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Project Title -Implementation of particle system from water fountain.(Drag force implemented)

Problem summary – Water fountain with very less variation in droplet size and forces can make it look very unrealistic. As all particles move in the same track, the fountain look more like curtains falling from the fountain. Adding randomness to the velocity can bring some realistic touch but, applying different particle sizes cause it to look more interesting. Along with drag force applied to particles.

Description of work- My work composed of 4000 particles of different sizes, and a water fountain and floor. I have tried to implement the fall from fountain with taking natural gravitation force. The acceleration due to gravity, 9.8 m/s^2. For drag force on particles I have applied force proportional to the net velocity and size square as in nature drag force works proportional to cross section are and the velocity. For bouncing effect I have used the restitution coefficient of 0.8 The complete work of project is in three files. Main.cpp for the fountain and opengl functions. Particles.cpp and particle header file for particle class.

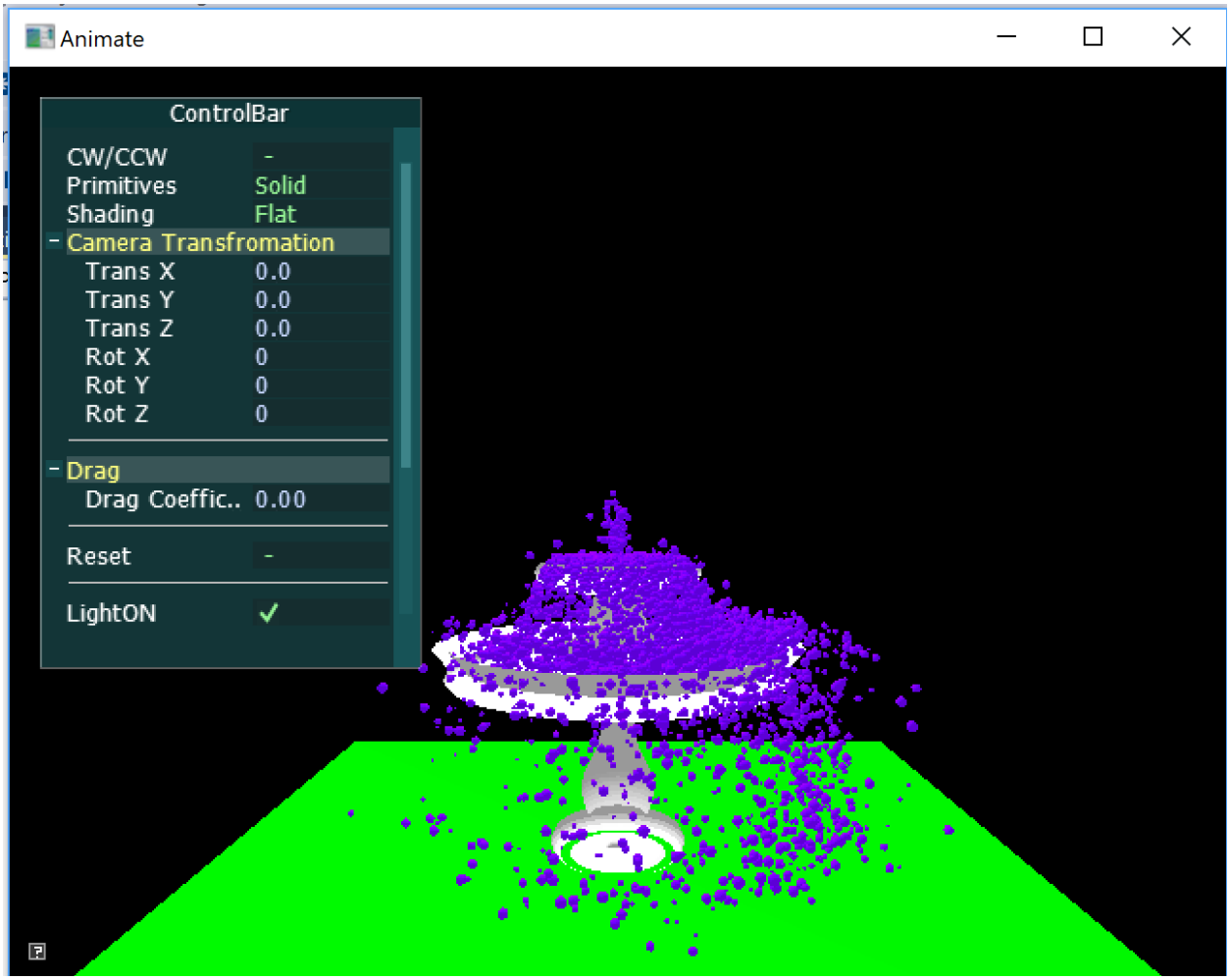
RESULT The complete work is as seen in the code implementation

