CS6323.001 - Computer Animation & Gaming
Final Project

- Your *Name* - **Kapil Gautam (KXG180032)**

- *Title* for project - **Spring-Mass-Damper Cloth**

- ***Problem summary***

  The objective was to simulate the motion of a cloth and its possible interaction with other objects. Cloth is a complicated and interesting subject in computer animation. It is an essential component of many virtual scenes. Creating a cloth interaction with another object can be used in many places. I implemented a 10x10 spring-mass-damper mesh to simulate a cloth. The mesh is created in the x-y plane. Any corner vertices of the cloth can be fixed and rest can be observed under the influence of various external global forces such as gravity or a pseudo random wind force. Some appropriate values are set for time-delta, mass, spring constant, damper constant, and wind strength with trial and error.

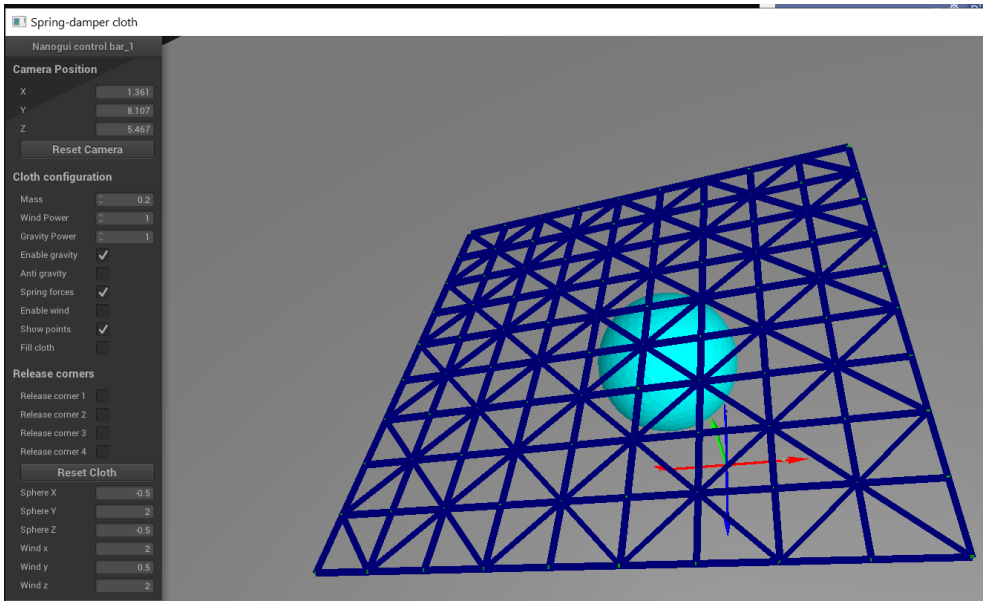
- ***Description of work***

  1. Simulate a cloth object using a 10x10 mesh of points connected through springs (Edge, Diagonal and Angle)
  2. Add gravity and wind-forces to the cloth environment.
  3. Add a sphere object to the environment.
  4. Apply Explicit-Euler integration algorithm.
  5. Simple collision detection of the cloth with the sphere.
  6. Allow panning and movement using the mouse along with the keyboard.

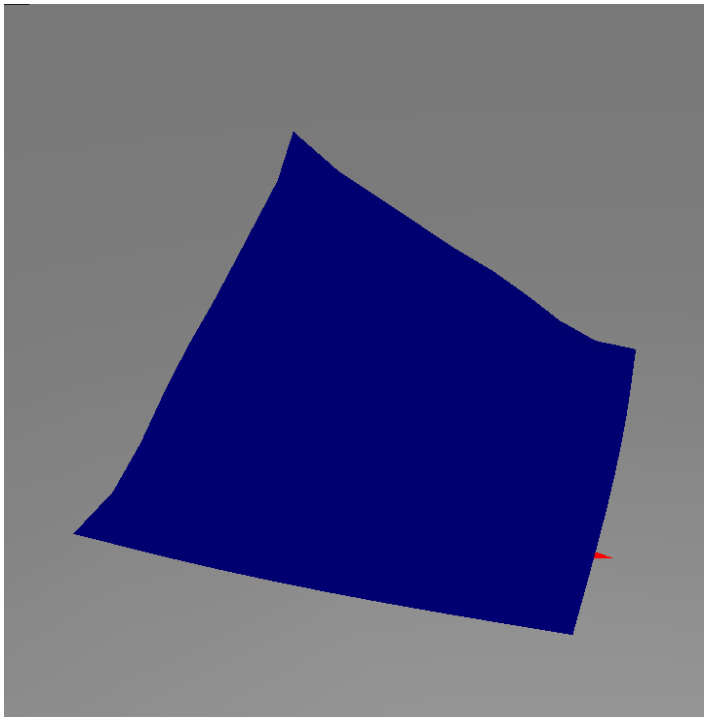
  Major challenges – Cloth rendering is affected sometimes when the collision happens.

