

## Experiment No:- 01

Aim:-

Assignment on state space formulation and PEAS representation for various AI application.

Theory:-

A variety of 'worlds' are getting used as example for knowledge representation, reasoning, and planning. Among them are the vacuum world, the Block world, and also the wumpus world. we'll examine the wumpus world and during this context introduce the situation calculus, the frame drawback, and a range of axioms. The Wumpus world was introduced the situation calculus, the frame drawback which is by Genesereth and is mentioned in Russell-Norving. The Wumpus world could be an easy world (as is that the Block World) to represent knowledge and to reason.



→ Wumpus World - state space formulation:-

- states:- Different configurations of the agent, the wumpus, pits, gold, and arrows. Each location in the grid can be a state.
- Actions:- possible moves (forward, turn left, turn right), shooting an arrow, picking up gold, and climbing out of the cave.
- Example Actions in Wumpus World:-

1 Move forward:-

Effect:- The agent moves one square forward in the direction it is facing.



H. J. Thim Trust's  
**THEEM COLLEGE OF ENGINEERING**

Date : \_\_\_\_\_

changes in state:- The agent's position changes, and if it moves into a square with the Wumpus or a pit, it may face danger.

2. shoot Arrow:-

Effect:- The agent shoots an arrow in the direction it is facing.

changes in state:- The arrow travels in a straight line until it hits a wall or the Wumpus, possibly killing the Wumpus.

3. pick up Gold:-

Effect:- The agent picks up gold if it is present in the current square.

changes in state:- The agent gains gold, and the gold is removed from the environment.

4. climb out:-

Effect:- The agent climbs out of the cave.

changes in state:- The game ends, and the agent's performance is evaluated based on the collected gold and successful exit.

- Transition Model:- Describes how the state changes based on the agent's actions and the environment's dynamics. For example, moving to a neighboring





square might lead to a different state depending on whether there's a pit or Wumpus nearby.

#### 4. Goal Test:-

determines whether the agent has achieved its objective, usually by reaching the gold and returning to the start position.

5. Cost function:- Assigns a cost to each action taken by the agent. The objective might be to minimize the total cost (e.g., the number of actions taken or the risk involved).

### → Wumpus World - PEAS Representation

#### 1. performance measure:-

(a) +1000 points for picking up the gold - this is the goal of the agent

(b) -1000 points for dying = entering a square containing a pit or a live Wumpus Monster

(c) -1 point for each action taken, and

(d) -10 points for using the arrow trying to kill the Wumpus - so that the agent should avoid performing unnecessary actions.

#### 2. Environment:- $4 \times 4$ grid of squares with...

(a) The agent starting from square (1,1) facing right

(b) The gold in one square.





(c) the initially live Wumpus in one square, from which it never moves.

(d) maybe pits in some squares

The starting square  $[1,1]$  has no Wumpus, no pit, and no gold - so the agent neither dies nor succeeds straight away.

3. Actuators:- The agent can turn 90° left or right, walk one square forward in the current direction, grab an object in this square, shoot the single arrow in the current direction, which flies in a straight line until it hits a wall or the Wumpus.

4. sensors:- The agent has 5 true/false sensors which report a stench when the Wumpus is in an adjacent square - directly, not diagonally, breeze when an adjacent square has a pit, glitter, when the agent perceives the glitter of the gold in the current square, bump, when the agent walks into an enclosing wall (and then the action had no effect), scream, when the arrow hit the Wumpus, killing it.



conclusion:- Thus, we have seen the formulating the Wumpus World as a state space problem allows the use of various search algorithms, such as depth-first search, breadth-first search, A\*, or other informed search technique, to find an optimal or satisfactory solution and peas description provides a framework for understanding the interaction between the player and Wumpus World environment. Hence by this we have successfully implemented Wumpus world problem.