Wildfire Simulation & Rendering

Using physically accurate models to simulate and render the spread of wildfire

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Who we are

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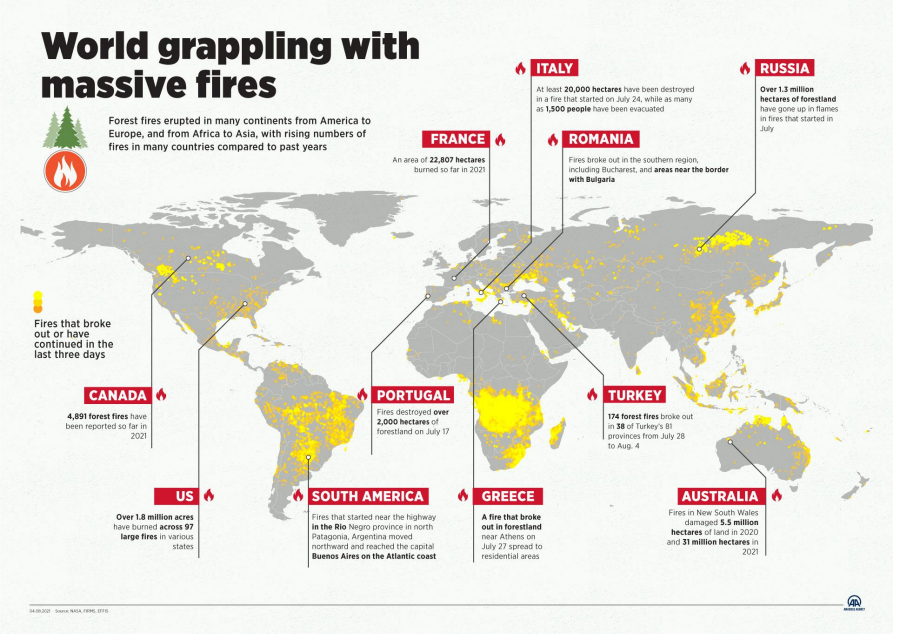
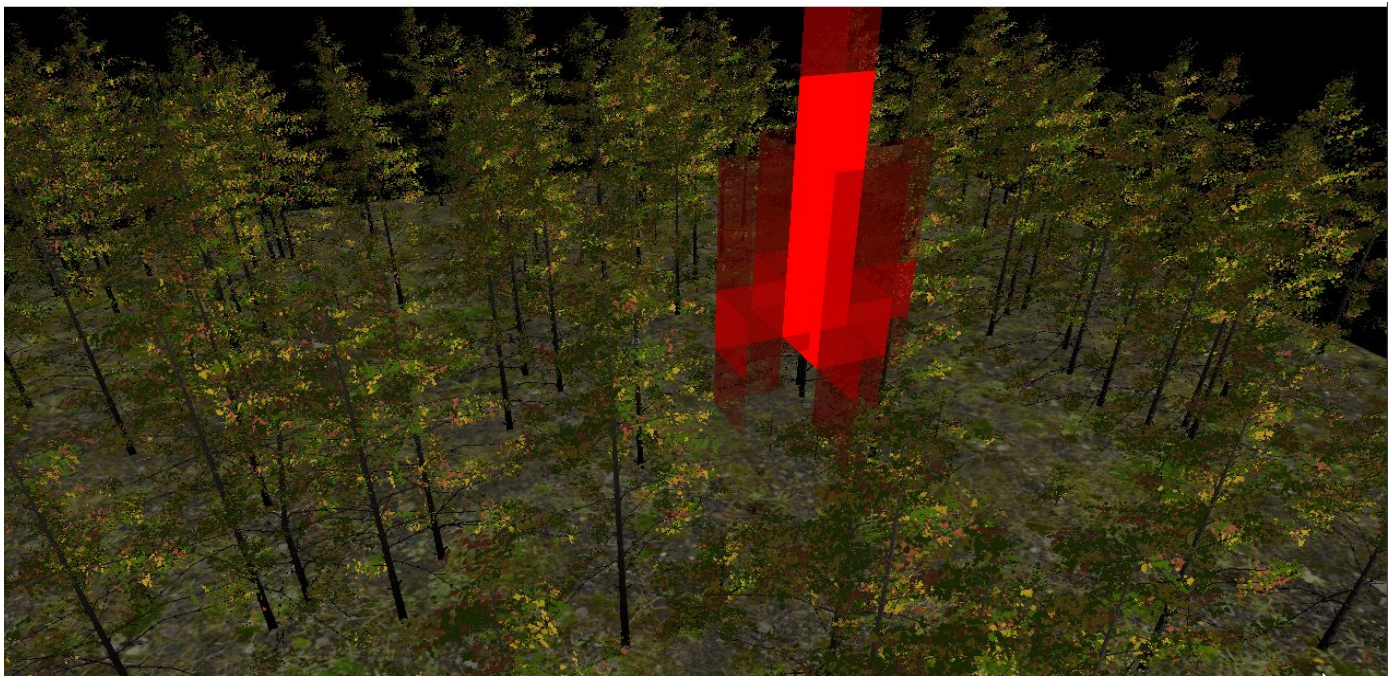
Project Inspiration



As **climate change** exacerbates the frequency and intensity of **wildfires** globally, we need to find ways to **accurately predict** their spread.

