

# Milestone 1 Progress Report – AI Path Planner

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## Project Summary:

Our Project focuses on developing an AI Path Planning System capable of finding optimal routes in a grid-based environment. The goal is to simulate intelligent navigation, The system takes a grid map as input and outputs the computed path, along with key metrics such as path cost and number of expanded nodes. We are using Breadth First Search (BFS) as our core AI technique for first milestone. In subsequent submissions we will implement Uniform Cost Search (UCS) and A\* Algorithm.

## What Has Been Accomplished So Far:

- **Grid World Setup:** We created a functional grid generator that constructs a static environment with defined start and goal positions.
- **BFS Algorithm:** The BFS algorithm has been successfully implemented to explore the grid and find a valid path.
- **Visualization:** visualization module is working; it displays both the search process (explored nodes) and the final path discovered by BFS.
- **Path Metrics:** The system outputs the **path cost** and **number of expanded nodes**, as planned.
- **Code Structure:** Project modules are organized (algorithms, utilities, visualization), laying the groundwork for adding A\* and UCS later.

## What Has Fallen Behind:

Nothing major is remaining for milestone 1, we are on track for the given timeline in proposal and no major project changes have been done.

## Summary:

We have met the milestone 1 goals, a working BFS pathfinding system with visualization in a static grid world. Core architecture is in place and remaining modules of A\*, UCS, heuristics performance will be built upon this foundation in milestone 2 and a real-life application integration will be implemented before final submission.