

Appendix 2: Final Project – Developing an Original Game

Goal

For this project, you will develop an original game that incorporates moving objects that obey the laws of physics. This includes objects that move with constant velocity or constant acceleration, objects with correct relative motion (such as bullets shot from a moving shooter), projectiles, and objects that explode into pieces (like in the game Asteroids).

Project Guidelines

You will develop a game that involves moving objects that obey the laws of physics. It is due on at the beginning of our Final Exam time.

There are six categories that the project's grade is based on.

1. level of difficulty (“How does your game compare to the ones written for this class in terms of difficulty?” or “Is the code written for your project similar to A-level exercises in our class in terms of difficulty?” or “Does your game include competitive aspects?”)
2. level of creativity (“Is this game exactly like ones we’ve done in class or have you reached to do something innovative?” or “Did you try to duplicate other popular games?” or “Did you add correct physics to a popular game that did not have correct physics?”)
3. level of independence. Using resources is good, but you can’t copy another program or having someone else write the code for you. Always cite your references, including people who help you. Be sure to cite the page numbers from our class handouts that were used for your project.
4. completeness (i.e. "Does the simulation run?" or "Did the program include objects that move with constant velocity?" or "Does the program work as expected?")
5. quality of documentation ("Did you include relevant references?" or "Did others test your game?")
6. quality of your presentation (“Did you discuss the purpose of the game?” or “Did you discuss the rules of the game?” or “Did you discuss the physics principles used in the game?”)

You should:

1. write a VPython program that includes objects that move.
2. test your game by having others play it and by asking them for feedback.
3. answer the questions below in a Word document.
4. create and deliver a presentation about the game.

Documentation

You must write a document in Microsoft Word or pdf format that answers the following questions. The document should be complete; it should have correct grammar; and it should be easy to read and understand. Quality writing and organization is expected. Detail is required. Terse responses will not receive significant credit.

1. What is the purpose of your game?
2. What are the rules of your game?
3. How must the game be played (i.e. keystrokes, etc.)?
4. Is this game like any other game that you've seen or played?
5. What physics principles were used in your game in order to make it realistic? Be sure to cite the physics principle(s) (such as projectile motion, constant velocity motion, constant acceleration motion, relative motion, center of mass motion, etc.) and where these principles were discussed in our course handouts. Be sure to reference the page number(s).
6. Does your game violate any laws of physics? (Note that sometimes this is desirable for playability or artistry.)
7. Who played your game and what did you learn as a result of their feedback?
8. How might you improve your game in the future?
9. What resources did you use to help you in writing the game? If you used web sites, people (such as Dr. T or Zach), books, or any other resources, you must reference them.
10. What did you personally get out of this project?

Presentation

You will give a seven minute presentation. Five minutes will be for the presentation and two minutes will be for questions. You are expected to create a Keynote, Powerpoint, or pdf document that:

1. describes the purpose of the game.
2. describes the rules of the game.
3. describes how the game is played.
4. describes which physics principles were used in the game.
5. how the game can be improved.

You are also expected to demonstrate your game by playing the game.

Your presentation will be graded on:

1. whether others acted interested in your game by giving feedback or asking questions.
2. whether you spoke clearly and were organized in your presentation.
3. whether you addressed the items above in your presentation.
4. whether you demonstrated relative aspects of your game.
5. whether you were enthusiastic about your game.

Appendix 3: Tracker Cheat Sheet

Description

This one-page “cheat sheet” will show you the most common steps required to analyze videos with Tracker. Tracker is developed by Doug Brown and is available from <http://www.cabrillo.edu/~dbrown/tracker/>.

Preliminary Steps

1. Go to **Video**→**Import...** and select the video you wish to analyze.

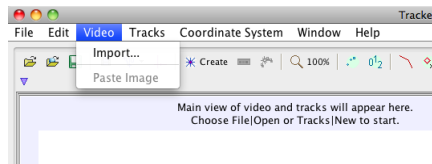



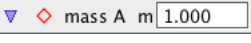


Figure .1: Import your video.

2. Click the movie settings icon  and set the frame rate, start frame, and end frame. Note that setting the start frame and end frame is quite useful for trimming the movie to just the part that is of interest.
3. Click the calibration icon  and select one of the calibration tools. Stretch the tool across an object of known length, such as a meterstick, that is in the plane of the motion. Click on the numeric indicator for the length of the tool and change the value to be the length of your standard object in the video.
4. Click the coordinate system icon  and move the origin of the coordinate system to the desired location. Grab the x-axis and rotate it in order to set the direction of the coordinate system.

Mark an object

1. Click the button and select **Point Mass**.
2. In the toolbar, a menu for **mass A** will appear.  Click on **mass A** in order to select its **Name...**, **Color...**, or other parameters.
3. *While holding the shift key*, click on the object. A mark will appear, and the video will advance to the next frame.

Analyze a graph

1. Right-click on the graph and select **Analyze...**. The Data Tool window will pop up.
2. Check Fit, and the Fit menus and parameters will appear.
3. Check Autofit for the Data Tool to automatically calculate the best-fit parameters.
4. To fit a curve to a portion of the data, select the data in the graph or data table.