

12/16/17 Wall approacher Project

Project description:

- I have this lego robot I build with a continuous rotation servo and a distance sensor mounted on the front. I want to make a robot that stays a certain distance away from the wall. If it is too close, it moves backwards and vice-versa. I will use the Photon Particle board because I have one lying around but today I won't be using the cloud programming feature and will program and collect data from a USB serial connection.

Tools Used:

- Hardware:
 - Particle Photon
 - Lego Robot
 - Breadboard + 22 gauge wires
 - Continuous rotation servo: Vigor VS-2
 - Sharp distance sensor
 - Webcam mounted above table to record
 - Macbook air to run code
- Software
 - <https://github.com/jhaip/stream-logger/> logger.py
 - "pfgp" CLI tool
 - <https://github.com/jhaip/seriallogger2> app to visualize data and record notes (runs in Google Chrome web browser)
 - <https://github.com/jhaip/seriallogger2/tree/master/streaming> to record camera stream

Tweet size annotations (missing filled in later)

- (2017-12-16T15_19_01-0500) Project start
- (2017-12-16T20:24:49.773652+00:00) First notebook entry
- (2017-12-17T03:38:07.748613+00:00) Notebook entry recording distance sensor research and wiring
 - this is the datasheet I found and used from Adafruit:
[http://www.sharp-world.com/products/device/lineup/data/pdf/datasheet/gp2y0a21yk_e.pdf](http://www.sharps-world.com/products/device/lineup/data/pdf/datasheet/gp2y0a21yk_e.pdf)
 - Wiring:

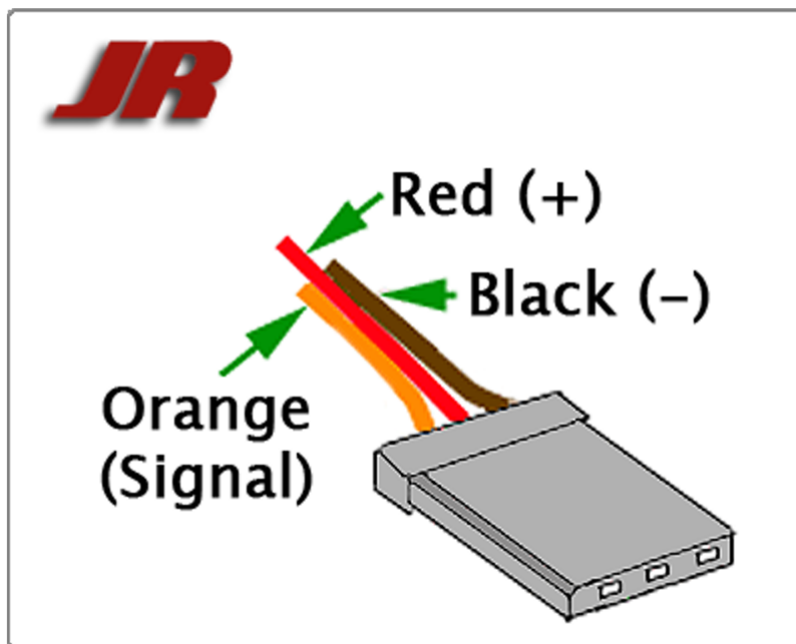
```
My wiring is remapped to:  
1. V_o (signal) --> Photon A0  
2. Power --> Photon 3V3  
3. Ground --> Photon Ground
```

