

**MALAWI UNIVERSITY OF BUSINESS AND APPLIED SCIENCES (MUBAS)**

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**AI VACUUM CLEANER AGENT DOCUMENTATION**

1. **INTRODUCTION**

This document provides an overview of the AI Vacuum Cleaner Agent, which simulates an intelligent agent that moves between rooms or in more than two rooms and cleans them when dirty. The implementation models a simple decision making process where the robot perceives its environment, acts accordingly and optimizes its movements to achieve efficiency.

The AI agent is designed to mimic real world autonomous cleaning robots, such as robotic vacuum cleaners by following a structured approach to maintaining cleanliness in an environment. The simulation demonstrates how an artificial intelligence system can operate under different conditions, adapt to its surroundings and make rational decisions to achieve a its goal. By incorporating different levels of complexity, the implementation explores the effectiveness of the agent’s decision making process.

1. **TASK OBJECTIVES**

The objectives of this project were:

* To develop an AI agent that behaves similarly to the vacuum cleaner model.
* To simulate an environment where the agent moves between rooms and keeps them clean.
* To enhance the agent by increasing the number of rooms and adding.

1. **TASKS**

**TASK 1: BASIC VACUUM CLEANER AGENT**

**Implementation**

* A simple environment with two rooms (Room A and Room B).
* The agent randomly starts in one of the rooms.
* If the current room is dirty, the agent cleans it.
* The agent then moves randomly to the next room and repeats the process.
* The simulation runs until both rooms are clean or.

**Is the Robot Rational?**

Yes, the robot can be considered rational because:

* It perceives the environment by checking whether a room is dirty or clean.
* It acts accordingly by cleaning dirty rooms and moving to another location.
* It stops cleaning once all rooms are clean, which optimizes efficiency.

**Levels of Complexity**

1. **Easy:** The agent is initialized with a fixed environment state.
2. **Medium:** The environment's initial state is randomised (Now the Agent is operating at this level).

**Outcome**

The agent successfully cleaned both rooms within the given steps. The robot is rational in decision-making, but movement is random rather than optimized.

**TASK 2: EXTENDING THE AGENT TO MULTIPLE ROOMS**

**Implementation**

* The environment was extended to simulate the MUBAS main building, where Room 43 is located.
* The rooms were arranged in a corridor-like structure, with sequential movement.
* The vacuum agent follows a linear path, moving from one room to the next.
* If the current room is dirty, the agent cleans it before moving.

**Levels of Complexity**

1. **Easy:**

* The rooms are structured along a corridor.
* The agent moves from one room to the next.
* The agent stops once all rooms are clean.

1. **Medium:**

* Cleaning time (cleanTime = 2 seconds) was introduced.
* Travel time between rooms (travelTime = 1 second) was considered.
* The agent stops as soon as all rooms are clean, minimizing unnecessary movement.

**Outcome**

The agent successfully cleaned multiple rooms along a corridor. It incorporated time constraints to simulate real-world operations. Movement was still sequential, without prioritization of dirty rooms.

1. **CONCLUSION**

The AI Vacuum Cleaner Agent was successfully implemented and progressively enhanced. The tasks completed showcase an intelligent agent capable of decision making, movement and cleaning the rooms. Future improvements can further optimize its efficiency and adaptability in different environments.