Snow animation using Machine Learning

TE2502 : Civil engineer thesis topic for game programming students

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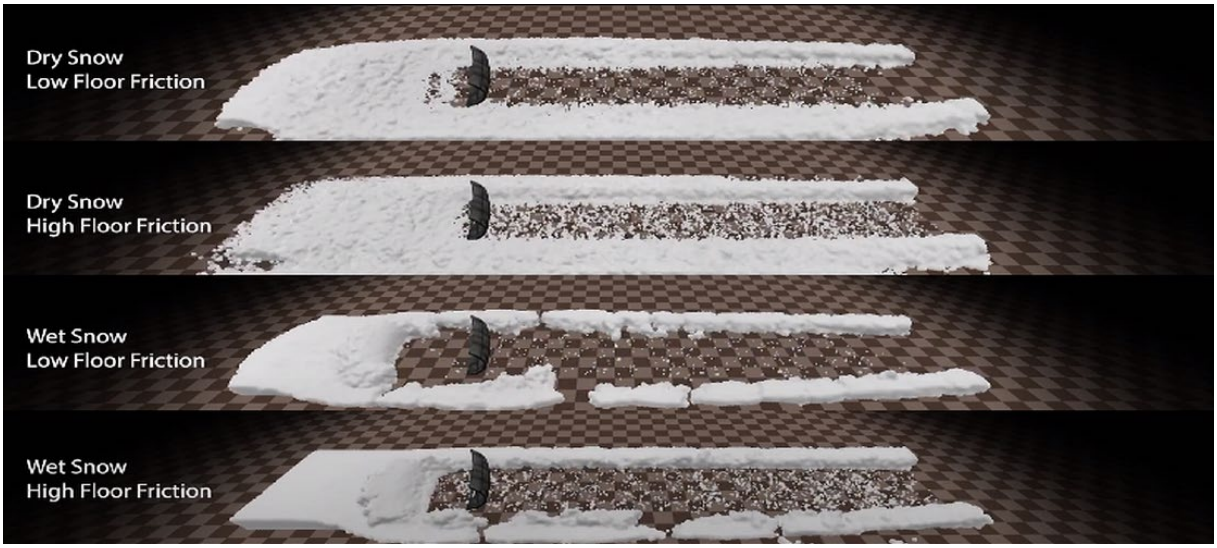
Background:

Realistic snow simulation and rendering has become an important part of outdoor scenes in computer graphics, especially where animation is involved. Whereas traditionally snow simulation has been an expensive process [3], recent work has made it not only efficient but also real-time [1,2] using GPU. The modern method is particle-based and is capable of running at several hundreds of frame rate per second.



Aim and objectives:

The aim of this project is to use artificial intelligence on state of the art snow simulator [1]. This simulator already accelerates the previous method [2] by around 8 times. With the help of machine learning method in [4], we hope to make it even faster. The student(s) will have a reasonable room to experiment and improve the project in the scientific and implementation areas.

Requirements:

- ✓ Student(s) should be advanced level programmers in C++
- ✓ Knowledge in GPU programming required
- ✓ Interest and adaptability in the underlying physics and simulation

Related links:

[1] Real-time snow simulator using Iterative-Relaxation and Boundary Handling, Adrian Nordin, Simon Nylen, BTH thesis 2021

[2] Real-time particle-based snow simulation on the GPU, Prashant Goswami, Christian Markowicz*, Ali Hassan*, EGPGV 2019 [Link]

[3] A material point method for snow simulation, Alexey Stomakhin et.al., SIGGRAPH 2013 [Link]

[4] Sanchez-Gonzalez, Alvaro, et al. "Learning to simulate complex physics with graph networks." *International Conference on Machine Learning*. PMLR, 2020.