INFORMATICS INSTITUTE OF TECHNOLOGY

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Contents

Structure Diagram

Machine Maze

CONSTANTS
```
width, height,
maze_x_range
maze_y_range,
maze,
exit_square,
internal_wall
```

PROPERTIES
```
width = 7 &
height = 5 &
maze_x_range <: NATURAL1 &
maze_x_range = 1..width &
maze_y_range <: NATURAL1 &
maze_y_range = 1..height &
maze : maze_x_range <-> maze_y_range &
maze = maze_x_range * maze_y_range &
exit_square = (1 |-> 5)
internal_wall : maze_x_range <-> maze_y_range &
internal_wall = {(1 |-> 3), (2 |-> 1), (2 |-> 3), (2 |-> 5), (3 |-> 3), (4 |-> 2), (4 |-> 3), (4 |-> 4), (6 |->
1), (6 |-> 2), (6 |-> 4), (7 |-> 4)}
```

SEES

Machine Robot

SETS
```
REPORT = { CANNOT_MOVE_INTERNAL_WALL_DETECTED, CANNOT_MOVE_OUT_OF_THE_MAZE, CANNOT_TELEPORT_TO_INTERNAL_WALLS,
CANNOT_TELEPORT_OUT_OF_MAZE,INVALID_ENTRY_HIT_INTERNAL_WALL, INVALID_ENTRY_OUT_OF_MAZE,
SUCCESSFULLY_TELEPORTED, CANNOT_TELEPORT_IMMEDIATELY_FROM_START_TO_EXIT,CANNOT_TELEPORT_IMMEDIATELY_TO_EXIT,
CANNOT_TELEPORT_TO_SAME_POSITION, MOVE_SUCCESSFULLY, CANNOT_MOVE_FURTHER, YES_VISITED,
NO_NOT_VISITED,YES_CURRENT_POSITION_HAS_BEEN_VISITED_BEFORE, NO_CURRENT_POSITION_HAS_NOT_BEEN_VISITED_BEFORE
};

OUTPUT_MESSAGES = { YES, NO, CAN_RESET, CANNOT_RESET };
```

VARIABLES
```
robot_current_position,
robot_visited_path,
robot_x_position,
robot_y_position,
```

INVARIANT
```
robot_x_position : NATURAL1 &
robot_x_position : maze_x_range &
robot_y_position : NATURAL1 &
robot_y_position : maze_y_range &
(robot_x_position |-> robot_y_position) : maze &
(robot_x_position |-> robot_y_position) /: internal_wall &
robot_current_position = (robot_x_position |-> robot_y_position) &
robot_current_position : (maze) &
robot_current_position /: internal_wall &
robot_visited_path : seq(maze) &
```

MovedNorth

MovedWest

getPosition

robotsRoute

MovedSouth

MovedEast

hasVisitedSquare
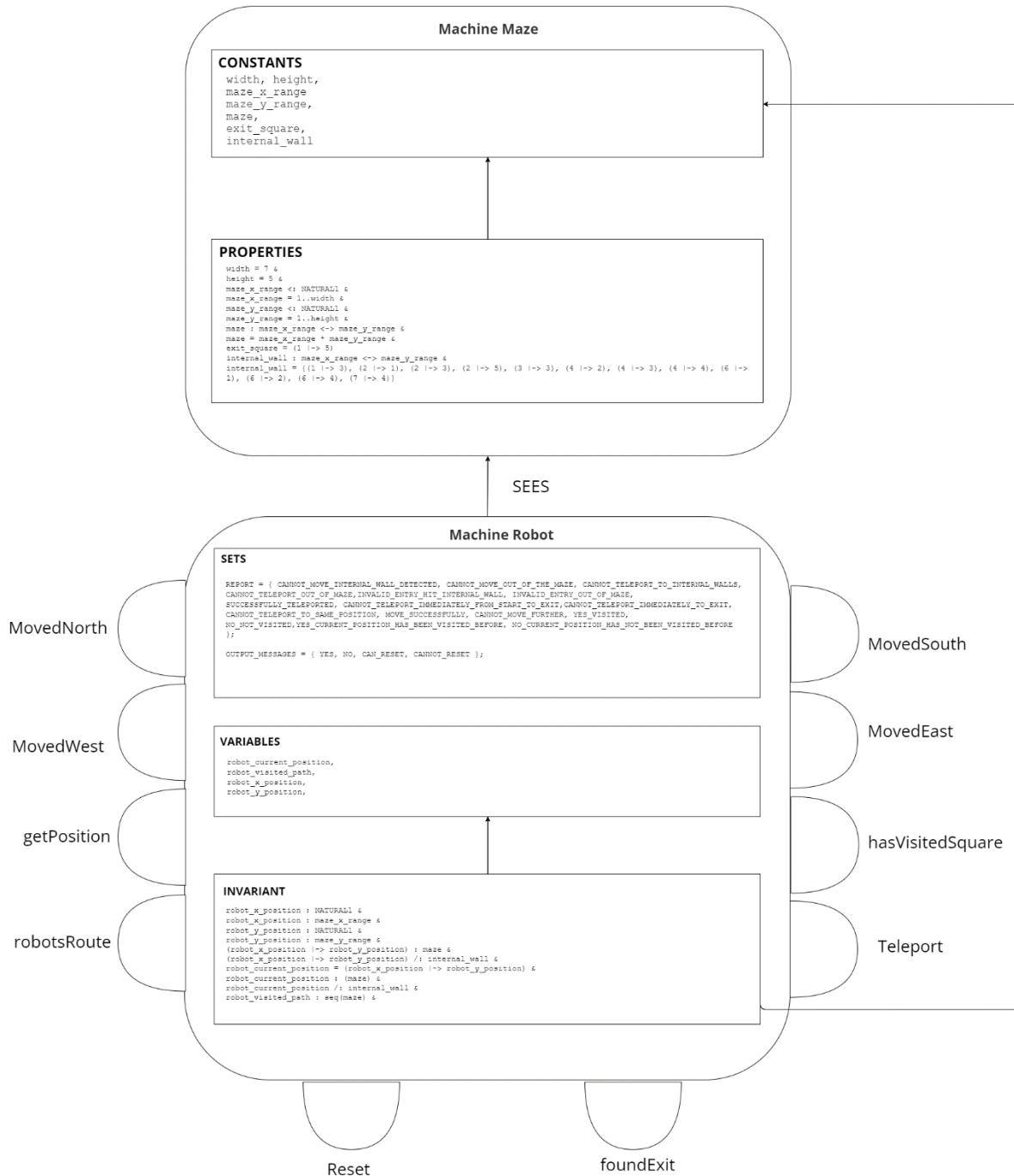
Teleport

Reset

foundExit

Figure 1 Structure Diagram

Description of Invariants

robot_current_position

Only Natural numbers between 1 and 7 and 1 to 5 (within the x range and y range) can be used for the robot's current x and y coordinates.

robot_visited_path

Robot visited path can only be found in maze-compatible sequences. To save the values included in the x and y coordinates as well as the sequence in which the Robot visited each square.

robot_x_position

Within the x values of the maze range, the robot's current x-axis position can only have values ranging from 1 to 7 which are Natural numbers starting from 1.

robot_y_position

Within the y values of the maze range, the robot's current x-axis position can only have values ranging from 1 to 5 which are Natural numbers starting from 1.