# CONDITIONALS

LAB 05

SECTION 5

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SUBMISSION DATE-10/5/21

# PROBLEM

Determine how the DualShock 4 controller is oriented and interpret the acceleration values in more detail. Use acceleration and gyroscopic values to determine movement detection.

# ANALYSIS

We must output TOP when the DS4 is lying flat, BOTTOM when it is flipped over, LEFT when side with arrow buttons is down, RIGHT when its turned, FRONT when the LED bar is facing the ceiling and BACK when its facing down.

# DESIGN

- Use ds4rd.exe and the magnitude function from lab 03.
- Create 3 or more of your own functions to help with orientation.
- Code should end when Triangle button is pressed.
- A new line should be output only when orientation changes.

# TESTING

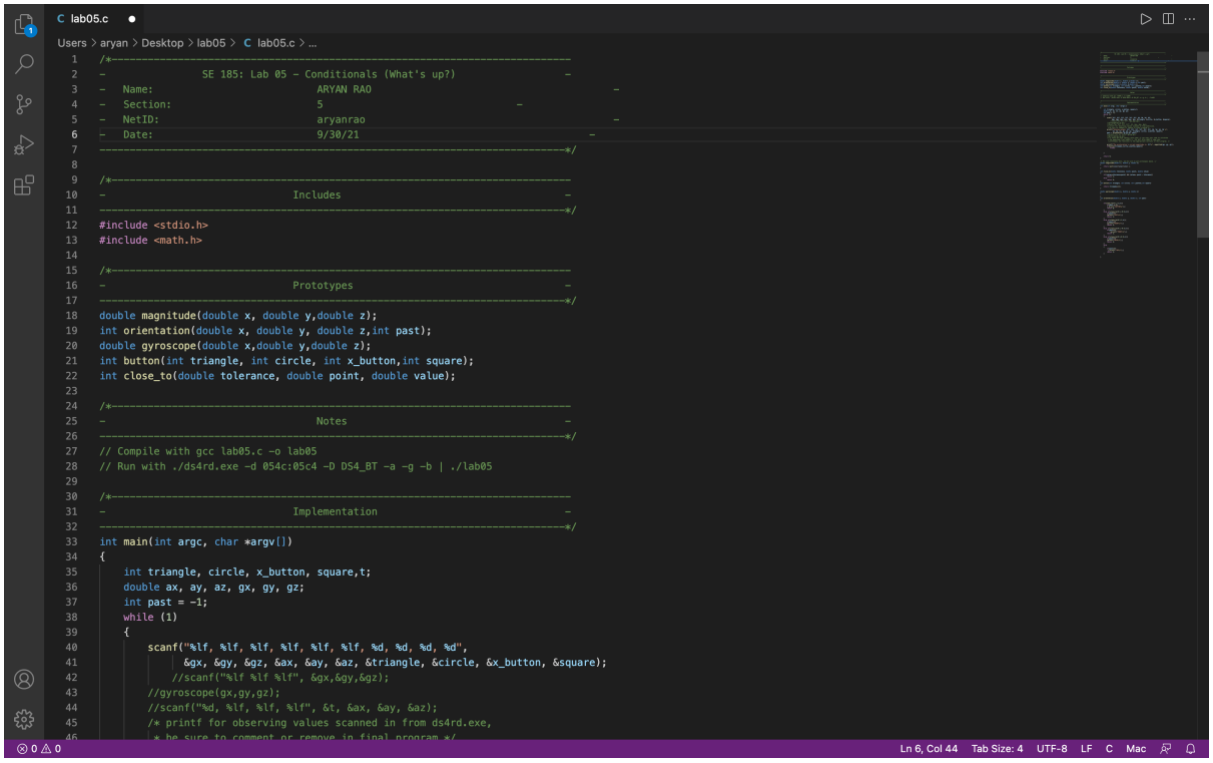
Calculate the value of acceleration using the gyroscopic values manually to compare them with the result we get.