The water first comes out of the nozzle. it has varying velocity and droplet sizes.

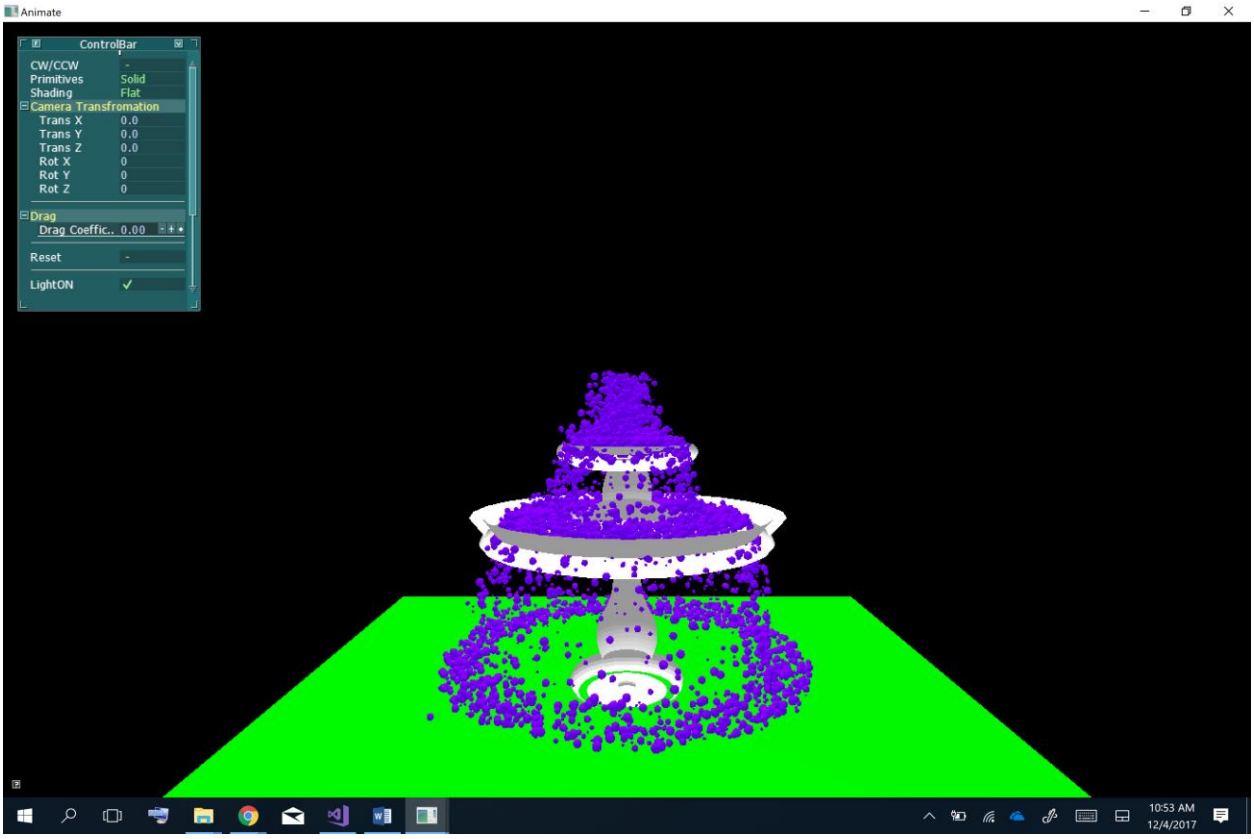
Vertical velocity is in the range 5-15 m/s. horizontal velocity is composed of x and z direction velocity in range(-3,3) m/s
The drolets reaches maximum height of 5 units. It comes back to the first level of fountain where it bounces off .for within the radius. Then the next level comes at depth of 15 units down. Where there is curb at the rim. Some particles bounce back in to fill the lower level .The particles which escapes the second level bounces on the floor. The water droplets touching ground can be seen in form of a circle around the fountain.

