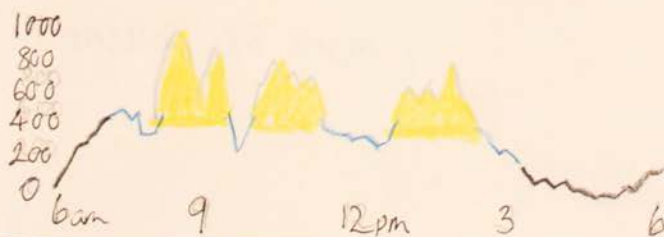
dots/lines semi-transparent so aggregate - darker

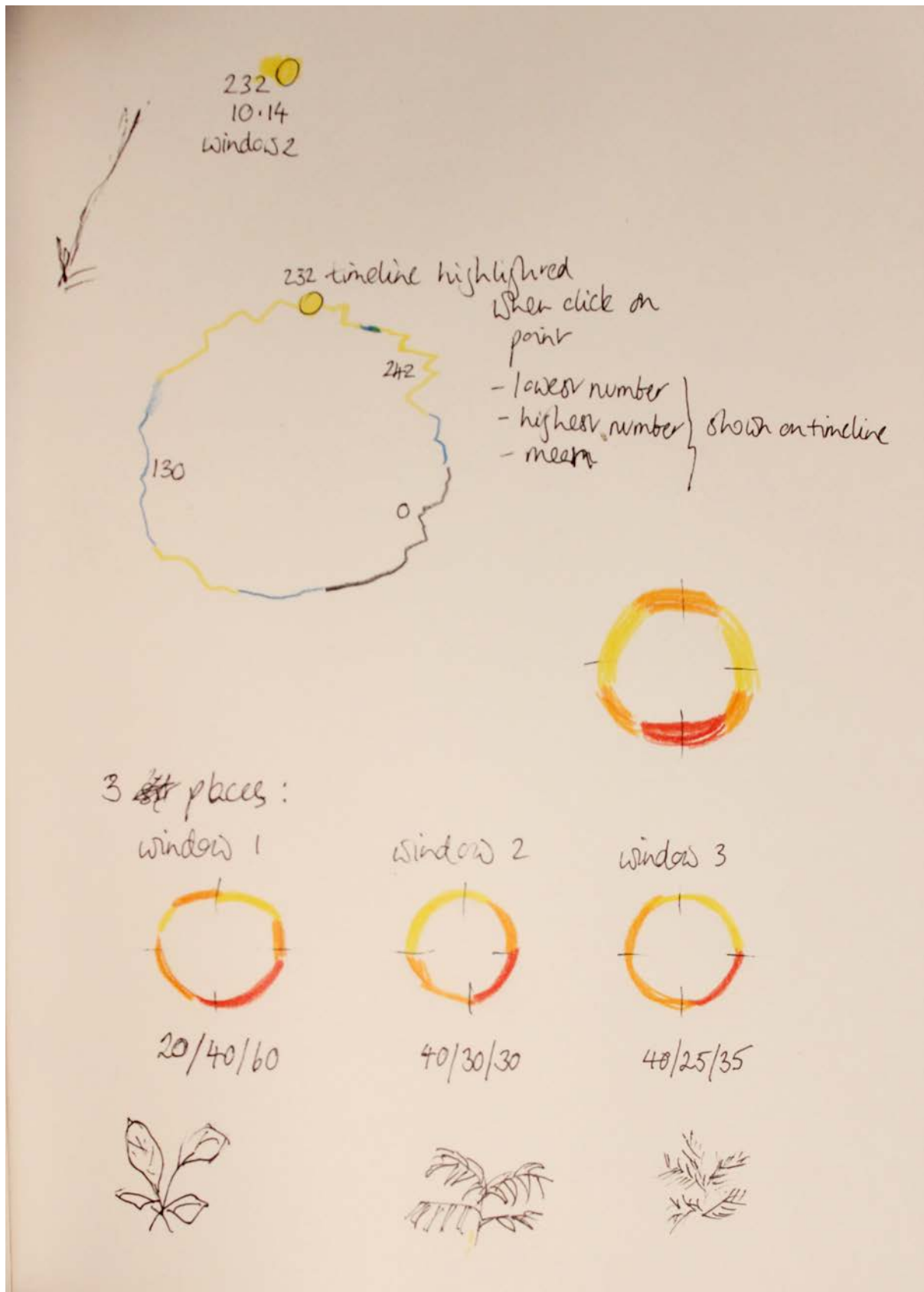
- show details on  
hover

- highlight timeline  
color on  
hover



- have dots move  
in sequence as -  
speeded up timeline  
- larger when highlighted  
continually moving





Dot is highlighted when you hover it, as is the circular timeline it is part of, i.e. all the readings from 12 hours are highlighted.