

Lab 6: Wiidrop

Objectives:

- Develop problem solving skills
- Develop skills in the use of numerous loops to solve a problem.

Process:

Creating a New Project in Visual Studio

Following the technique learned in Lab 1, create a new folder named `Lab6` in your `cpre185labs` folder **on the v: drive**.

Problem :

Understanding freefall is the basis of practical applications such as landing rovers on Mars (<http://www.youtube.com/watch?v=B6PUdWKWiBM&feature=related>) as well as fun projects such as Eggdrop competitions (<http://www.youtube.com/watch?v=ADBTHpk0L8g>). This week, we will develop an application that we will call Wiidrop to detect free fall and narrate the action. At the end of the lab, you will put a wiimote into a foam football and drop it off of the 3rd floor balcony in Coover. (FOR SAFETY, DO THIS ONLY UNDER SUPERVISION OF A TA OR PEER MENTOR.)

Your code's output should look like the following.

```
I'm Waiting .....
      Help me!  I'm falling  !!!!!!!!!!!!!!!!!!!!!!!
      Ouch! I fell 8.997 meters in 1.355 seconds.
I'm Waiting .....PLUS PRESSED, EXITING PROGRAM.
```

Each period on the “I'm Waiting” Line should correspond to some number of input lines from wiiwrap. Try 10 or so to see what works well. The exclamations on the falling line should work similarly. (Note: You may want to use a counter and mod (%) for this. (Challenge version: output them approximately every k milliseconds.) Whatever you do, be sure to use constants defined at the beginning of the program to specify how many lines or seconds equate to one punctuation mark.

Lab Report Requirements

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

How far is it from the third floor railing to the bottom floor? We will do this in the second lab session (next week). Have this program functioning by next week so we can add some features.

If your program is not done by end of class, you can capture data wiiwrap data to a file as shown below and then test your code by running wiidrop <file.csv

Demo your source code to a TA and have them initial a printed copy of the source. Be sure your comment your code and functions that you write.

In your report, include a diagram of your algorithm and explain any tolerances you are using.

Development Tips

Many loops in this program read and throw away data from the wiimote until some condition is met. Do one loop and see if it works, then add another feature and see if it works. Don't try to write it all at once!

The tee command can be used to capture the data your program sees:

```
wiiwrap /T /A /B | tee file.csv | wiidrop
```

will write the output of wiiwrap to file.csv as well as passing it on to your program (wiidrop).

Capturing data to a file by wiiwrap /T /A /B >file.csv will allow you to then click on file.csv and look at your data in excel. This can be helpful in planning your solution.

Feel free to use any functions from past assignments.

Needed Equations

$x_0 = x_1 + vt + \frac{1}{2}gt^2$ where v is the initial velocity (0) and t is the fall time. X1 is the location before and x0 is the location after the fall.

$g = 9.8 \text{ m/sec}^2$