Restarting and Replanning

Robots that die will be restarted in the nearest free square to where they died (player's choice when there are multiple nearest squares) with the same orientation they had at the time of death.

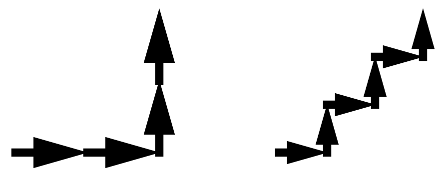
You can replan using the world state after every player has moved in the turn in which your robot died or your plan completed.

There is a 4 turn replanning penalty.

Notes

Moving forward 2 squares when there is a pit 1 square in front of your robot causes the robot to fall into the pit (i.e. it doesn't jump it)

Since each turn (left or right) takes time, route (a) is faster than route (b)

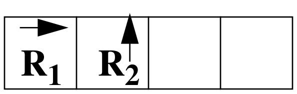


(a) (b)

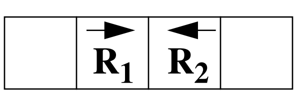
Bump Rules

Below are examples of what happens when two robots collide with each other. Robot R_1 is the collider and robot R_2 is the collidee. The arrows indicate the direction the robot is facing. The orientation of colliding robots changes as follows: the collider's orientation remains unchanged, while the collidee's orientation turns left 90 degrees. Remember, robots can be pushed into pits!

initial position

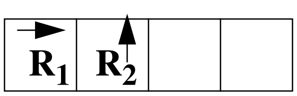


final position

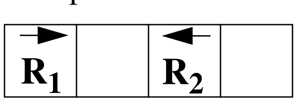


move forward 2

initial position

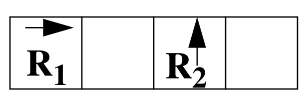


final position

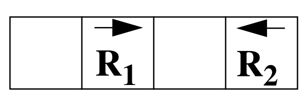


move forward 1

initial position



final position



move forward 2

initial position

final position

move forward 1 or 2

Sensors

Your robot begins the game with global knowledge of the board and the positions of other robots. You also know your own position and heading. From this data you must plan a series of actions selected from the set at the right.

You will not receive sensor updates as your plan executes and your plan cannot have sensor tests or conditionals.

You will again receive a "global snapshot" of the board state when your robot finishes its current plan, or dies (and needs a new plan).

Actions

The possible actions which the robot can take on any given turn are:

- turn left in same square (TL)
- turn right in same square (TR)
- move forward 1 square (F1)
- move forward 2 squares (F2)
- back up 1 square (B)
- no-op (N)

all turns are 90 degrees

Operations

Your robot cannot use any operators other than the actions listed above.

Planning Rules

- You can create a plan of any length you like.
- You do not need to use any planning algorithm, just your head!
- Plans must consist of only a list of the actions specified above.
- You cannot stop executing a plan once you begin.
- When you finish your current plan, or your robot dies by falling into a pit or off the board, your are assessed a *4 step penalty* (that is the other players will get to move 4 times while you sit there re-planning).
- You will replan based on the board state during your first turn out (so the world may be different when you plan begins executing)

Robot Programming Game: Planner Directions

This game involves programming robots to tag a series of flags within a maze-like environment. Teams will be using either the reactive or planning paradigm to program their robot. You have been assigned the task of generating a plan to give your robot victory. You will be competing against 3 other robots, two of which are running reactive programs and one of which is also executing a fixed plan.

The game environment is a board and your robot is a token. The board is a grid where each square is either a wall (which blocks your motion), a pit (which kills your robot if you walk into it), a flag (which you want to touch in numerical order), or free-space. A copy of the board is included in these notes. The board is also populated with the other robots playing the game. You cannot sense them, but you can run into them with various consequences (see Bump Rules).

The game plays as follows. Each team generates a reactive program or plan for their robot and they are all executed one step at a time. So, first robot A executes 1 plan step, then robot B chooses an action based on current perceptions, then robot C executes 1 plan step and finally robot D chooses an action based on current perceptions. Each team will “execute” their plan/program through one of the symposium chairs. When it’s your team’s turn, your team will look at your plan and announce the robot’s next action. Your team should say something like “The next step of our plan is move forward 2”. Your robot’s token will then be moved.

One final note before turning you loose on robot planning. This game is supposed to be an educational exercise to provide a forum to discuss the good and bad points of reactive robots and planners. It’s also supposed to be fun. Although it appears easy to generate a sequence of steps to touch all the flags in order, there are 3 other, unpredictable robots in the game...

The next few pages give you details on the specifications of your robot and directions for generating plans. You plan should be a sequence of actions on any length you decide. Good Luck!