- **Results**

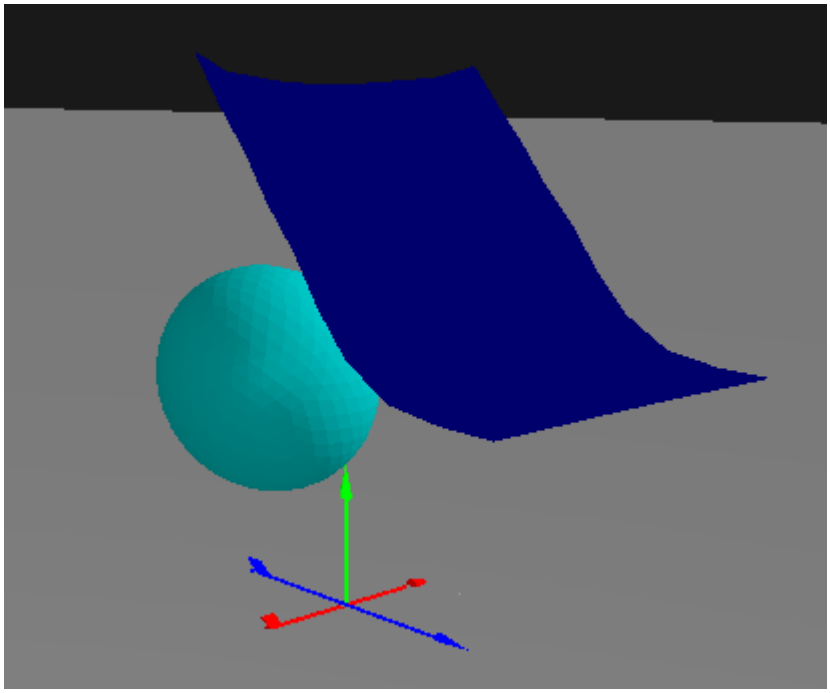
1. Spring mesh generated with springs and points.



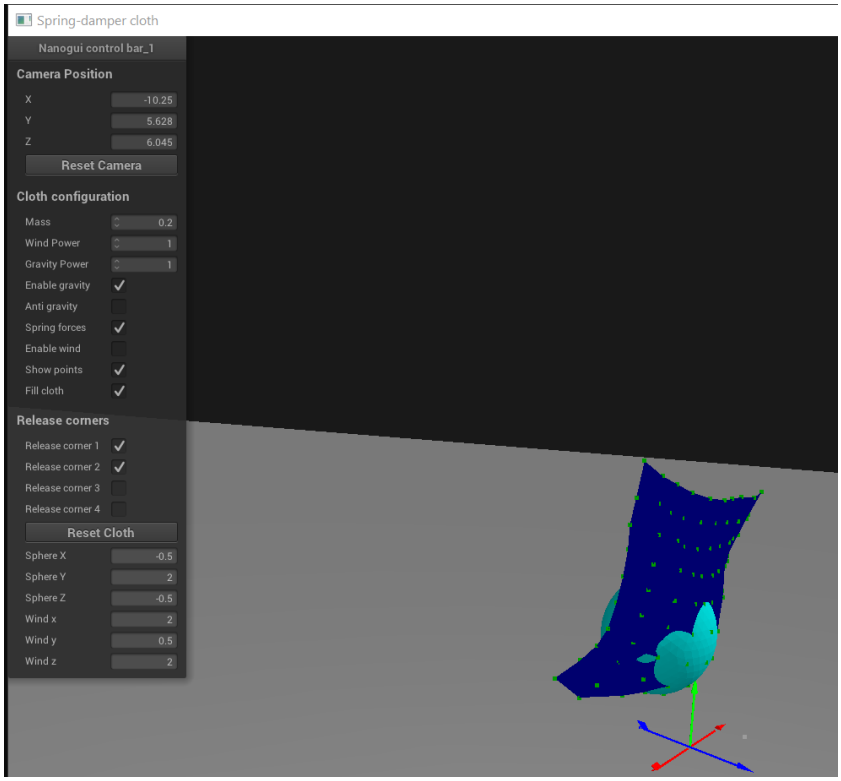
2. Single cloth-corner released (filled cloth)



