# ABSTRACT


## *PATH PLANNING OPTIMIZATION FOR WHEELED ROBOT IN A MAZE ENVIRONMENT*

The essence of this research addresses the challenge of path optimization in maze environment. Primarily, hinderances a wheeled robot encounters during travel are the complexity of finding which paths are deemed to be the shortest for the robot's navigation route. Paramount to the criteria is the constraint of voltage consumption of the robot's ability to reach the exit of the maze timely. Therefore, the importance of path distance with duration is the critical for determining the robot's effectiveness to reach the exit with the constraints presented.

Mitigating the challenges can be resolved by implementing shortest-path planning algorithmic approaches including *Dijkstra* and *A** algorithm as the robot's main planner. Conversely, while the main planner focuses on the generation of waypoints. The robot manoeuvring system is controlled by the *Dynamic Window Approach* algorithm which serves as the interface for planner's control unit to move the robot towards the goal as well as avoiding potential obstacles in maze environment. Moreover, the comparison scope delves into thorough comparison of which path planning algorithm is best suited to direct the robot with shortest distance and time. This places the robot on various testing area ranging from L Shape, T-Intersection and a complete maze.

Notable outcome shows distinct optimization strengths in individual algorithms when put under different structural formations. Observed that Dijkstra shortest path exceeds A* in simple formations such as L shape by 2.71% shorter distance travel. Contrary in complex maze structure, A* heuristics improvises direct nodes toward goal, leading 4.02% in shorter distance travel.


**Keywords**: Dijkstra Algorithm, A* Algorithm, Maze Path Planning, Wheeled Robot, Comparative Analysis