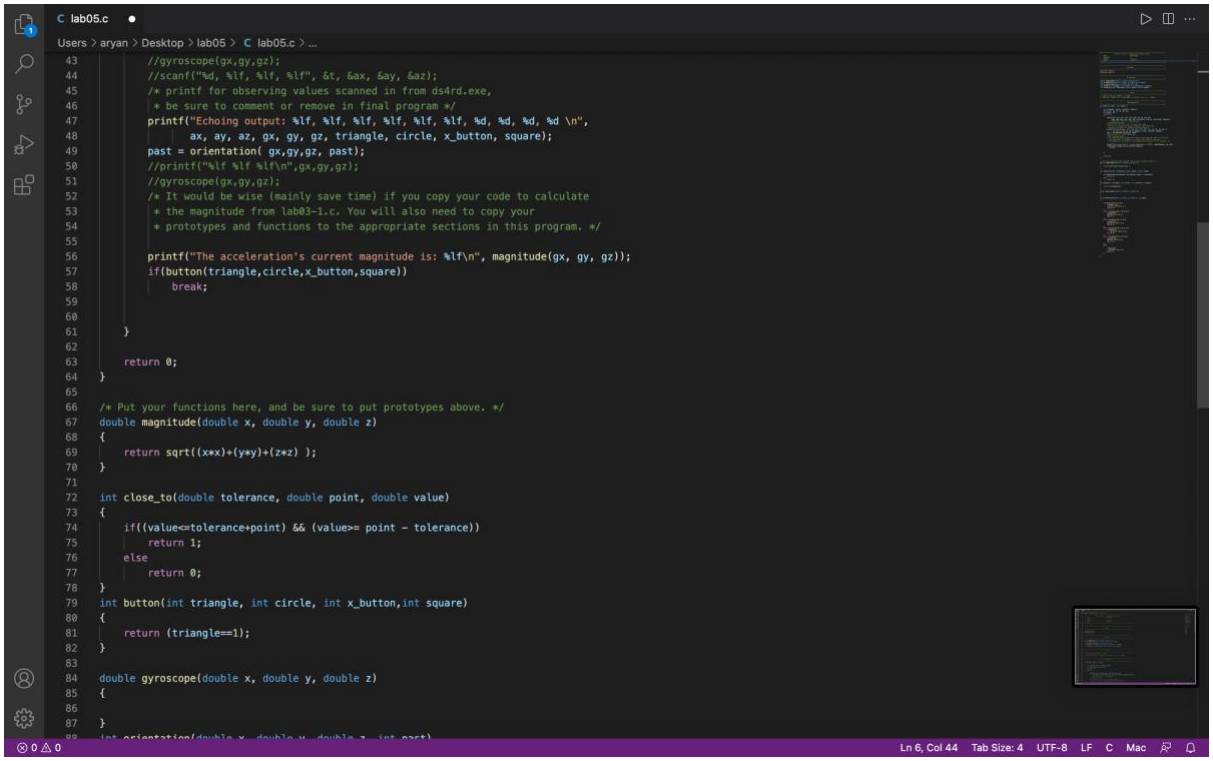
# COMMENTS

Be sure to use DS4_BT when the controller is connected with Bluetooth and DS4_USB when connected with the USB cable. Also, make sure that the close_to() function calculates the values correctly as the whole code might get affected because of that.