Drag force coefficient can be adjusted from the tweak bark.

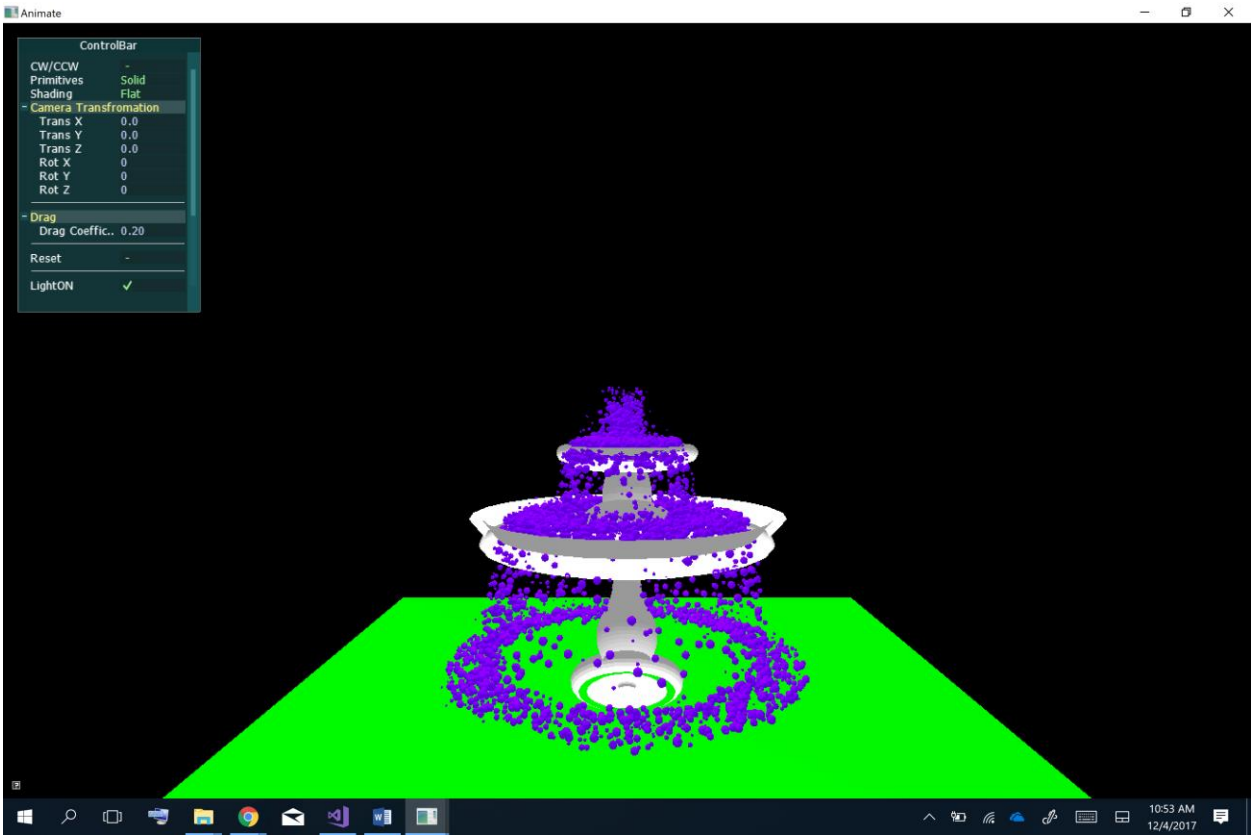
At the start of the simulation there is burst of droplets from the top, which I have composed to show the splash effect at second level



