

Easy Way Out: Get a vive and scrape the set up data.

Hard way:

We need to calculate the Rotational Matrix in a given room configuration.

These are also called Euler angles. These are Yaw Pitch and Roll.

<http://mathworld.wolfram.com/EulerAngles.html>

<http://planning.cs.uiuc.edu/node102.html>

Issue I found was that the lighthouse code things of y+ as the up and down and z is horizontal to you along with x.

Reason: <https://github.com/ashtuchkin/vive-diy-position-sensor/wiki/Position-calculation-in-detail>

http://nghiaho.com/?page_id=846 This is really good for composing and decomposing a matrix

Currently we're trying to keep the heights the same and then just try and figure out if I can calculate the rotational matrices

$$R_z(\alpha) = \begin{pmatrix} \cos \alpha & -\sin \alpha & 0 \\ \sin \alpha & \cos \alpha & 0 \\ 0 & 0 & 1 \end{pmatrix}.$$

yaw

$$R_y(\beta) = \begin{pmatrix} \cos \beta & 0 & \sin \beta \\ 0 & 1 & 0 \\ -\sin \beta & 0 & \cos \beta \end{pmatrix}.$$

pitch

$$R_x(\gamma) = \begin{pmatrix} 1 & 0 & 0 \\ 0 & \cos \gamma & -\sin \gamma \\ 0 & \sin \gamma & \cos \gamma \end{pmatrix}.$$

roll

Rotational matrix R is given by $R_z * R_y * R_x$

Working CONFIG below (needs deeper understanding)



Pen indicates my positive x (black part is $+$ silver is $-$) and the ruler indicates my $+z$ in increasing inches



This is B1 its “pitch” (but looks more like yaw but that’s because of the coordinate systems in play here) is 180 degrees.

B1 Data:

Rotation about y axis (up) is 180

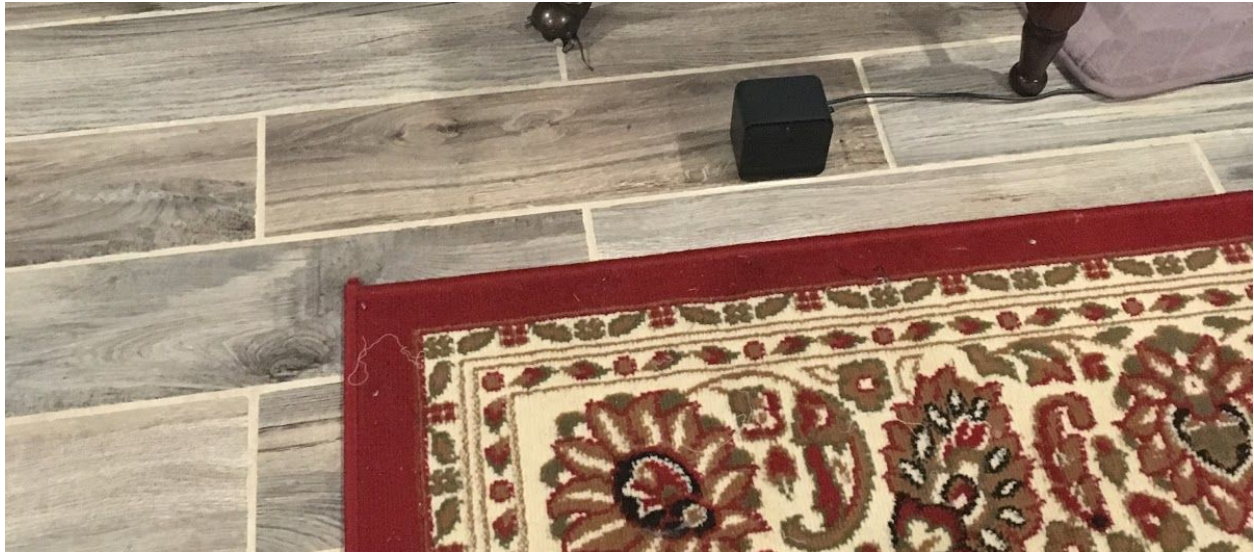
Yaw: 0

Pitch: 180

Roll: 0

Because of this config the Rotation matrix is really easy and becomes

$$\begin{vmatrix} -1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -1 \end{vmatrix}$$



This is B0 and it is pointing in line with my x+ axis (away from the rug)
So its "pitch" is 0 degrees

B0 Data:

Yaw: 0

Pitch: 0

Roll: 0

Because of this i get an IDENTITY matrix

$$\begin{vmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{vmatrix}$$



The whole set up.

