# Msc project pre-proposal

Project:   
Creating a java physics engine for use in mobile app development.

Aim:   
Purpose of this project is to create a physics API with java using and creating a graphical interface using the Java Canvas class. This will be done by creating a series of java classes built to simulate different physical.

## The physics engine should be able to do:

Simulate motion of a particle:  
This will create different motion simulations for particles under a variety of different conditions including:

* Velocity in both the X and Y axis.
* Acceleration of the particle in both the X and Y axis as a result of:
  + Its own generated force (it can generate its own thrust force)
  + External forces acting on it i.e. gravity or collisions.

Collision Simulations:  
Simulate the collision of either a single particle or a collection of particles through the use of Newton principles of momentum.

## Collisions:

Collisions come under two types of collisions. Elastic and Inelastic collisions. These will consist of either a single object colliding into a static surface or a series of moving object colliding into each other. The object can be an individual particle or a series of particles that form to make the object.  
Therefore, Each Particle should consist of the following properties:

* Mass
* Speed (speed is the magnitude of the objects velocity and therefore not a vector)

**Elastic collisions:**  
elastic collisions are when objects collide while conserving all momentum and energy. Therefore there will be no loss of energy as a result of the collision.  
Therefore:

Conservation of momentum of a single object  
p1 = p2

Where p1 and p2 are the initial and final values for momentum.

Conservation of momentum of a single object  
S1M­1 = S2M2

Where:  
S1 is the initial Speed  
S2 is the final Speed  
M1 and M2 is the mass of the particle (as mass is conserved in a single particle, M1 = M­2).

As Speed is a magnitude of velocity, this can be