Java/C/C++/C# ▾

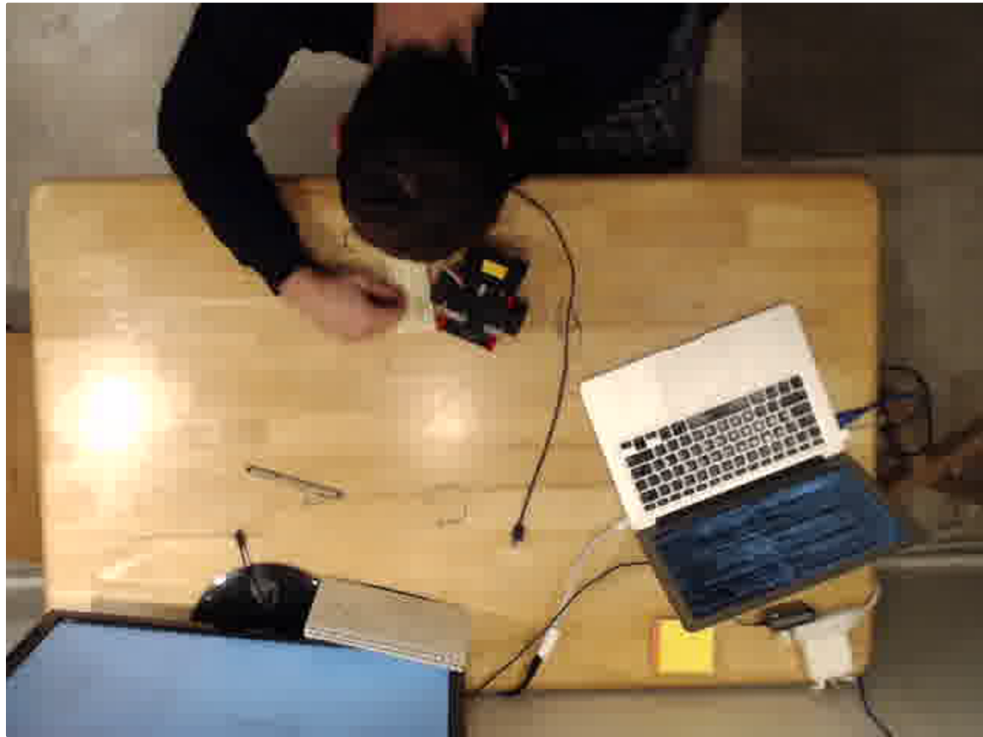
- (2017-12-16T15_55_40-0500 - 2017-12-16T15_56_27-0500) Wired the sensor
 - clip/screenshot
 - out2017-12-16T15_56_01-0500.png



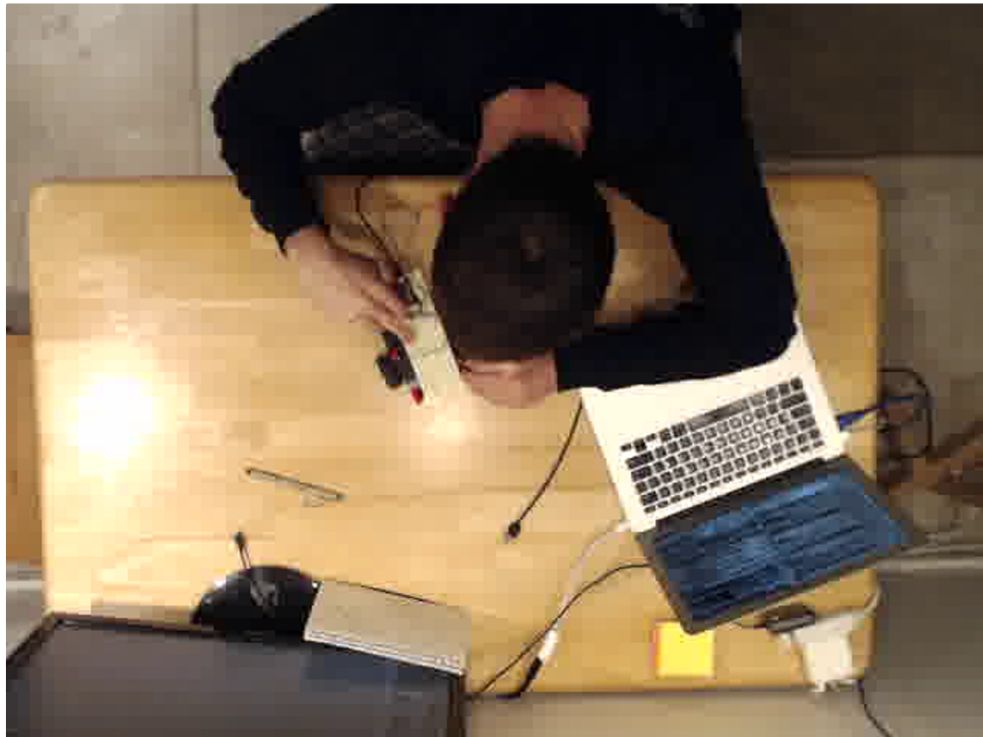
- (Sat Dec 16 16:01:15 2017 -0500) Upload sensor code
- ...messaging around trying to get serial data logged to [Adafruit.io](https://adafruit.io) with my logger.py code
- (Sat Dec 16 16:18:29 2017 -0500) reduced frequency of serial prints to make visualizing easier
- (2017-12-16T21:38:00.000Z - 2017-12-16T21:40:41.301Z) Gather sensor code data
- (2017-12-16T22:06:10.317328+00:00) Notebook entry about motor wiring research
 - I found this image:
<http://www.fatlion.com/sailplanes/images/jrconnector.png>



