Implementation Report

Programming language: C++, implemented with NGL library and Qt modules.

Techniques & Algorithm:

The hair strand simulation in this project uses position-based dynamics method. The algorithm is from the academic paper *Fast Simulation of Inextensible Hair and Fur* (M.Müller et al. 2012), whose authors proposed a fast simulation method based on the previous research of its first author. This method only iterates all the particles once for calculating constraints, which is more efficient in real-time simulation.

Description of Implementation

Main class	***Description***
NGLScene	Used to display the main scene and handle the UI interaction.
HairStrand	Basic hair strand class. Used to store and handle data of particles which composing the hair strand. Damping parameter is also in this class.
Camera	Basic camera class, used to handle camera interaction.
Force	Basic Force class, used to handle some mathematical methods.
Simulator	The important class to process simulation data. It is initialized with a hair strand data, and modifies the positions of hair strand via "*update*" method, where the core algorithm of hair segment constraint is applied. This method is invoked every frame if the simulation state is on. In addition, the "*Simulator*" class is also used to integrate forces, and gravity is already applied in by default.