Pinball Game in HTML5 and JavaScript

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What is Pinball?

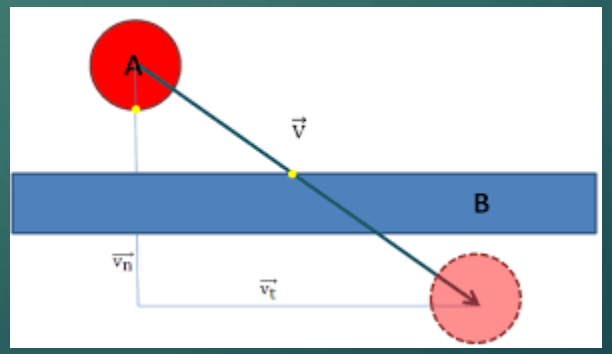
- Try to hit targets with pinball to get points.
- Hit pinball with flippers at bottom of board.
- Keep pinball from falling into hole between the flippers.

HTML5 and JavaScript

- HTML5
  - Hypertext Markup Language
  - Great for designing webpages
  - Cannot do the sophisticated things that typical programming languages can do.
- JavaScript
  - Code that can be embedded in an HTML page.
  - Allows the webpage to do more than could be done with just HTML.

THREE.js and Box2DWeb

- THREE.js is a 3D graphics library.
  - Generates 3D graphics
- Box2DWeb is a physics engine.
  - Updates the velocities and positions of all objects.
  - Handles collisions.
  - Originally considered Physi.js, but collision detection was poor. Had issues with "tunneling."

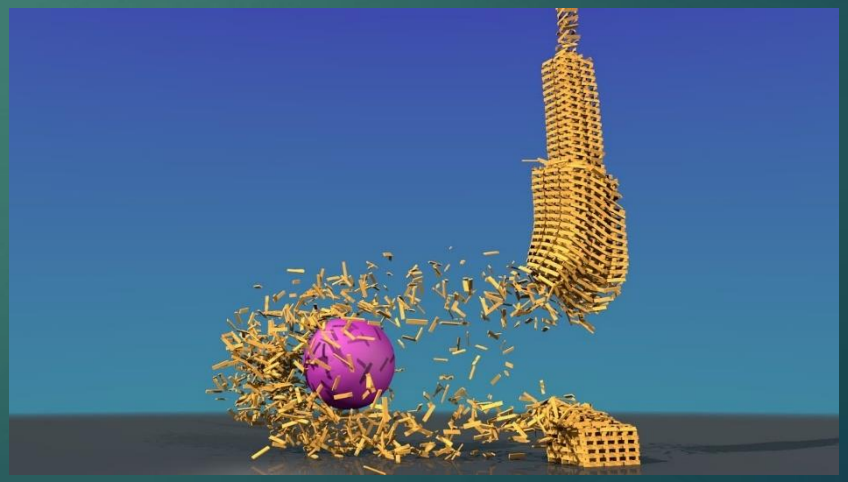


Challenges with Box2D

- Learning an entirely new library of functions.
- Most of the documentation was on the C version of Box2D.
- Compatibility with THREE.js.

How a Physics Engine Works

- Calculates the positions and velocities of all objects every time step (e.g. 1/60th of a second).
- Box2D's function "world.step()" accomplishes this.
- I put the world.step() function in my render function, so the objects are updated every time the graphics are updated.



How a Physics Engine Works (cont.)

- Bodies and Fixtures
  - Bodies
    - Specifies the object's velocity, position, and mass.
  - Fixtures
    - Specifies the object's shape, friction, restitution, and other things.

My Program's Path Generation

- world.step() used to generate the paths.
  - world.step() used over and over as fast as possible rather than every 1/60th of a second.
  - Position of ball recorded after every world.step and stored in an array.

Random Generation of Objects

- Randomly generated objects are positioned on the paths generated by "Simulate."
  - A random point on a random path is picked.
  - The point is checked to make sure it is a valid point to place the object.
  - If the point is valid, object is placed. If the point is not valid, try a different point.
  - Keep trying until valid point is found, or until it has tried too many times.
  - Once valid point is found, mark path as unusable, because it is now blocked.
  - Mark all other paths passing through the object as unusable as well.

Improvements and Changes I Would Like to Make

- Obviously, it needs more flashing lights.
- Implement randomly generated walls and tunnels.
- Implement lives.
- Better, cleaner code.
  - Due to time constraints, not everything is commented.
  - Could divide the GeneratePinballMachine function into multiple functions.
  - Better use of the physics bodies' userdata parameter.


Questions

Sources:

- http://buildnewgames.com/physics-engines-comparison/
- http://box2d.org/manual.pdf
- http://blog.sethladd.com/2011/09/box2d-collision-damage-for-javascript.html
- http://www.iforce2d.net/b2dtut/