

Figure 1. Example of gameplay: in grey, the path covered by the robot; in blue, the obstacles reported by the sensors; in red, the other obstacles; in green, the exits.

As an example, a gameplay is reported in Figure 1, where the player uses the EXPLORE mode in (7,7) to check at N/S/W/E; then moves to E up to (7,11) and looks at N/S; then moves to N up to (4,11) and looks at W/E; continues up to (1,11) and looks W/E; changes direction to E in (0,11) and finally reaches (0,12). Along the path, obstacles in (5,7), (7,12), (4,7) are identified.

In the new controller, the touchscreen display shows the **obstacles that have been detected** by the robot's proximity sensor in the **current game**. Moreover, the robot must be displayed **using different colors** (chosen by you) when the game is in EXPLORE mode or in MOVE mode (see Figure 2). **Please note** that obstacles must appear on the touchscreen in both EXPLORE and MOVE mode (if within the range of 5 slots).

The touchscreen is also used to make some actions:

- To start a new game, the user must touch the labyrinth area.
- A RESTART button can be touched to quit the current game and to show the initial screen.
- A CLEAR button can be touched to cancel all obstacles previously detected in the current game; the game continues, and the display will show new obstacles detected (including previous ones if detected again).

When the player reaches one of the exits, the game ends. To start a new game, the player must press the RESET button or touch RESTART on the screen. **The joystick is disabled** when the previous game ends and **until the new game is started**. When the game ends, an end-game message must be displayed on the touchscreen (up to you to design the message).

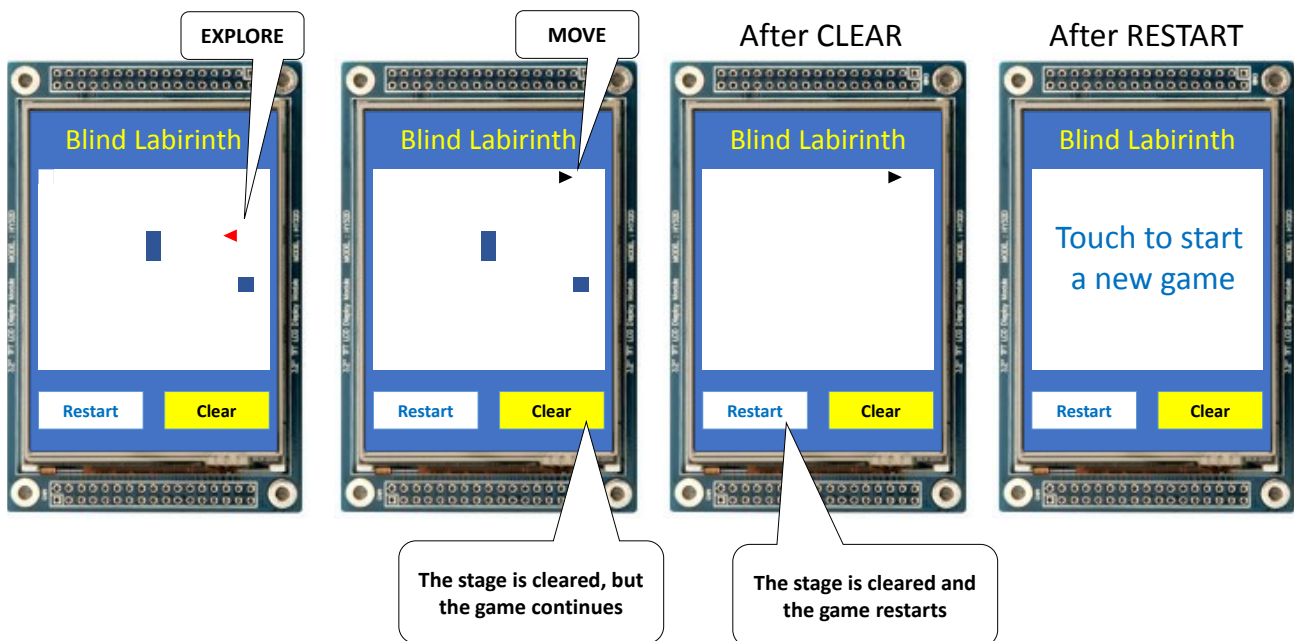


Figure 2. Touchscreen display usage. In the first figure from the left, the robot is exploring the area and obstacles detected by the proximity sensors are displayed; in the second, the robot is moving; in the third, after touching Clear, the game continues and obstacles are “forgot”; in the right figure, after touching Restart, the player is ready to play again.

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