Project Goal

Develop a **GPU-based** approach to leverage **parallelism** at a **modular** level of computation in both trees and simulation space



Live Demo

Backup: https://tinyurl.com/ycku9m5c

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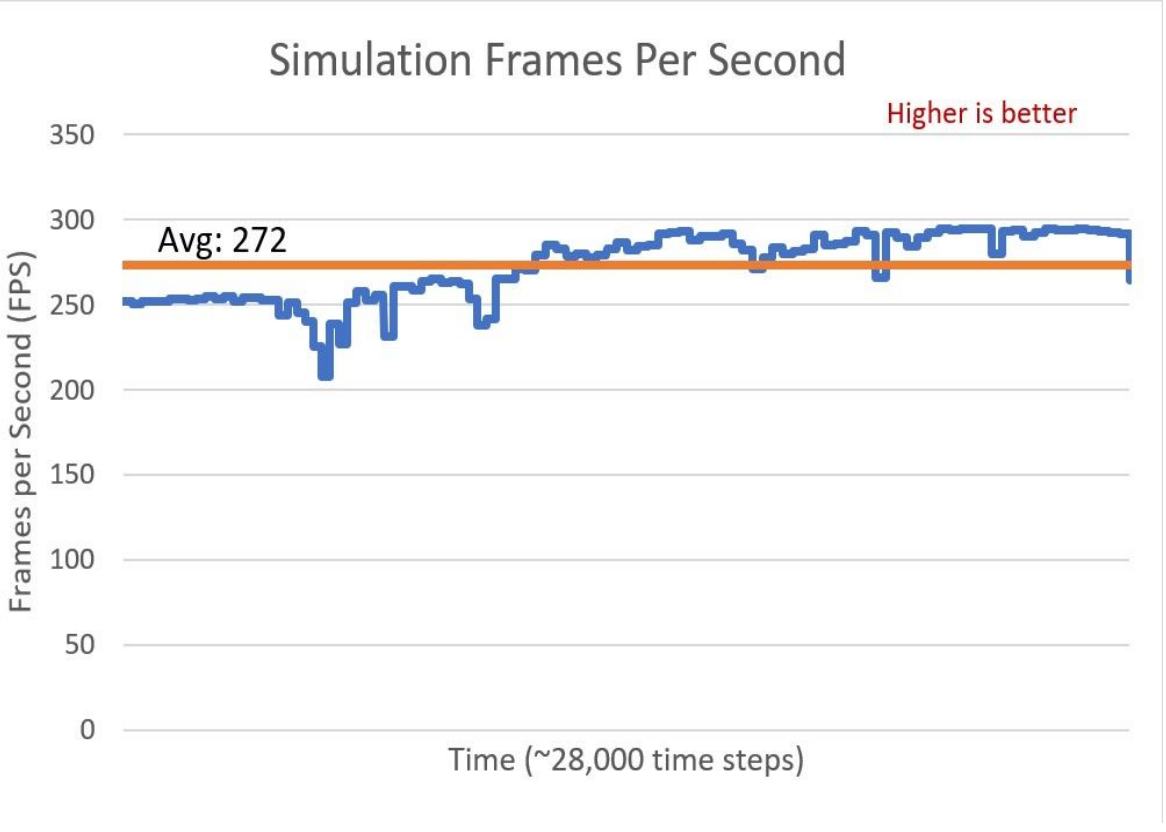
Implementation & Metrics

- FPS increase over time as modules burn and get removed from scene
- Testing with a scene ~10x larger saw ~10x lower frame rates



Tested on Windows 10, AMD Ryzen 5 3600, Geforce RTX 2060 Super (personal)

Future Work

- Dynamic environment
  - User adjustable wind and rain
- Interactiveness
  - Addable fire retardant/barriers
- Simulate larger environments
  - Adjust level of detail of each tree to scale for larger scenes
- More varied terrain
  - Introduce topography of real-world forests

Acknowledgements

We'd like to thank Torsten Hädrich and his team for providing us with the forest scene files used in our simulation.

Our work was based on their research paper

- Paper: http://computationalsciences.org/publications/haedrich-2021-wildfires/haedrich-2021-wildfires.pdf
- Website: http://computationalsciences.org/publications/haedrich-2021-wildfires.html