A Physics Engine in C++

## Functionality

* Rigid body objects, both dynamic and static
  + Sphere
  + AABB
  + Plane
* Collision detection and resolution between all objects
* Springs
  + Multiple springs strung together to simulate cloth physics
* Global force (wind)
* Gravity
* Ability for user to spawn spheres and AABBs
* User can delete their most recently created sphere from the scene

## Description

Spheres, planes, and boxes behave in a way that seems physically realistic. Pressing “E” will shoot a sphere forward, using this, you can watch how it reacts when colliding with other objects. Pressing “Q” will delete that sphere. Holding the right mouse button will allow the user to rotate their view. Left mouse button shoots a cube forward. There are objects in the area that do not move, and there are objects that do. 2 spheres automatically spawn connected with a spring. There is also a cloth in the scene in which objects can be shot at.

## Third Party

The AIE bootstrap library was used to render the shapes in the scene and the camera class was created by Marc Chee.

## Future Work

To expand this physics engine, I would like to add Oriented Bounding Boxes to simulate a more realistic box. I can also add friction and rotation physics to the sphere which would make them behave more realistically too.

## References

GameDev.net. (2018). *Box vs Plane Collision Detection*. [online] Available at: https://www.gamedev.net/forums/topic/646404-box-vs-plane-collision-detection/ [Accessed 1 Mar. 2018].

GameDev.net. (2018). *Is this the simplest Sphere-AABB collision test?*. [online] Available at: https://www.gamedev.net/forums/topic/335465-is-this-the-simplest-sphere-aabb-collision-test/ [Accessed 4 Mar. 2018].

Studiofreya.com. (2018). *Sphere vs AABB collision detection test | Studio Freya*. [online] Available at: https://studiofreya.com/3d-math-and-physics/sphere-vs-aabb-collision-detection-test/ [Accessed 2 Feb. 2018].

YouTube. (2018). *#4 3D Physics Engine Tutorial: Axis Aligned Bounding Boxes (AABB's)*. [online] Available at: https://www.youtube.com/watch?v=Iu6nAXFm2Wo [Accessed 27 Feb. 2018].