DS4 Drop

LAB 6

SECTION 2

Gavin Monroe

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Problem

Problem 1: Do the same drop 5 times in the classroom and record the distances. How consistent are your results? What could cause any variation?

We were pretty consistent with our drops, except for maybe 2 of the 5. Each output was around 800 to 900 column entries. The variation would have been caused by me who probably started the program too early or too late and stopping with the same problem. I fixed this issue by re-recording the output while my partner dropped the controller when I said go.

Problem 2: How far is it from the third floor railing to the bottom floor according to your code, using the sample data? The sample data is from a previous drop from the third floor.

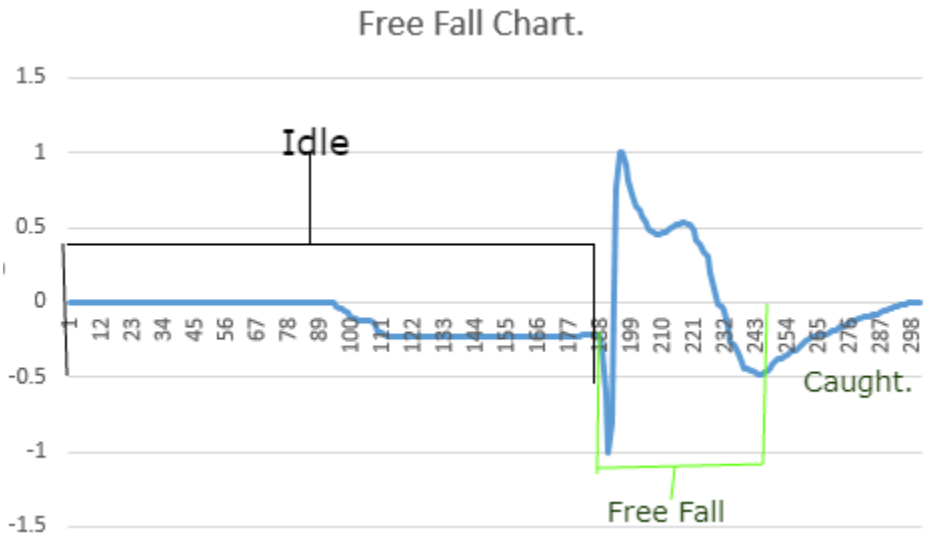
```
      $ ./lab6 < sF.csv
Ok, I'm now receiving data.
I'm Waiting

Help me! I'm falling!


Ouch! I fell 39.514 meters in 4.032 seconds.

39.5 meters
```

Problem 3: In your report, include a graph of the magnitude of the acceleration as a function of time and label where the freefall is happening, where it hits the ground, and your tolerances. Explain and justify any tolerances you are using.



Time is in Milliseconds. And Acceleration is in gravity. It never hit the ground because we caught it. Our tolerance was simple since all we needed to check if it was greater than 0.03.

Problem 4: Demo your source code to an undergraduate TA using our 3 story drop data set and have them enter your demo score into the “Lab 06 Demo” column in Blackboard. Be sure your comment your code and functions that you write.

Completed and Also did extra credit.

Analysis

Physics was a big piece of the puzzle so knowing gravity’s acceleration along with the distance equation, I could find the distance. Of course I needed to do a little more work with detecting the falling motion but after using the mag function I was fine. Then I worked that into my tolerance to detect the falling motion.

Design

I tried to make it easy for myself by using some old but good code that I made last lab. I had to re-work some of it but it worked nice. I used in total around 4 functions, with each having their own purpose of course. I also only used one loop.

Testing

When testing the code I really had to go step by step to keep everything in order. I ran into some problems with time keeping but I fixed that by having some global vars.

Comments

I had so much fun doing this!

Source Code

```
/* SE 185 Lab 5 Wrapper Program
Gavin Monroe
Fletcher Smith
*/

#include <stdio.h>
#include <math.h>

#define TRUE 1

/* Put your lab 4 functions prototypes here, as well as the prototype for lab 5 */
double mag(double x2, double y2, double z2);
void findFall(double ayInput);
void outputInfo(int oldd, int neww, double tm, double aTime);
void calcTime(int tm, int on);
void calcDistance(int tm, int on);

//Detect Change Vars
int d;
int d2;

//Distance & Time
double dist;
int start = 0;
int beforeTime;
double afterTime;

int main(void) {
	int t, b1, b2, b3, b4;
	double ax, ay, az, gx, gy, gz;
	while (TRUE) {
		fflush(stdout);//Flush Code
```

```
                scanf("%d, %lf, %lf, %lf, %lf, %lf, %d, %d, %d, %d", &t, &ax, &ay, &az, &gx, &gy, &gz, &b1,
&b2, &b3, &b4 );//Grab Input


                d2=d;//set old orientation.


    findFall(mag(ax, ay, az));//Find Direction which the controller is facing.
                outputInfo(d2, d, t, afterTime);//Output Result.
    calcTime(t, d);//Output dots
    calcDistance(t, d);//Get Distance


            }
    return 0;
}


double mag(double x2, double y2, double z2){
            /*          CODE SECTION 1 */
            double sqrtX = pow(x2, 2);
            double sqrtY = pow(y2, 2);
            double sqrtZ = pow(z2, 2);
            return sqrt(sqrtX + sqrtY + sqrtZ);
}
void calcTime(int tm, int on){
            int varTime = tm % 100;
  if (varTime == 0 && on == 1){
      printf(".");
  }
  if (varTime == 0 && on == 2){
      printf("!");
  }
}
void calcDistance(int tm, int on){
  if (on == 2){
            double sec = tm - beforeTime;
            sec = sec / 1000;
```

```
            afterTime = sec;
            double v = 9.8;
    dist = v * sec;
  }
}
void findFall(double ayInput){
  if (ayInput != 0 && start == 0){
    start = 1;
    d = 1;
  }
  if (ayInput  >= 0.5 && start == 1 && d==1){
    d = 2;
  }
  if (ayInput  < 0.5 && start == 1 && d == 2){
    d = 3;
  }
}
void outputInfo(int oldd, int neww, double tm, double aTime){
            if (oldd!=neww){
                        if (neww==1){
                                    printf("Ok, I'm now receiving data.\nI'm Waiting");
                        }
                        if(neww==2){
      beforeTime = tm;
                                    printf("\n\nHelp me! I'm falling!\n");
                        }
                        if(neww==3){
                                    printf("\n\nOuch! I fell %3.3lf meters in %3.3lf seconds.\n", dist, aTime);
                        }
                        if(neww==4){
                                    printf("RIGHT\n");
                        }
            }
}
```

Screen Shots