# SCREENSHOTS

# SOURCE CODE



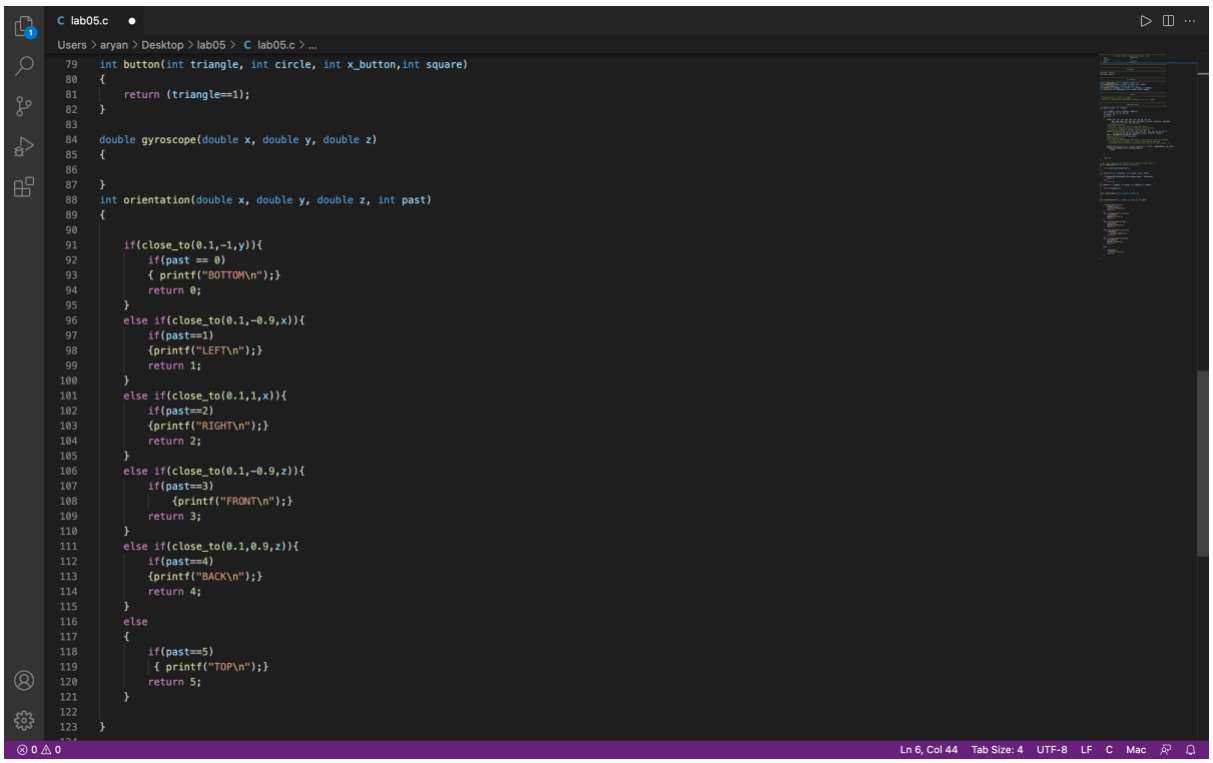


lab05.c

Users > aryan > Desktop > lab05 > lab05.c > ...

```
43          //gyroscope(gx,gy,gz);
44          //scanf("%d, %lf, %lf, %lf", &t, &ax, &ay, &az);
45          /* printf for observing values scanned in from ds4rd.exe,
46           * be sure to comment or remove in final program */
47          printf("Echoing output: %lf, %lf, %lf, %lf, %lf, %lf, %d, %d, %d, %d \n",
48                  ax, ay, az, gx, gy, gz, triangle, circle, x_button, square);
49          past = orientation( gx,gy,gz, past);
50          //printf("%lf %lf %lf\n",gx,gy,gz);
51          //gyroscope(gx,gy,gz);
52          /* It would be wise (mainly save time) if you copy your code to calculate
53           * the magnitude from lab03-1.c. You will also need to copy your
54           * prototypes and functions to the appropriate sections in this program. */
55
56          printf("The acceleration's current magnitude is: %lf\n", magnitude(gx, gy, gz));
57          if(button(triangle,circle,x_button,square))
58              break;
59
60
61      }
62
63      return 0;
64  }
65
66  /* Put your functions here, and be sure to put prototypes above. */
67  double magnitude(double x, double y, double z)
68  {
69      return sqrt((x*x)+(y*y)+(z*z) );
70  }
71
72  int close_to(double tolerance, double point, double value)
73  {
74      if((value<=tolerance+point) && (value>= point - tolerance))
75          return 1;
76      else
77          return 0;
78  }
79  int button(int triangle, int circle, int x_button,int square)
80  {
81      return (triangle==1);
82  }
83
84  double gyroscope(double x, double y, double z)
85  {
86
87  }
88  int orientation(double x, double y, double z, int past)
```