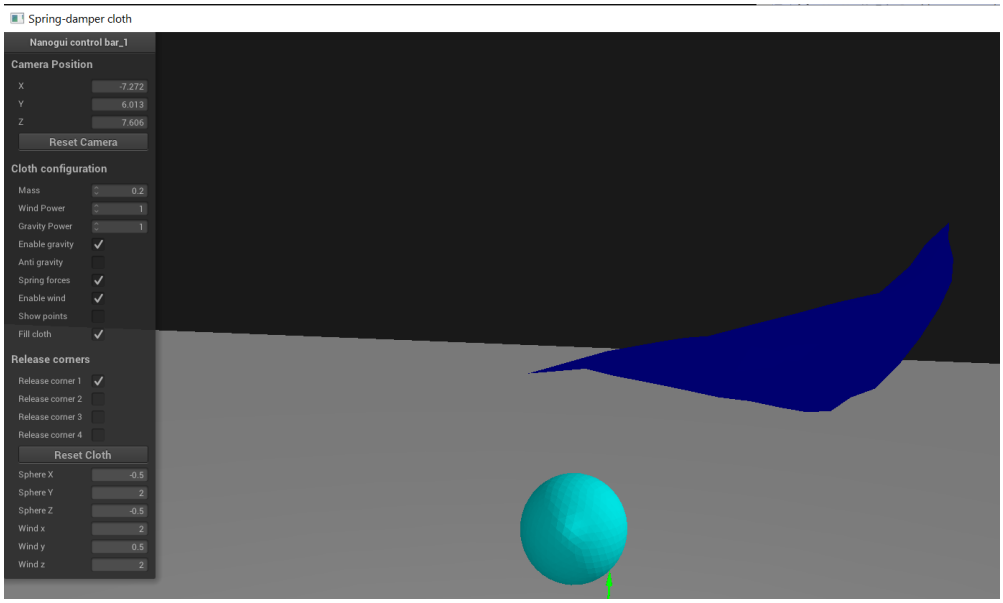
3. Two cloth-corners released (before touching sphere)



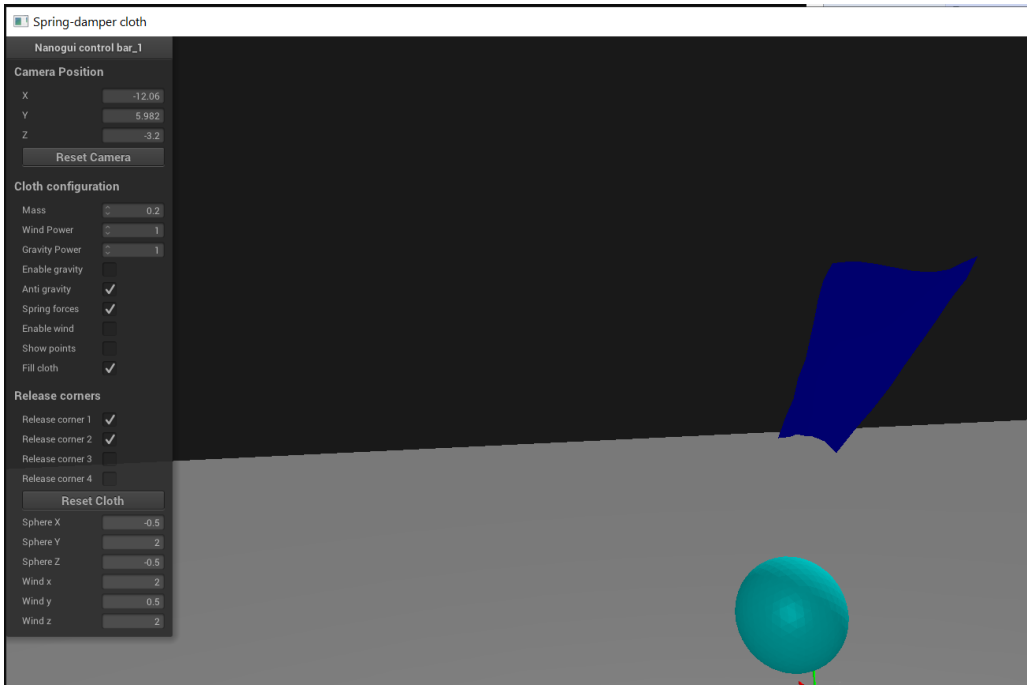
4. Simulated cloth touching sphere and converging inwards due to spring forces. (Mesh Points shown to show collision points)



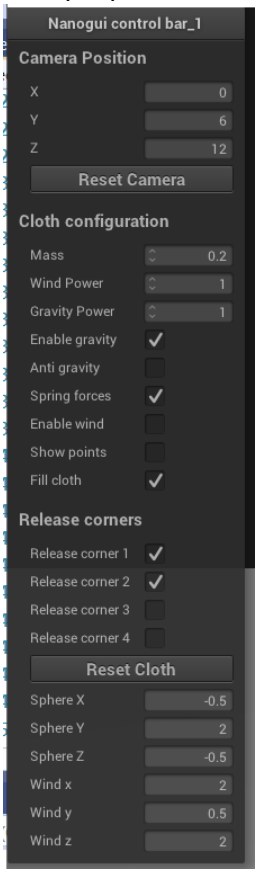
5. Influence of wind on cloth (wavy pattern and folds by length with one corner)



6. Anti-gravity effect



7. Multiple control system for various properties:



- **Analysis of work**
  - New results– No novel results, implemented existing algorithms for simulation and collision detection for cloth.
  - Meeting goals–
    - A cloth like mesh (**Accomplished**)
    - Each particle of the mesh has some properties, like mass, velocity, acceleration, momentum, force to govern its motion. (**Accomplished**)
    - Cloth interaction with some object. (**Accomplished**)
    - Effect of gravity/wind or any external force on the mesh. (**Accomplished**)
    - Cloth in some constraint – configurable corners fixed (**Accomplished**)