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MeshTorrent: A Community-Driven P2P System for AI-Generated 3D Model Creation and Distribution

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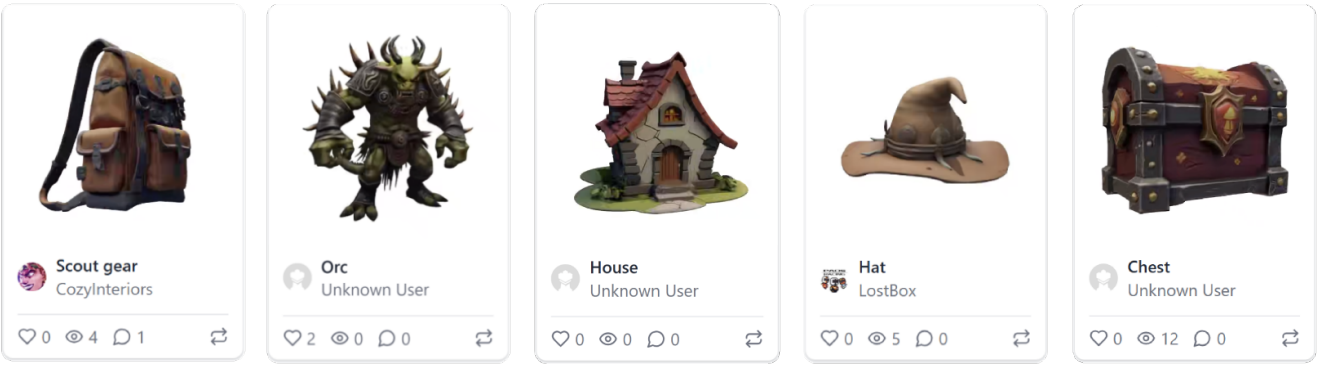

Figure 1: A preview of model cards with titles and 3D models. The torrent network automatically saves all associated metadata.

Abstract

MeshTorrent is a peer-to-peer platform for automated 3D content creation and exchange, inspired by BitTorrent-style file sharing. By merging AI-based text-to-3D generation with swarm-based distribution, MeshTorrent harnesses the combined bandwidth and storage resources of its users, enabling scalable and decentralized sharing of 3D assets. This paper describes the core design of MeshTorrent, including an AI workflow for generating fresh `.glb` files, metadata management via a distributed hash table, partial previews for quick inspection, and specialized extensions for 2D sprites (*SpriteTorrent*) and rigged character models (*RigTorrent*). Preliminary tests show faster content download times than single-host alternatives, reduced server costs, and robust resilience to network churn, advancing an open ecosystem for collaborative 3D model exchange.

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1 Introduction

Peer-to-peer (P2P) systems have historically shifted large data traffic from centralized hosts to distributed participants [Cohen 2003; Zhao et al. 2019]. Meanwhile, text-to-3D advances [Poole et al. 2022] offer a rising stream of AI-generated 3D meshes, yet distributing these assets often relies on central servers prone to bandwidth constraints and single points of failure.

MeshTorrent[1] aims to bridge the gap between on-demand 3D generation and scalable 3D asset sharing. It extends chunk-based P2P strategies to accommodate large geometry and textures, providing partial or progressive downloads for previewing. A simple local AI module lets any node generate new 3D content, wrapped in `.glb` files that are seeded back into the network. Extensions handle 2D sprite assets (*SpriteTorrent*) and rigged characters (*RigTorrent*), reusing the same chunking pipeline but inserting special metadata.

2 System Overview

2.1 Architecture

MeshTorrent is built atop a standard P2P backbone. Each 3D file is split into independently verifiable chunks (e.g., 256 KB pieces). A node that completes or partially downloads a file can immediately re-seed those chunks to others. This allows model downloads to scale with the swarm's size. Peers utilize a distributed hash table (DHT) [Maymounkov and Mazières 2002] to locate available chunks and maintain updated metadata (tags, user ratings, image and 3D model generator, or short textual prompts used to generate the mesh), which may also contain a distributed quality score.

