

Conditionals

LAB # 5

SECTION # C

Akash Patel

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Problem

The problem for this lab was to display the orientation of the controller without printing the same orientation in a row and it should end the program when the triangle button is pressed.

Analysis

This program required to read points and tolerance and adjust the code using those to find the right ones to show the orientation. Learning about acceleration and gyroscope and how it effects orientation was pretty interesting.

Design

I made `GYRO_TOLERANCE = .3` and `ACCE_TOLERANCE = .02`. I also created a void `display_Orientation(char c)` to assign letters from the output of controller. I modified the while statement so that orientation is assigned to a letter depending on the gyro, axis and the acceleration(only works when controller isn't in motion). A conditional was created to break the program when `b1(triangle)` was pressed. And a conditional was created to make sure it wouldn't have the same output back to back. I used switch cases to assign the letters to the orientations such as top, bottom, left etc. `int close to function` returned true or false if the value was in range of tolerance and point.

Testing

I first ran the `ds4.exe` to get the values of gyro and acceleration. Then I implemented codes and tested to see if I was getting correct outputs and changed the code according to that. When it kept printing repeatedly I created a conditional to make sure it prints the orientation only once and put everything in the while loop so it prints only when the controller is facing the way and its not moving.

Comments

This one was a bit challenging. I used switch cases to make the prints easier and at first I had a hard time printing the orientation without it stopping after it was set one way. So it would pring left left left right right right. I also put the `close to gyro` inside the `close to acce, 0, mag` so it would print when `acce` is close to 0. It gave me a good understanding of the controller and the tolerances.

1. I approached it by just creating print statements and learning which flags I needed.
2. I had to read in the gyro, and acceleration data and the buttons being pressed
3. I implemented the `mag` function, a `close_to` function and a void `display_orienation` function. The `mag` function. The `close to` function was implemented to use only the data that feel in range and the `display` function was used as a callback for returning characters.

4. I used .3 because all the values seemed to fall in range with that and I used .02 for acceleration so it would print the characters when it was within that and 0 in the while loop.

Source Code

```
/*-----  
-                               SE 185 Lab 04  
-       Developed for 185-Rursch by T.Tran and K.Wang  
-       Name:   
-       Section:   
-       NetID:   
-       Date:   
-----*/  
  
/*-----  
-                               Includes  
-----*/  
#include <stdio.h>  
#include <math.h>  
  
/*-----  
-                               Defines  
-----*/  
#define TRUE 1  
#define FALSE 0  
  
/*-----  
-                               Prototypes  
-----*/  
double mag(double x, double y, double z);  
int close_to(double tolerance, double point, double value);  
const double GYRO_TOLERANCE = .3;  
const double ACCE_TOLERANCE = .02;  
void display_Orientation (char c);  
  
/*-----  
-                               Implementation  
-----*/  
int main(void) {  
    int t, b1, b2, b3, b4;  
    double ax, ay, az, gx, gy, gz;  
    char orientation;  
    char prev;  
  
    while (TRUE) {  
        scanf("%d, %lf, %lf, %lf, %lf, %lf, %d, %d, %d, %d", &t, &ax, &ay, &az,  
&gx, &gy, &gz, &b1, &b2, &b3, &b4 );  
  
        /* printf for observing values scanned in from ds4rd.exe, be sure to comment  
or remove in final program */  
        //printf("Echoing output: %d, %lf, %lf, %lf, %lf, %lf, %d, %d, %d, %d  
\n", t, ax, ay, az, gx, gy, gz, b1, b2, b3, b4);  
  
        /* It would be wise (mainly save time) if you copy your code to calculate the  
magnitude from last week
```

(lab 3). You will also need to copy your prototypes and functions to the appropriate sections

in this program. */

```
if( close_to(ACCE_TOLERANCE, 0 , mag(ax, ay, az))){\n    if (close_to (GYRO_TOLERANCE, 1, gy)){\n        orientation = 't'; //top\n    }\n}
```

```
    else if (close_to(GYRO_TOLERANCE, -1, gy)){\n        orientation = 'b'; //bottom\n    }\n}
```

```
    else if (close_to(GYRO_TOLERANCE, -1, gx)){\n        orientation = 'l'; //left\n    }\n}
```

```
    else if (close_to(GYRO_TOLERANCE, 1, gx)){\n        orientation = 'r'; //right\n    }\n}
```

```
    else if (close_to(GYRO_TOLERANCE, -1, gz)){\n        orientation = 'f'; //front\n    }\n}
```

```
    else if (close_to( GYRO_TOLERANCE, 1, gz)){\n        orientation = 'd'; //back\n    }\n}
```

```
    }\n    //printf("At %d ms, the acceleration's magnitude was: %f\\n", t, mag(ax, ay,\n    az));\n}
```

```
if (b1 == 1){\n    break;\n}
```

```
if (prev != orientation){\n    prev = orientation;\n    display_Orientation(orientation);\n}
```

```
}
```