lab05.c

Users > aryan > Desktop > lab05 > lab05.c > ...

```
79  int button(int triangle, int circle, int x_button,int square)
80  {
81      return (triangle==1);
82  }
83
84  double gyroscope(double x, double y, double z)
85  {
86
87  }
88  int orientation(double x, double y, double z, int past)
89  {
90
91      if(close_to(0.1,-1,y)){
92          if(past == 0)
93          { printf("BOTTOM\n");}
94          return 0;
95      }
96      else if(close_to(0.1,-0.9,x)){
97          if(past==1)
98          {printf("LEFT\n");}
99          return 1;
100     }
101     else if(close_to(0.1,1,x)){
102         if(past==2)
103         {printf("RIGHT\n");}
104         return 2;
105     }
106     else if(close_to(0.1,-0.9,z)){
107         if(past==3)
108             {printf("FRONT\n");}
109         return 3;
110     }
111     else if(close_to(0.1,0.9,z)){
112         if(past==4)
113         {printf("BACK\n");}
114         return 4;
115     }
116     else
117     {
118         if(past==5)
119          { printf("TOP\n");}
120         return 5;
121     }
122
123 }
```

# OUTPUT

## COMPLETE:

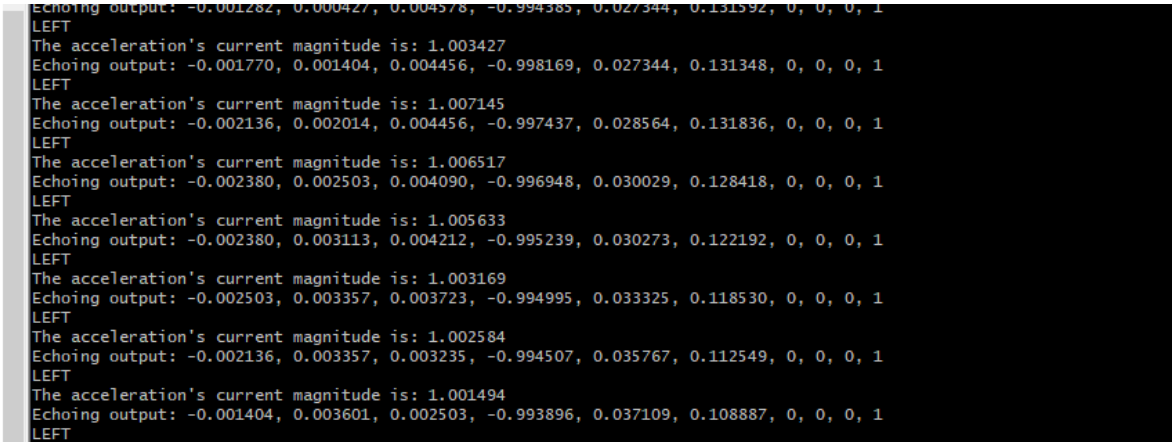
```
Echoing output: -0.012391, 0.003357, -0.005432, -0.029785, 0.938843, 0.008667, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.941504
Echoing output: -0.002380, 0.003113, 0.004212, -0.995239, 0.030273, 0.122192, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.003169
Echoing output: -0.005310, 0.000061, 0.000793, 0.001709, 0.201294, -0.974731, 0, 0, 0, 1
FRONT
The acceleration's current magnitude is: 0.995300
Echoing output: 0.004822, -0.012391, 0.002991, 0.957031, 0.020142, 0.206543, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.979272
Echoing output: -0.013123, 0.004334, 0.000549, 0.013306, -0.984375, 0.246704, 0, 0, 0, 1
BOTTOM
The acceleration's current magnitude is: 1.014906

[Done] exited with code=0 in 0.2 seconds
```

