

01-25-2006-CS8650-Wednesday

AI Game Project

CS 8650
Introduction to AI & Robotics
Dr. Ken Hoganson

Class

Will

Start

Momentarily...

- Textbook Section 7.2, page 197
- A game where the “player” can be implemented as an agent.
- The agent wanders through a grid of rooms
- Incomplete knowledge of the game board – can only see the room you are in.

- Game Project: Design Ideas
- Natural fit with the Agent concept
- Object is to find the gold without getting eaten by the Wumpus, or falling in a pit.
- Cannot always use logic to determine the correct decision – make a random guess.

	<u>W</u>	Pit	<u>Gold</u>
	Pit		
<i>Start Player</i>		Pit	

- Cannot always use logic to determine the correct decision
- Make a random guess.
- Outcome is not deterministic – random chance involved.

?	<u>W</u>	Pit	<u>Gold</u>
<i>Player</i> breeze ↑	? Pit		
<i>Start</i> ↑		Pit	

- From Chapter 2.

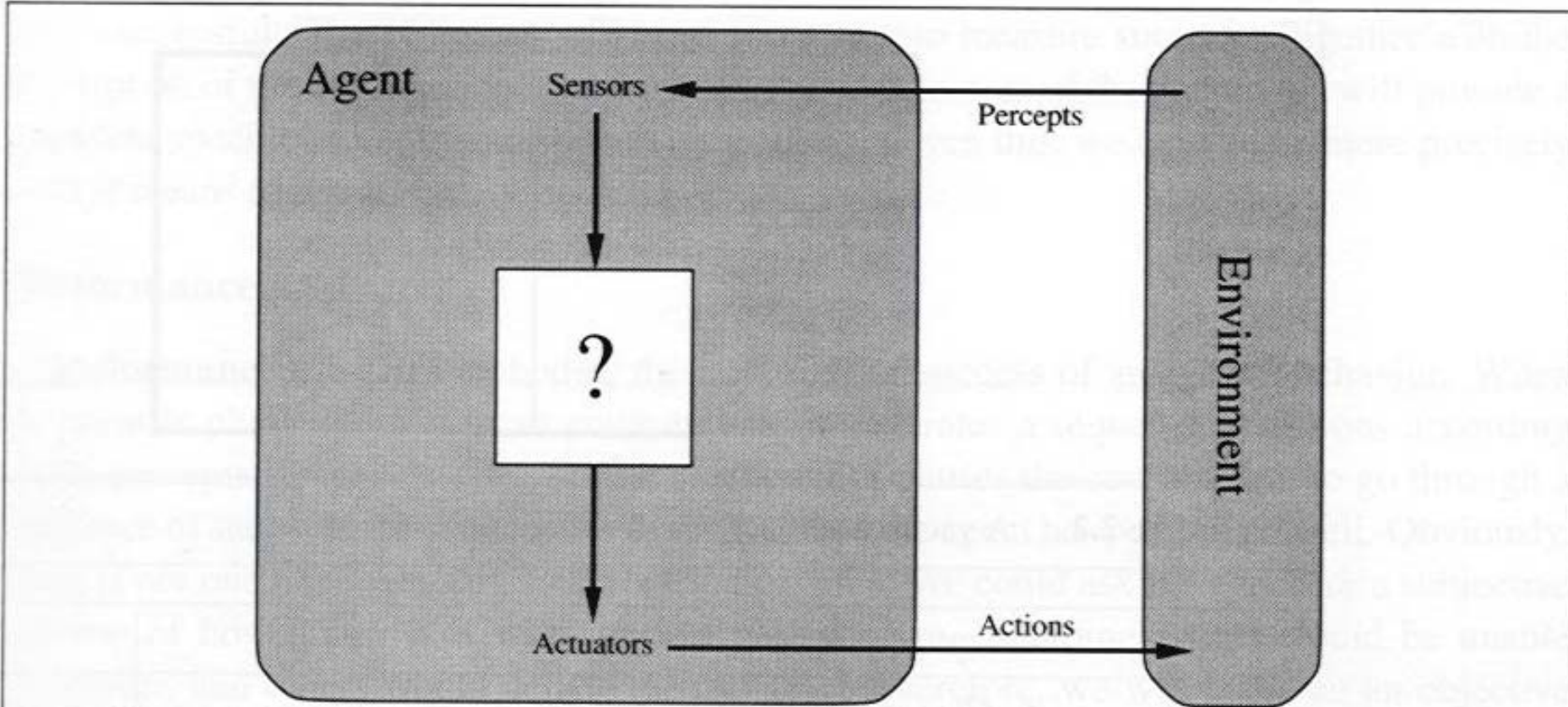


Figure 2.1 Agents interact with environments through sensors and actuators.

Connection: Doesn't this sound a lot like robotics as well?

- Note, works naturally as an object, that may execute as an independent thread.
- Object can have methods that execute whenever the sensors detect and input.
- Object can have methods for generating output.
- Objects can have methods that process and make decisions (the AI)
- Object will have a main method that controls the processing, that communicates with and coordinates the other methods.

- Plays the game in place of the human player.
- Game setup is separate (could be random), and is not part of the AI – but would be part of your program.
- Possible construction:
 - Object to hold the game board, with method to interface with the data structure that holds the game, perhaps stored in an array,
 - method to set up a random game board
 - Each square can either be empty, or hold
 - Methods to display the current state and location on the monitor. This could be primitive:

Methods to display the current state and location on the monitor. This could be primitive: simply print four lines with text for each square in a row.

-	-	-	-
-	<u>W</u>	Pit	<u>Gold</u>
<i>Player</i>	Pit	-	-
-	-	Pit	-

Feel free to invest more time in the display **after** you have the AI working.

Sensors: what kind of input does the AI perceive?

Based on the game design: From a given square, the AI player can:

- Perceive a breeze from a pit in an adjacent square (but don't know which square)
- Perceive a smell from the Wumpus in an adjacent square (but don't know which square)
- Perceive a wall by bumping into it.
- Can perceive the gold when in the same square
- Can perceive the "death scream" of the wumpus if it is killed.

Actions: what capabilities does the player have?

Based on the game design: From a given square, the AI player can:

- Move in any of four directions unless bounded by the limits of the game board: up, down, left, right.
- Shoot a single arrow, one time, to kill the wumpus.
- Can be done if sure that the wumpus is there and you need to kill him rather than go around,
- or can be shot into a square that may have the wumpus, to clear it so you can pass through.

Overview:

- Main program, that creates objects and data structures, and controls turn sequencing
- Game board object/data structure with methods to interact with the board
- Player agent that interfaces with the game board, and has the "AI" decision making process

- The decision process – how to play?
- Maintain a “memory” of where you have been in the maze, and what you learned and perceived in each square. Looks like another object/data-structure equivalent to the game board – in fact, it should be another instance of the same object.
- Set of if/then/else statements that incorporate the game playing logic
- Use logic when possible, to determine the location of pits and the wumpus

- AI project choices:
 - Genetic Algorithm (only if not already seen in CS 8625)
 - Wumpus Game project
 - Expert System (still to come)
 - Some other project you propose
- Working project due on April 15.

**End
Of
Today's
Lecture.**