- (2017-12-16T16_45_07-0500 - 2017-12-16T16_48_49-0500) Wire motor
 - out2017-12-16T16_46_47-0500.png



- (2017-12-16T16_48_49-0500) Zip tie breadboard on top of robot
 - out2017-12-16T16_48_49-0500.png



- (Sat Dec 16 16:52:39 2017 -0500) Upload motor test code: back and forth
- (Sat Dec 16 16:53:45 2017 -0500) Upload motor test code: one direction more than the other to figure out code → movement
 - clip: it moves backwards
- (Sat Dec 16 17:00:03 2017 -0500) Upload integrated code: with

proportional error handling

- clip over moving and handling change in distance
- graph of error over time
- (2017-12-16T17_09_50-0500) Project end

Sources:

video:

```
import requests
url = "http://10.0.0.223:8080/api/"
params = [("start", start.isoformat()), ("end",
end.isoformat())]
r = requests.get(url, params=params)
if r.status_code == 200:
    data = r.json()["results"]
    for d in data:
        d["value"] = d["url"]
    return data
return []
```

Javascript ▾

video_html:

```
results = []
for d in dependent_data["video"]:
    url = d["value"]
    a = ""
    
    "".format(url)
    results.append({"timestamp": d["timestamp"], "value":
a})
return results
```

Javascript ▾

serial:

```
import requests
url =
```

```

"https://io.adafruit.com/api/v2/jhaip/feeds/serial-log-
data/data"
    params = [{"start_time", start.isoformat()},
("end_time", end.isoformat())]
    headers = {"X-AIO-Key":
"3a3688bc5a6f46da9c5281823032892f"}
    r = requests.get(url, params=params, headers=headers)
    if r.status_code == 200:
        data = r.json()
        for i in range(len(data)):
            data[i]["timestamp"] = data[i]["created_at"]

    return data
return []

```

Javascript ▾

Code:

- (Sat Dec 16 17:00:03 2017 -0500) Commit:
4d8c84426a586335bf9de6e6f2d5ac1dec8f6088 "Photon firmware
flash of wall_robot_2"
 - wall_robot_2.ino

```

int servoPin = D0;
Servo myServo;
int servoPos = 0;

void setup() {
    myServo.attach(servoPin);
    myServo.write(67);
    Serial.begin(9600);
}

void loop() {
    delay(200);
    int goal = 2500;
    int val = analogRead(A0);
    int error = val-goal;
    error = error / 20;
    Serial.println(error);

    mvServo.write(67+error):

```

```
}
}
```

Java/C/C++/C# ▾

- (Sat Dec 16 16:53:45 2017 -0500) Commit:
b348c92e5577558fc2aa5c3e80c774bc0ad71240 "Photon firmware
flash of wall_robot_2"

```
myServo.write(67+10);
- delay(1000);
+ delay(2000); // move forward more than backward
myServo.write(67-10);
delay(1000);
}
```

- (Sat Dec 16 16:52:39 2017 -0500) Commit
91b19b73b19dbf99dcd239d41c50259c83289c3f "Photon firmware
flash of wall_robot_2"

- wall_robot_2.ino

```
int servoPin = D0;
Servo myServo;
int servoPos = 0;

void setup() {
    myServo.attach(servoPin);
    myServo.write(67);
    Serial.begin(9600);
}

void loop() {
    /*int val = analogRead(A0);
    Serial.println(val);
    delay(1000);*/

    myServo.write(67+10);
    delay(1000);
    myServo.write(67-10);
    delay(1000);
}
```

```
delay(1000);
}
```

Java/C/C++/C# ▾

- (Sat Dec 16 16:18:29 2017 -0500) Commit
f21522023cf870fe84ae21190cfec0ee9932387e "Photon firmware
flash of wall_robot_2"

- ```
void loop() {
 int val = analogRead(A0);
 Serial.println(val);
 - delay(100);
 + delay(1000);
}
```