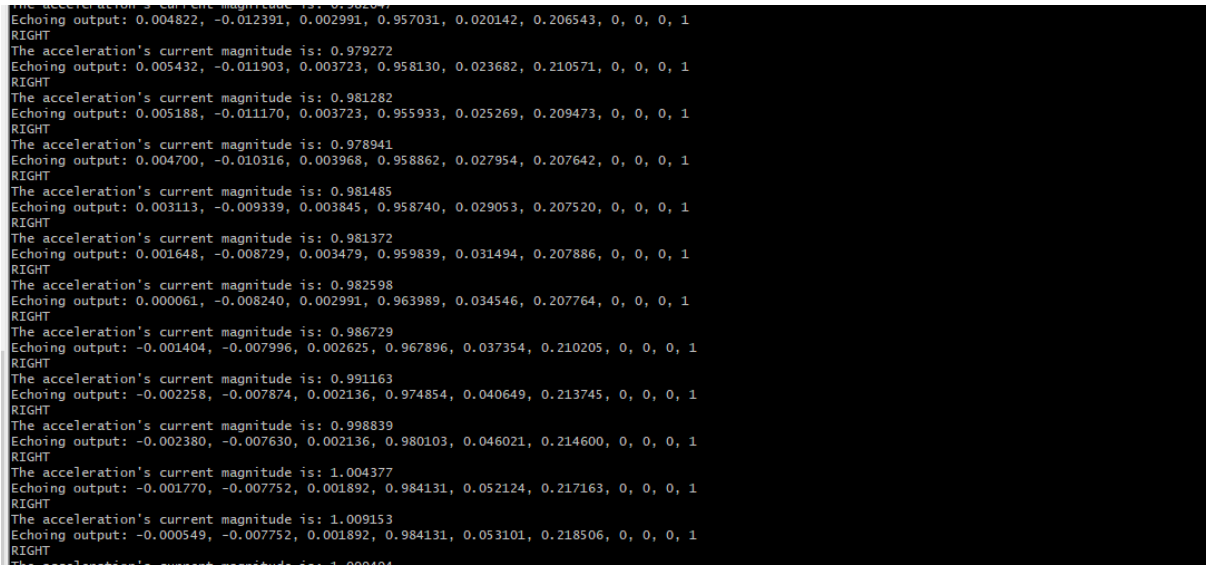
## TOP:

```
TOP
The acceleration's current magnitude is: 0.941504
Echoing output: -0.012391, 0.003357, -0.005432, -0.029785, 0.938843, 0.008667, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.939355
Echoing output: -0.013978, 0.003113, -0.004700, -0.031616, 0.939819, 0.010254, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.940407
Echoing output: -0.014955, 0.002869, -0.003845, -0.033081, 0.945435, 0.010376, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.946070
Echoing output: -0.015565, 0.002747, -0.003235, -0.033447, 0.949097, 0.013916, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.949788
Echoing output: -0.015565, 0.002258, -0.002503, -0.033325, 0.954346, 0.019287, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.955122
Echoing output: -0.015199, 0.001770, -0.001648, -0.035034, 0.958008, 0.023315, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.958932
Echoing output: -0.014100, 0.001038, -0.000916, -0.035278, 0.962891, 0.025635, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.963878
Echoing output: -0.013001, 0.000305, 0.000183, -0.033447, 0.962524, 0.030396, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.963584
Echoing output: -0.011048, -0.000549, 0.001648, -0.033447, 0.966309, 0.031128, 0, 0, 0, 1
TOP
The acceleration's current magnitude is: 0.967389
```

