



Synopsis

Budhil Nigam
Department of Computer Engineering
Jamia Millia Islamia

Enhancing the OpenFOAM GUI: Migration and Improvements for Blender 4.2 Compatibility

OpenFOAM's blockMesh utility is a foundational tool for structured mesh generation, but its reliance on manually edited dictionary files poses a usability challenge for new users. This project focuses on improving the Blender-based GUI add-on *Venturial*, which graphically assists in creating blockMeshDict files. With the upcoming deprecation of Blender 3.6 LTS, the add-on required a comprehensive migration to Blender 4.2 LTS, involving significant API updates and interface refinements.

The upgraded GUI resolves multiple limitations in the previous version—visual artifacts from deprecated OpenGL wrappers were fixed by adopting Blender's new GPU module, and double dialog bugs were eliminated for smoother directory selection. Key enhancements include dynamic face selection for merging operations directly from the 3D viewport, automatic master-slave detection using geometric validation, and a revised vertex placement algorithm that ensures symmetric arc formation. The interface has been restructured for better visual clarity, persistent data support, and a more intuitive layout, allowing users to seamlessly configure block geometries and boundaries. These improvements not only align the add-on with Blender's latest standards but also offer a more robust and user-friendly workflow for OpenFOAM case setup.

References

1. Blender GPU Shader Utilities:
<https://docs.blender.org/api/current/gpu.shader.html>
2. Blender OpenGL Wrapper Module (Deprecated):
<https://docs.blender.org/api/current/bgl.html>
3. OpenFOAM Documentation: <https://www.openfoam.com/documentation/overview>
4. Blender Python API Documentation: <https://docs.blender.org/api/current/>