 (00) Commit  
7400cbd92547d7296 "Photon  
"  
[seriallogger2/blob/907a7624689a3688  
6f3b5427400cbd92547d7296/photon/wall\\_robot\\_2/wall\\_robot\\_2  
.ino](https://github.com/seriallogger2/blob/907a7624689a36886f3b5427400cbd92547d7296/photon/wall_robot_2/wall_robot_2.ino)

- wall\_robot\_2.ino

```
void setup() {
 Serial.begin(9600);
}

void loop() {
 int val = analogRead(A0);
 Serial.println(val);
 delay(100);
}
```

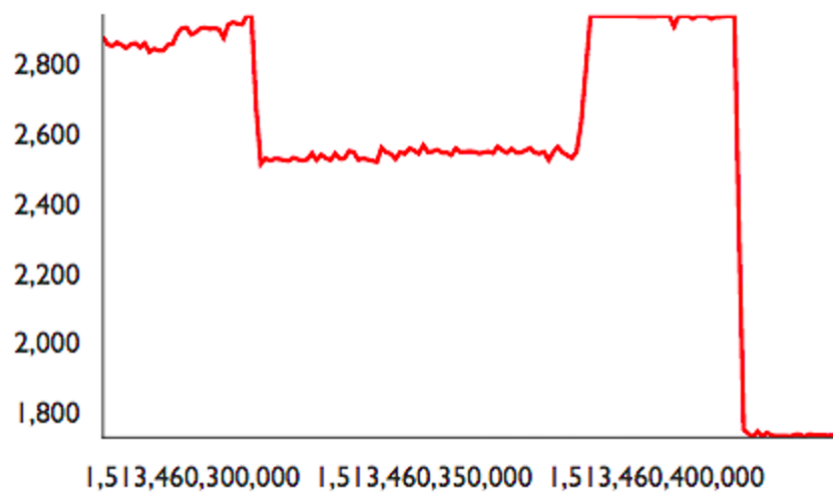
Java/C/C++/C# ▾

## Data

Sensor values:

```
<Embed source="serial" start="2017-12-16T21:38:00.000Z"
end="2017-12-16T21:40:41.301Z" visualType="line graph">
</Embed>
```





Error readings:

(won't plot easily because multiple values in the same time range)

```
<Embed source="serial" start="2017-12-16T22:03:00.000Z"
end="2017-12-16T22:04:00.000Z" visualType="raw"></Embed>
```