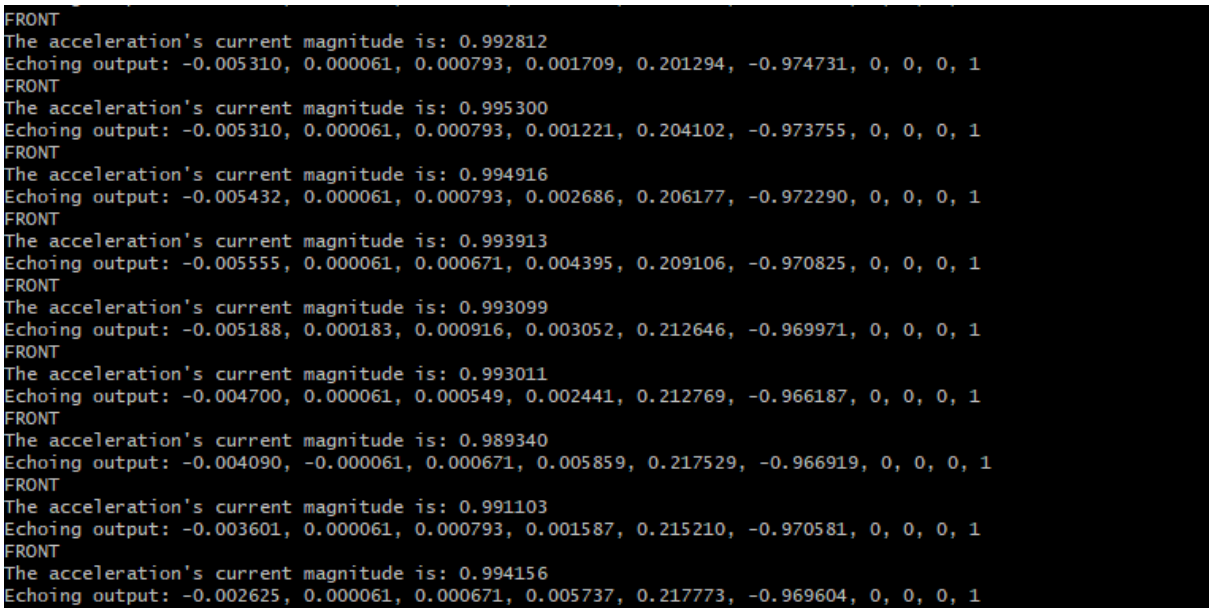
# LEFT:


LEFT
The acceleration's current magnitude is: 1.003427
Echoing output: -0.001770, 0.001404, 0.004456, -0.998169, 0.027344, 0.131348, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.007145
Echoing output: -0.002136, 0.002014, 0.004456, -0.997437, 0.028564, 0.131836, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.006517
Echoing output: -0.002380, 0.002503, 0.004090, -0.996948, 0.030029, 0.128418, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.005633
Echoing output: -0.002380, 0.003113, 0.004212, -0.995239, 0.030273, 0.122192, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.003169
Echoing output: -0.002503, 0.003357, 0.003723, -0.994995, 0.033325, 0.118530, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.002584
Echoing output: -0.002136, 0.003357, 0.003235, -0.994507, 0.035767, 0.112549, 0, 0, 0, 1
LEFT
The acceleration's current magnitude is: 1.001494
Echoing output: -0.001404, 0.003601, 0.002503, -0.993896, 0.037109, 0.108887, 0, 0, 0, 1
LEFT

