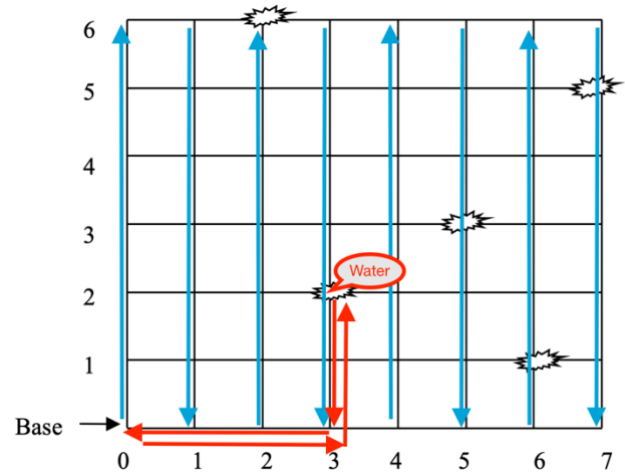# INTELLIGENT AGENTS – 310CT

Rover on Mars, documentation

Task

A rover was sent to Mars to find if there is any life form on the planet. Water is strong evidence that suggests the existence of possible life forms. The water cannot be found on the surface, but in the rocks.

Solution

Belief Desire Intention (BDI) agent was implemented to traverse the given area seeking rocks.

The agent must achieve the top-level goal which is to travel the entire area. This is achieved by switching between three operational modes.

Exploratory

- Operational mode in which the agent moves across the area
- Movement happens in the manner depicted in top-right picture
- Once the rock is found, it's analysed for traces of water
- If water is found, the Return Home mode is enabled

Return Home

- The robot moves down the Y then X axes unitl positions 0 are reached
- If more rocks were encountered, their positions were saved and the fetch mode is enabled.
- If not robot returns to the point exploration was stopped and resumes it

Fetch

- Robot returns to a rock it had encountered on its way home while it was carrying another rock with water
- The rock is examined for traces of water
- If water is found, Return Home mode is enabled
- If not, resume exploring

Test Results

- ROCK 2 6 "False";
- ROCK 3 1 "False";
- ROCK 6 1 "False";
- ROCK 5 3 "False";
- ROCK 7 5 "True";
- ROCK 3 2 "True";
- ROCK 2 2 "True";
- ROCK 3 3 "True";

```
MISSION COMPLETE!
Total moves were made: 111

Rock with no water at: 2 | 6
Rock with no water at: 3 | 1
Rock with no water at: 5 | 3
Rock with no water at: 6 | 1

Rock with water at: 2 | 2
Rock with water at: 3 | 3
Rock with water at: 3 | 2
Rock with water at: 7 | 5
```

- ROCK 7 0 "False";
- ROCK 3 1 "False";
- ROCK 1 1 "False";
- ROCK 0 1 "False";
- ROCK 7 5 "True";
- ROCK 3 2 "True";
- ROCK 4 6 "True";
- ROCK 7 6 "True";
- ROCK 1 6 "False";

```
MISSION COMPLETE!
Total moves were made: 139

Rock with no water at: 0 | 1
Rock with no water at: 1 | 6
Rock with no water at: 1 | 1
Rock with no water at: 3 | 1
Rock with no water at: 7 | 0

Rock with water at: 3 | 2
Rock with water at: 4 | 6
Rock with water at: 7 | 5
Rock with water at: 7 | 6
```

Exploratory Mode

Return Home Mode

Fetch Mode

Top-level goal is set to **achieve** traversal of the entire area

Fetch Mode is ON

Return Home Mode is ON

Default

Enable Exploratory Mode

Move up until end,
Switch X axis,
Move down until end,
Switch X axis,
Repeat

Move in predefined pattern

Empty rock encountered

Area boundary position is reached

Rock with water encountered

Meaning, store the rock positions

Keep moving down and remember encountered rocks

Robot was moving down

Robot was moving up

Robot on Y: 0

Enable Return Home mode

Disable Exploratory Mode

Move to position 0:0

Memory has no known rock positions

Memory has known rock positions

Enable Fetch mode

Retrieve a known rock position

Move to the rock position

Analyze the rock

Rock has water

Rock has no water

Enable Return Home mode

Disable Fetch Mode