Javascript ▾

```
serial, 6 hours ago
```

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```

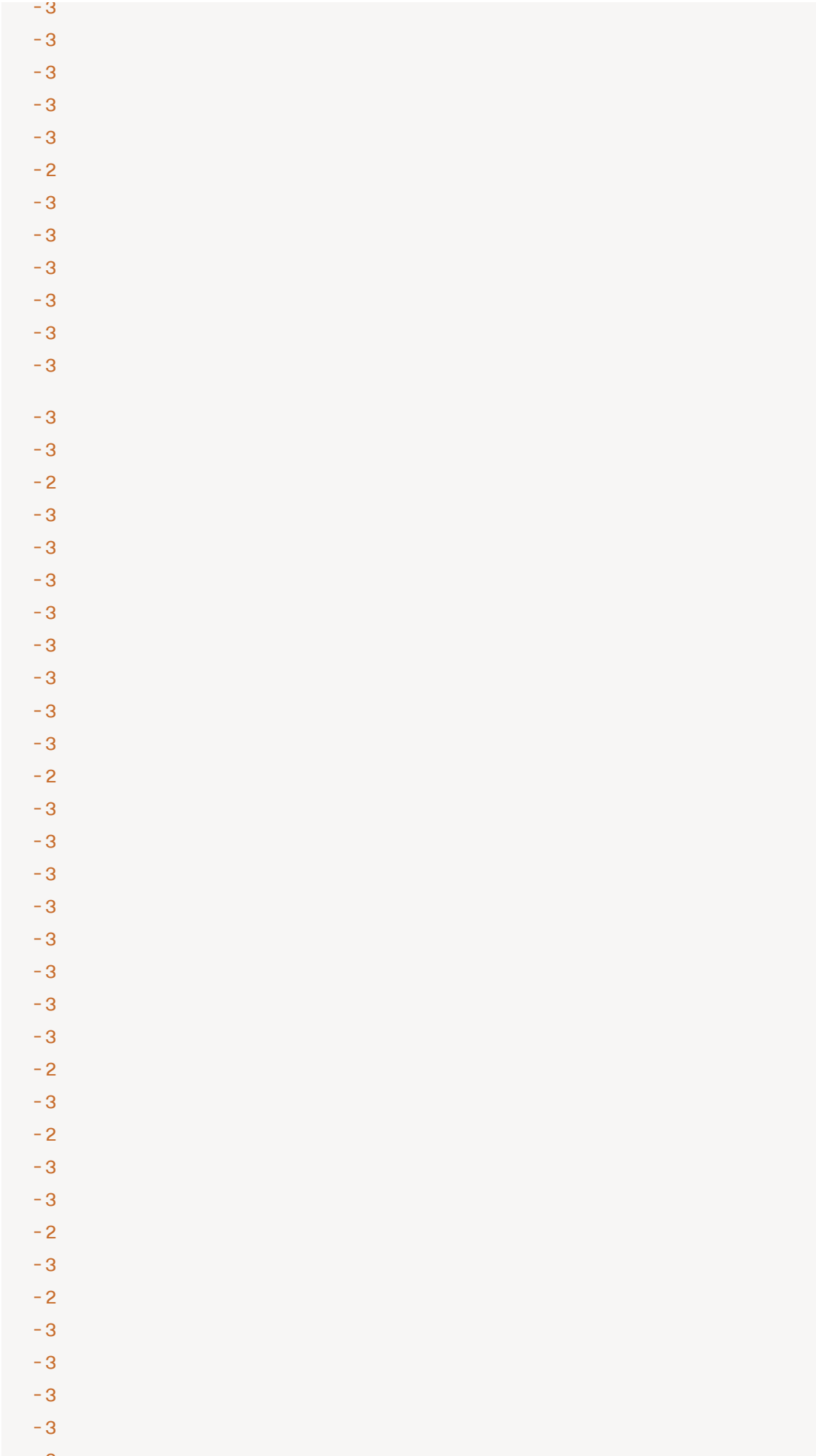
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serial, 6 hours ago

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Javascript ▾

## Notebook entries:

## First:

Created: 2017-12-16T20:24:49.773652+00:00

Last modified: 2017-12-16T20:24:49.773720+00:00

Today I'm going to remake the wall approaching robot. It is already build but I ripped out the wiring so I don't remember how to wire it and I'll start the code from scratch.

First I need to figure out what Photon I'm using.

I am using IR temperator sensor 2

Javascript ▾

## Distance Sensor

Created: 2017-12-17T03:38:07.748613+00:00

Last modified: 2017-12-17T03:38:07.748696+00:00

Based on [this](http://www.sharp-world.com/products/device/lineup/data/pdf/datasheet/gp2y0a21yk_e.pdf) data sheet: [http://www.sharp-world.com/products/device/lineup/data/pdf/datasheet/gp2y0a21yk\\_e.pdf](http://www.sharp-world.com/products/device/lineup/data/pdf/datasheet/gp2y0a21yk_e.pdf)

The wiring is

1. V\_o
2. Gnd
3. V\_cc

My wiring is remapped to:

1. V\_o (signal) --> Photon A0
2. Power --> Photon 3V3
3. Ground --> Photon Ground

<Embed source="serial" start="2017-12-16T21:38:00.000Z" end="2017-12-16T21:40:41.301Z" visualType="line graph">  
</Embed>



```
<Embed source="serial" start="2017-12-16T21:38:00.000Z"
end="2017-12-16T21:40:41.301Z" visualType="text"></Embed>
```

Javascript ▾

## Motors

Created: 2017-12-16T22:06:10.317328+00:00

Last modified: 2017-12-16T22:06:10.317370+00:00

Mapping:

1. Brown -> Grey -> Brown = Ground GND
2. Red -> Grey -> Red = Power = 3.3V
3. Orange -> Red -> Orange = signal = D0

Vigor VS-2 servo

Error codes:

```
<Embed source="serial" start="2017-12-16T22:03:00.000Z"
end="2017-12-16T22:04:00.000Z" visualType="raw"></Embed>
```

It works well!

Javascript ▾