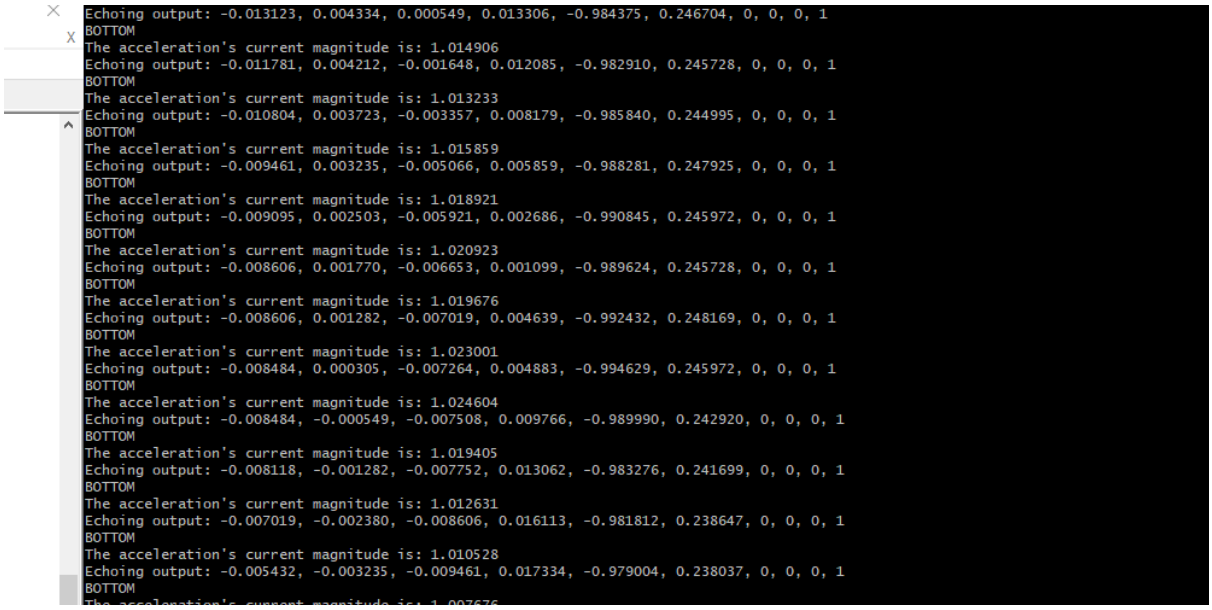
# RIGHT:


Echoing output: 0.004822, -0.012391, 0.002991, 0.957031, 0.020142, 0.206543, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.979272
Echoing output: 0.005432, -0.011903, 0.003723, 0.958130, 0.023682, 0.210571, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.981282
Echoing output: 0.005188, -0.011170, 0.003723, 0.955933, 0.025269, 0.209473, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.978941
Echoing output: 0.004700, -0.010316, 0.003968, 0.958862, 0.027954, 0.207642, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.981485
Echoing output: 0.003113, -0.009339, 0.003845, 0.958740, 0.029053, 0.207520, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.981372
Echoing output: 0.001648, -0.008729, 0.003479, 0.959839, 0.031494, 0.207886, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.982598
Echoing output: 0.000061, -0.008240, 0.002991, 0.963989, 0.034546, 0.207764, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.986729
Echoing output: -0.001404, -0.007996, 0.002625, 0.967896, 0.037354, 0.210205, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.991163
Echoing output: -0.002258, -0.007874, 0.002136, 0.974854, 0.040649, 0.213745, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 0.998839
Echoing output: -0.002380, -0.007630, 0.002136, 0.980103, 0.046021, 0.214600, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 1.004377
Echoing output: -0.001770, -0.007752, 0.001892, 0.984131, 0.052124, 0.217163, 0, 0, 0, 1
RIGHT
The acceleration's current magnitude is: 1.009153
Echoing output: -0.000549, -0.007752, 0.001892, 0.984131, 0.053101, 0.218506, 0, 0, 0, 1
RIGHT

