

We did a Visual Simulation for as a bonus:

Description: We have implemented a visually appealing simulation of the vacuum cleaner's operation using Pygame. It includes:

- ✚ Displaying the house matrix with walls, dirt levels, and the docking station.
- ✚ A rotating circle representing the vacuum cleaner, with a directional line indicating its movement.
- ✚ Dirt levels represented by varying shades of gray (white for clean, darker gray for more dirt).
- ✚ A flashing plus sign at the docking station when the vacuum cleaner is charging.
- ✚ Pause and resume functionality through on-screen buttons.

How to Check:

- ✚ **Generating Output Files:** Run the main function of the program, which will generate two JSON output files (initial_house.json and steps_history.json) based on the last input the user provided.
- ✚ **Running the Simulation:** Execute the visualize.py (we wrote in the terminal: python visualize.py) script to start the visual simulation.
- ✚ **Observing the House Matrix:** Take a look at the visual representation of the house matrix. Notice the walls, dirt levels, and the docking station.
- ✚ **Vacuum Cleaner Movement:** Observe the movement of the vacuum cleaner represented by a rotating circle with a directional line. This adds a dynamic and realistic feel to the simulation.
- ✚ **Dirt Levels:** Notice how the dirt levels are displayed using different shades of gray. The darker the gray, the more dirt is present. As the vacuum cleaner moves over these cells, the dirt level decreases. Cleaning occurs when the vacuum cleaner stays in place.
- ✚ **Docking Station:** Pay attention to the docking station symbol. A flashing plus sign will appear when the vacuum cleaner is charging, adding a clear visual cue for this state.
- ✚ **Pause and Resume:** Use the on-screen buttons to pause and resume the simulation. The vacuum cleaner will remain in its last position when paused.
- ✚ **End of Simulation:** At the end of the simulation, the vacuum cleaner will remain in its final position, and a message "End of Simulation" will be displayed at the top of the screen.

Note: you can change the clock tick in the visualize.py file, increment it to make the simulation faster.