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Description automatically generated**COMSATS UNIVERSITY ISLAMABAD ATTOCK CAMPUS**

**Artificial intelligence**

**Project Report**

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**Project Title:**Intelligent Heuristic-Based Rescue Robot System

**Project Description:**

This project implements a GUI-based rescue robot simulation that uses the A\* algorithm with Manhattan distance to navigate a grid, prioritize victims by criticality, and perform rescues. The system features interactive visualization with step-by-step controls.

**Key Features:**

* A\* Pathfinding – Efficient obstacle avoidance and optimal routing
* Victim Prioritization – Highest criticality first, then proximity
* Interactive GUI – Visualizes robot movement, victims (color-coded by severity), and obstacles
* Treatment Modes – On-site treatment or hospital transport
* Simulation Controls – Start, Next Step, and Reset functionality

**Limitations:**

* Fixed environment (no dynamic updates)
* Basic treatment logic (binary on-site/hospital decision)
* No error handling for edge cases
* Manual step-by-step execution (no auto-play)

**How It Works:**

* Initialization – Loads a predefined grid with victims, obstacles, and a hospital.
* Victim Selection – Chooses the most critical victim first.
* Pathfinding – Uses A\* to navigate to the victim.
* Rescue Decision – Treats on-site or transports to the hospital.
* Completion – Returns to start after all rescues.

**Future Improvements:**

* Dynamic map editing
* Real-time algorithm visualization
* Multi-robot coordination
* Enhanced treatment options