[1] meshtorrent.org

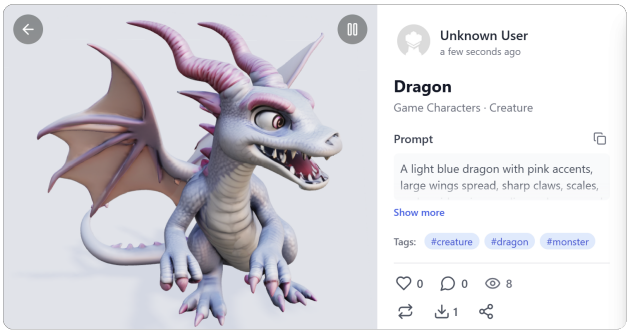

Figure 2: MeshTorrent client UI, displaying a streamed partial download and DHT metadata such as comments, likes, download count, as well as informational tags.

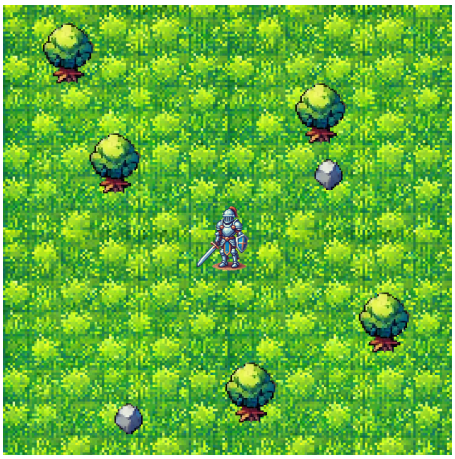

Figure 3: An example of procedurally generating a 2D game via SpriteTorrent's API for rocks, trees, and a player.

Figure 4: A walking animation playing on AI-generated 3D models via RigTorrent, a simple extension of MeshTorrent.

2.2 AI Content Generation

A node can optionally run a text-to-3D generator that outputs fresh geometry and textures, saved in a `.glb` bundle. This new asset is split into chunks, hashed, and advertised to the DHT. Other peers can discover and preview it, then download the entire file. Moreover, the system supports a dynamic ecosystem where peers can opt to continuously create new models—adding a steady stream of innovative content to the network. In parallel, dedicated seeders have the choice to constantly download and redistribute models that align with their interests (for instance, assets tagged as "medieval"), ensuring that both niche and popular themes receive ample bandwidth. This dual strategy fosters an environment where creative generation and targeted curation work in tandem to maintain a vibrant, self-sustaining repository of 3D assets.

2.3 Partial Previews and Progressive Streaming

3D files are often hundreds of megabytes. MeshTorrent gives priority to geometry chunks so that users can quickly preview approximate shapes before fully downloading. This partial streaming approach shortens the wait time when verifying or discarding a newly published model, reducing bandwidth waste.

2.4 Extensions

SpriteTorrent. SpriteTorrent chunks 2D sprite sheets, allowing partial preview of frames or animation sets. This repurposes the same architecture while letting users automatically generate 2D assets from text prompts (e.g., "small pixel-art goblin walk cycle").

RigTorrent. RigTorrent adds skeletal and weight-map data as additional layers in `.glb` files. An optional auto-rig AI module infers articulation points, merges them with the mesh, and seeds these rigged models. Other peers can partially download the rig, test basic poses, then fetch the rest if the skeleton looks correct.

3 Preliminary Results

In tests with 50 distributed peers, MeshTorrent outperformed single-host HTTP by 25–40% on mid-sized (50–300 MB) 3D files, thanks to parallel chunk downloads. When peers left randomly, the system reconnected to remaining seeders via the DHT with minimal impact on total transfer time. SpriteTorrent similarly benefited from chunked previews of 2D sprite sheets, while RigTorrent's layered rigging data let users confirm an AI-generated skeleton before download.

4 Conclusion and Future Work

MeshTorrent unites P2P distribution with local AI-based 3D generation. By delegating hosting and bandwidth demands to the community, it reduces reliance on any single server while encouraging crowd-driven sharing and curation of generative art. Future efforts include improved moderation, extended VR streaming capabilities, and deeper integration of shared incremental updates for real-time co-creation. MeshTorrent invites users to collectively produce, refine, and exchange an ever-growing library of unique 3D assets.

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