



LIDAR INTEGRATION FOR ENHANCED VEHICLE CAPABILITIES AND ENVIRONMENTAL SIMULATION

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INTRODUCTION

Light Detection And Ranging (LiDAR for short) technology and digital twins have become increasingly popular among various industries over the last years. The automotive industry is one of those industries that greatly benefit from the use of both of these technologies. With the recent advancement in technology regarding LiDAR technology, the automotive industry has also seen great potential in self-driving cars and advanced driving assistance systems, with major companies using LiDAR in addition to other technology for their respective autonomous driving systems for example.



RESEARCH QUESTIONS

- RQ1. How does integrating LiDAR scanning into game engine-based simulators and digital twins contribute to enhancing realism in simulated environments?
- RQ2. What methodologies and software pipelines are required to efficiently process LiDAR data as part of vehicle data, enabling the creation of real-time point clouds with minimal computational resources and energy consumption?
- RQ3. How can vehicles lacking integrated LiDAR sensors effectively utilize point cloud data generated by external LiDAR systems?

OBJECTIVES AND EXPECTED RESULTS

The research aims to investigate the potential of LiDAR-scanned environments to create realistic virtual testing environments for vehicles, with a focus on accurately importing LiDAR data into game engine simulations and evaluating mesh generation algorithms by comparing the models with ground truth data (RQ1). Additionally, it seeks to develop an efficient software pipeline for real-time LiDAR data processing, minimizing computational overhead and energy consumption to enhance scalability for vehicle applications (RQ2). Lastly, it examines how vehicles without LiDAR sensors can utilize and interact with point cloud data received through communication with other entities (RQ3).

METHODOLOGY

The research utilizes both theoretical analyses combined with practical experimentation. Most of the research conducted will be utilizing the LiDAR device in some way in regard to the practical implementation required.