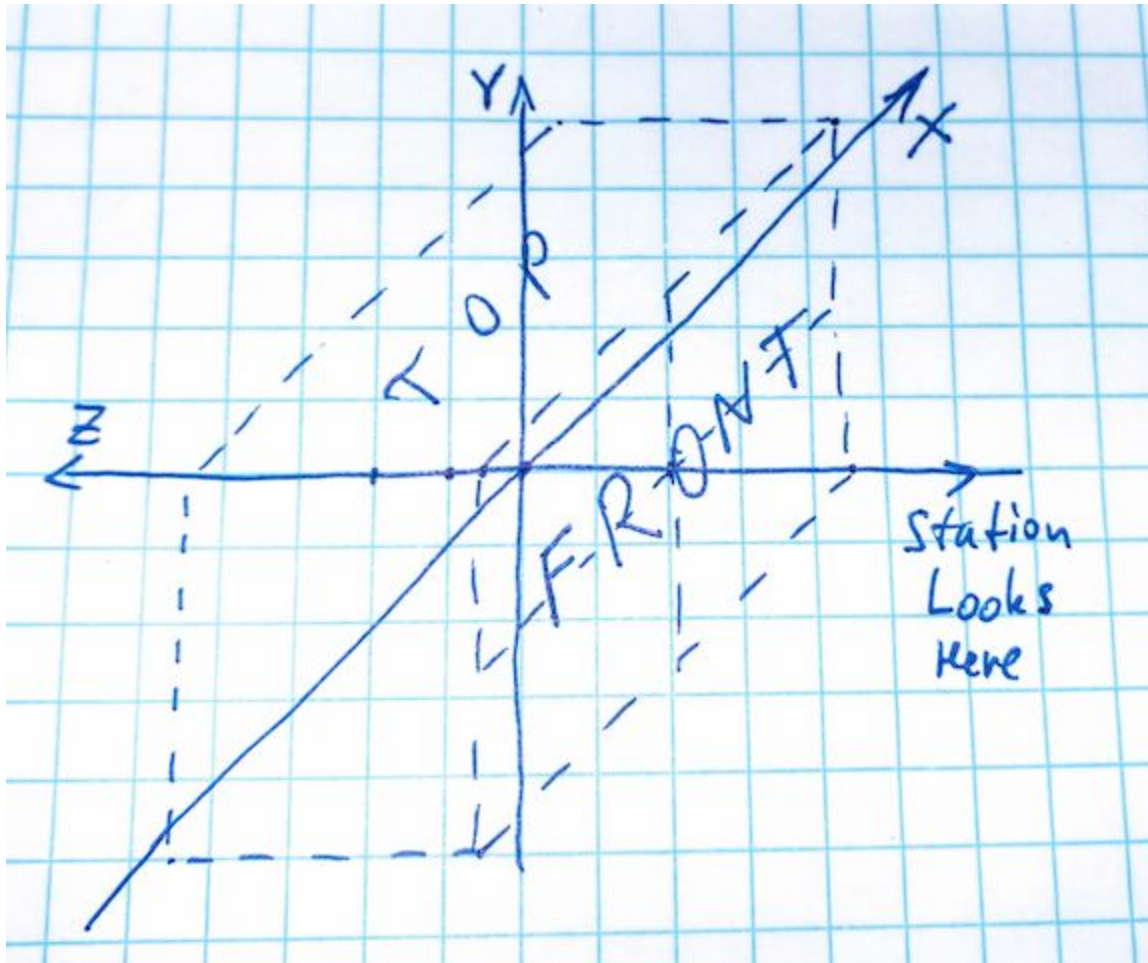
Now there's some error in where 0,0,0 is and other stuff but that's because i measured using a meter stick and eyeballing. Which can propagate errors. Also i could've gone into more sig figs to show thigns.

Here's what I plugged into the Teensy:

```
b0 origin -0.260000 0.030000 1.490000 matrix 1.000000 0.000000 0.000000 0.000000  
1.000000 0.000000 0.000000 0.000000 1.000000
```

```
b1 origin 0.255000 0.030000 -1.060000 matrix -1.000000 0.000000 0.000000 0.000000  
1.000000 0.000000 0.000000 0.000000 -1.000000
```

IMPORTANT PICS



Orientation of the basestations