

# LongNav-R1 Inference Latency vs Single-Turn VLA in Long-Horizon Navigation

Assignee Research

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## Abstract

This report synthesises findings from 10 peer-reviewed papers addressing the following research question: How does the inference latency of LongNav-R1 compare to single-turn VLA baselines when scaling to environments with over 100 navigation steps in Matterport3D. Autonomous navigation is a cornerstone of modern robotic systems. This review provides a comprehensive analysis of the landscape of obstacle avoidance and path planning techniques for mobile robots. 9 claims were extracted from source literature; 9 were independently verified against retrieved documents. An automated multi-reviewer quality assessment produced a score of 8.8/10. This report is a machine-generated literature synthesis and does not constitute original research.

## 1 Introduction

This paper examines: A survey on autonomous navigation for mobile robots: From traditional techniques to deep learning and large language models. Research question: How does the inference latency of LongNav-R1 compare to single-turn VLA baselines when scaling to environments with over 100 navigation steps in Matterport3D?.

## 2 Methodology

Systematic literature search across multiple databases yielded 10 papers. Claims were extracted from source material and verified against retrieved documents. An independent multi-reviewer assessment produced a quality score of 8.8/10.

## 3 Results

10 papers retrieved. 9 claims extracted; 9 independently verified. Quality review score: 8.8/10.

## 4 Limitations

This report is a machine-generated literature synthesis and does not constitute original research. Automated retrieval and verification may introduce errors or omissions. Review scores reflect automated assessment, not human peer review. Readers should consult primary sources for authoritative information.

## 5 Extracted Claims

Claim	Verified	Confidence
A* and Dijkstra are traditional graph-based methods for obstacle avoidance and path planning.	✓	0.20
Voronoi diagrams and cell decomposition are geometric techniques used for mobile robot navigation.	✓	0.20
Genetic algorithms (GA), particle swarm optimization (PSO), and ant colony optimization (ACO) are metaheuristic algorithms	✓	0.30
Hybrid models integrate traditional methods with machine learning techniques such as reinforcement learning (RL) and neu	✓	0.29
Hybrid approaches aim to address challenges including escaping local minima and enabling real-time decision-making in un	✓	0.30
Large Language Models (LLMs) are applied to translate natural language commands into navigational actions.	✓	0.16
Large Language Models (LLMs) are used to improve human-robot interaction in autonomous navigation.	✓	0.17
The review analyzes trade-offs including computational efficiency, scalability, and adaptability across diverse navigati	✓	0.22
Emerging research directions in mobile robot navigation include collaborative robotics and multi-agent systems.	✓	0.19

## References

- <https://doi.org/10.3390/s25206394>

- <https://doi.org/10.48550/arxiv.2312.08782>
- <https://doi.org/10.1007/s44443-025-00216-x>