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LiDAR Toolkit: Scalable and Efficient LiDAR Simulation for Computational Research in Unreal Engine 5

Abstract:

LiDAR technology is essential for environmental modeling, robotics, and geospatial analysis, but generating high-fidelity LiDAR data is costly and labor-intensive, requiring expensive equipment, expert operation, and manual effort. To address these challenges, we present the LiDAR Toolkit, a free and open-source plugin for Unreal Engine 5 that democratizes synthetic LiDAR dataset creation. Designed for non-experts, the toolkit uses multi-threaded line traces to generate customizable point clouds, supporting multi-scanner configurations, real-time visualization, and occlusion-aware scanning. It integrates with Quixel Megascans vegetation assets and Unreal's material system for realistic environmental interactions. Suitable for machine learning, environmental research, and education, the toolkit combines Unreal Engine's rendering power with accessible workflows, making high-quality LiDAR simulation efficient and impactful.