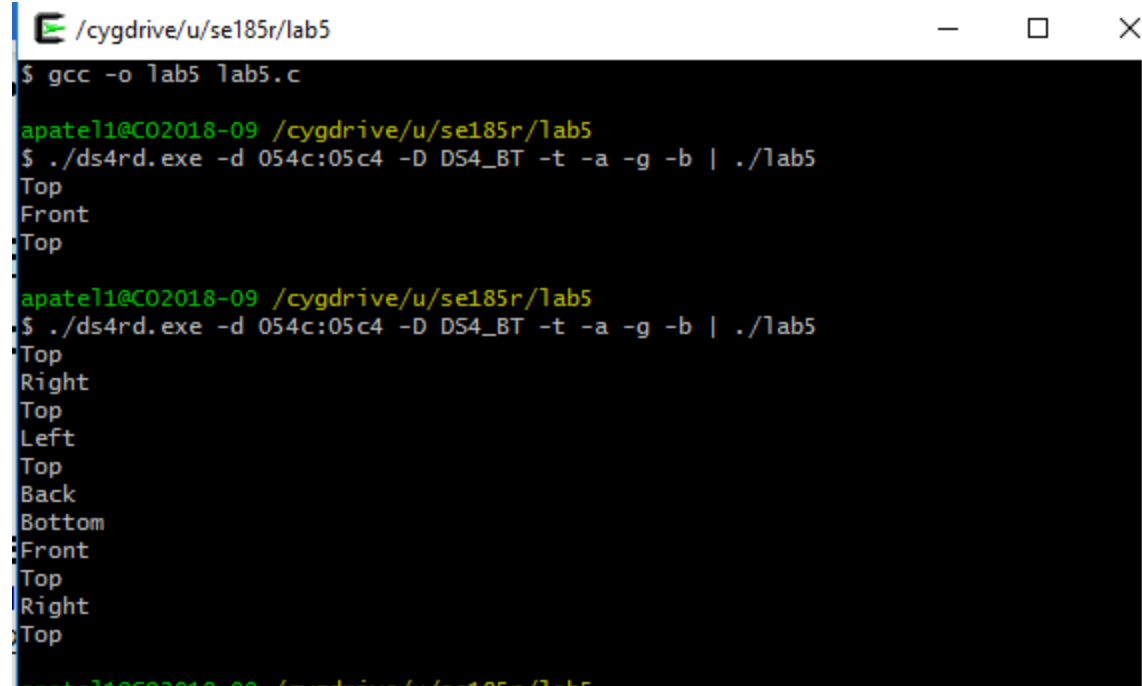
```
return 0;\n}
```

```
/* Put your functions here */  
double mag(double x, double y, double z){  
    return sqrt((pow(x,2) + pow(y,2) + pow(z,2)));  
}
```

```
int close_to(double tolerance, double point, double value){  
    return (point + fabs(tolerance) >= value && point - fabs(tolerance) <=  
value)?TRUE: FALSE;  
}
```

```
void display_Orientation (char c){  
    switch(c){  
        case ('t'): printf("Top\n");  
        break;  
        case ('b'): printf("Bottom\n");  
        break;  
        case ('l'): printf("Left\n");  
        break;  
        case ('r'): printf("Right\n");  
        break;  
        case ('f'): printf("Front\n");  
        break;  
        case ('d'): printf("Back\n");  
        break;  
    }  
}
```

Screen Shots



```
/cygdrive/u/se185r/lab5
$ gcc -o lab5 lab5.c
apatel1@C02018-09 /cygdrive/u/se185r/lab5
$ ./ds4rd.exe -d 054c:05c4 -D DS4_BT -t -a -g -b | ./lab5
Top
Front
Top
apatel1@C02018-09 /cygdrive/u/se185r/lab5
$ ./ds4rd.exe -d 054c:05c4 -D DS4_BT -t -a -g -b | ./lab5
Top
Right
Top
Left
Top
Back
Bottom
Front
Top
Right
Top
apatel1@C02018-09 /cygdrive/u/se185r/lab5
```