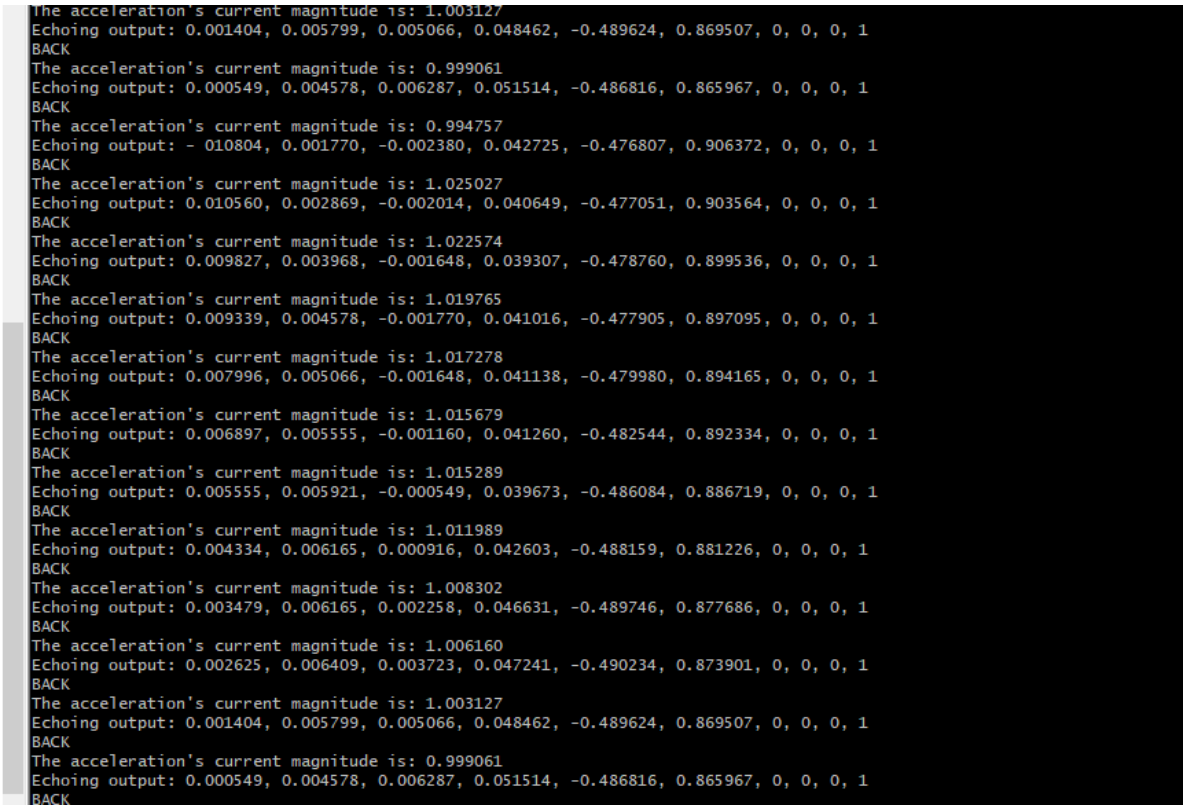
# FRONT:




# BOTTOM:



# BACK:


The acceleration's current magnitude is: 1.003127
Echoing output: 0.001404, 0.005799, 0.005066, 0.048462, -0.489624, 0.869507, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 0.999061
Echoing output: 0.000549, 0.004578, 0.006287, 0.051514, -0.486816, 0.865967, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 0.994757
Echoing output: - 010804, 0.001770, -0.002380, 0.042725, -0.476807, 0.906372, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.025027
Echoing output: 0.010560, 0.002869, -0.002014, 0.040649, -0.477051, 0.903564, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.022574
Echoing output: 0.009827, 0.003968, -0.001648, 0.039307, -0.478760, 0.899536, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.019765
Echoing output: 0.009339, 0.004578, -0.001770, 0.041016, -0.477905, 0.897095, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.017278
Echoing output: 0.007996, 0.005066, -0.001648, 0.041138, -0.479980, 0.894165, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.015679
Echoing output: 0.006897, 0.005555, -0.001160, 0.041260, -0.482544, 0.892334, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.015289
Echoing output: 0.005555, 0.005921, -0.000549, 0.039673, -0.486084, 0.886719, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.011989
Echoing output: 0.004334, 0.006165, 0.000916, 0.042603, -0.488159, 0.881226, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.008302
Echoing output: 0.003479, 0.006165, 0.002258, 0.046631, -0.489746, 0.877686, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.006160
Echoing output: 0.002625, 0.006409, 0.003723, 0.047241, -0.490234, 0.873901, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 1.003127
Echoing output: 0.001404, 0.005799, 0.005066, 0.048462, -0.489624, 0.869507, 0, 0, 0, 1
BACK
The acceleration's current magnitude is: 0.999061
Echoing output: 0.000549, 0.004578, 0.006287, 0.051514, -0.486816, 0.865967, 0, 0, 0, 1
BACK