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Assignment 1:

Q1) Part picking robot is characterized with the following properties:

- Partially observable: The robot's vision sensors could be faulty or may not be able to distinguish certain similar parts.
- Single-agent: The performance measure of a specific robot is not impacted by another robot doing the same job.
- Stochastic: It is not guaranteed to determine the next state of the environment as there could be faulty sensors or some random issue with the conveyor belt.
- Episodic: Because the classification of the parts in the current episode cannot be determined from the parts in the previous episodes.
- Dynamic: Because, as the robot decides on the category of the part, the conveyor belt keeps moving, so the environment keeps changing.
- Continuous: The robot perceives parts at random continuous times and may not be in finite discrete times.

Q2) PEAS description for the robotic soccer environment:

- Performance measure: To play efficiently, Scoring goals, winning the game.
- Environment: Soccer ball, field, team members, opponent players, referees, spectators.
- Actuators: motors (arms and legs), navigators.
- Sensors: vision sensors, communication and touch sensors.

Q3) Rational agent: An agent that chooses an action that maximizes the expected performance for every possible percept sequence using the evidence in the percept sequence and its prior knowledge of the environment.

Autonomous agent: An agent that chooses an action based on its own experience rather depending on knowledge of the designer.

Q4)

a. As per the given assumptions, the agent is only able to perceive presence of dirt on the location it is currently on and has no memory of the state of location it was previously on. So even if all the squares are clean, the agent will never be aware of it and the usage of 'NoOp' action will not make a difference and the agent is bound to keep moving between the squares due to lack of memory of previous state in the memory.

b. To prevent the vacuum cleaner from moving, we could use a Model-based reflex agent to keep track of the presence of dirt on the previous location the agent was on. Model-based reflex agents use an internal state to keep the previous location state in memory which the agent cannot perceive in its current location otherwise. This information can be used to decide if all the squares are clean and stop the vacuum from moving.