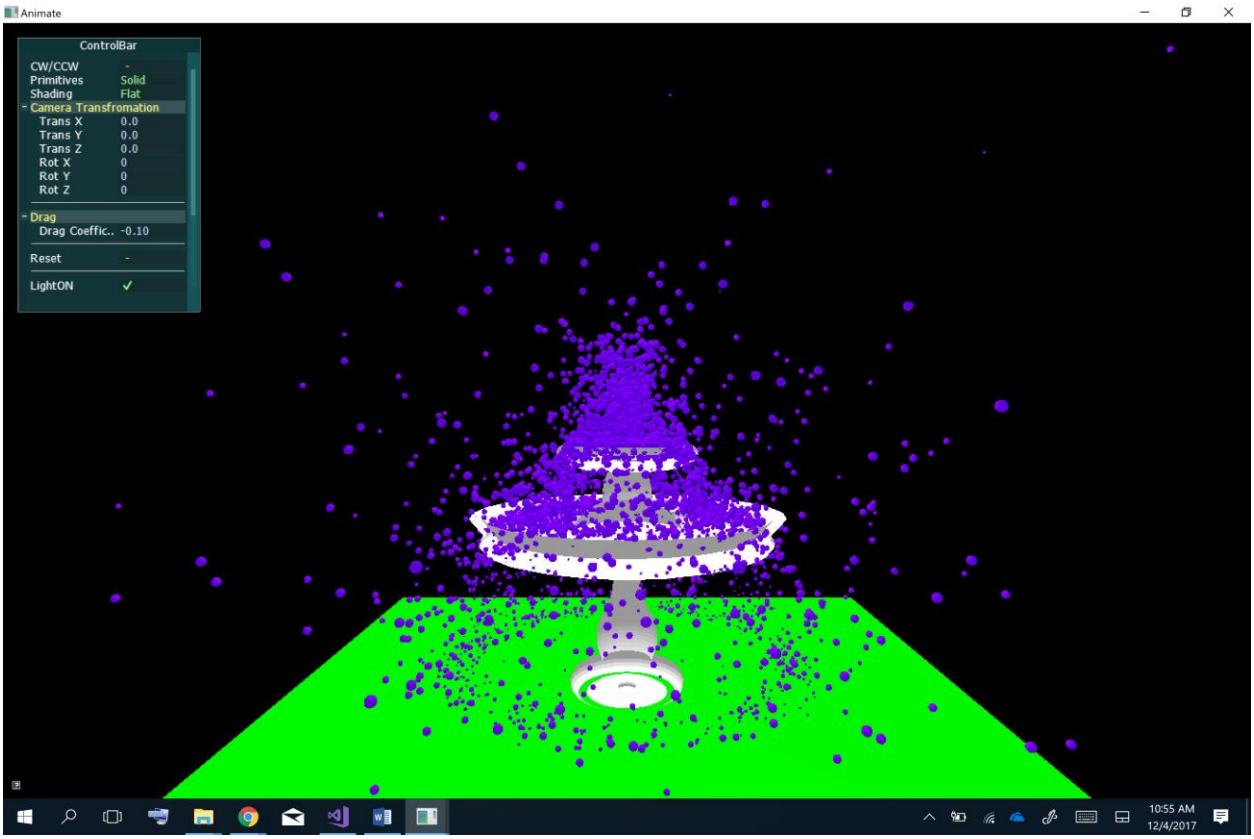
Fountain with coeffiecient of drag zero. Notice how all size droplets rises the same height .



Water droplets with drag coefficient 0.2. Notice at the top smaller droplets splatters out because drag force is less prominent on smaller size particles.



with negative drag force on droplets, effect on bigger particles are more pronounced.



RESULT-I have achieved the result of water fountain with drag force on droplets. That is the effect of air resistance .

Goal -The goals proposed in the proposal are met on time. But the result is not as I was expecting. Since the drag force on particles are not that prominent. It does not make a lot of difference.