

The Wumpus World Problem

The Wumpus World

The Wumpus world is a 4x4 grid of squares. The world contains a Wumpus, a pile of gold, and any number of pits. Each of these items is in a square of the grid. No square contains two of these items, some squares contain none of these items, and the items do not move. The robot starts in the lower left square facing up, and the goal of the robot is to get to the square with the gold and return to the start square with it, without running into the Wumpus or a pit. The robot has one arrow with which it can shoot and kill the Wumpus. You can assume that the world is such that an infinitely smart being can solve the puzzle without guessing (and without knowing this particular fact).

When a robot is in a square that is next to the square with the Wumpus, the robot smells a horrible smell. When the robot is in a square that is next to the square with the pile of gold, the robot sees a glitter. When the robot is in a square that is next to the square with a pit, the robot feels a breeze. If a square is next to multiple items, the robot gets multiple clues (e.g. if the robot is on a square that is next to a square with the Wumpus, as well as next to a square with a pit, the robot will sense a smell as well as a breeze). Being next to multiple pits does not 'increase' the breeze: the robot will simply feel a breeze. When the Wumpus has been killed, the square becomes an empty square, and the smells in the adjacent squares go away.

Game Play

Your robot should move from square to square, i.e. at all times the robot should be either stopped completely in a square, or should be crossing from one square into an adjacent square to the left, right, up, or down from it. There will be no physical smells, breezes, or glitter. Rather, an infrared signal from a remote will be used to indicate whether a square contains nothing (0), a breeze (1), a stench (2), glitter (4), gold (8), or any combination thereof.

There are two stages in the game: the first stage is looking for the gold, the second is going back to the lower left square. During stage one the robot can stop in any square and get a signal from the remote indicating what's in that square before moving on. There is no need to stop in every square though, e.g. if the robot already knows what is in a square then the robot can simply move through that square to a different square. Once the robot has the gold, the robot gets no more signals (as it should know how to get back safely), so stopping in a square has no use.

To successfully shoot the Wumpus the robot has to be in the square adjacent to the Wumpus, and face the square with the Wumpus. The robot can either physically shoot an arrow (interesting engineering challenge!) or simply display an appropriate message on the LCD screen. After the robot shoots the arrow, the robot should move to a new square before getting a new signal. The game is lost when the robot moves into a square with a pit or the Wumpus, or when the robot goes off the board.