National University of Modern Languages, Karachi
CS Department - Fall 2025
AI Lab 04 Tasks - CS IV

Course Code: CSAI-226L	**Course Name:** Artificial Intelligence-Lab
Instructor: Parshant Vijay	

Submission Instructions:

You must submit the following items:

1. **Source Code Files:**
   - Task1_SimpleVacuumAgent.py
   - Task2_TrafficLightAgent.py
   - Task3_ModelVacuumAgent.py
   - Task4_WarehouseAgent.py
2. Submit **one single Word/PDF document** named *Lab04_Report_YourName* containing a brief explanation, **one screenshot of the code**, and **one screenshot of the output for each of the 4 tasks**.

LAB # 04
INTELLIGENT AGENTS

LAB TASKS

Task 1: Simple Reflex Vacuum Cleaner Agent

Objective: Implement a **Simple Reflex Agent** using a Python class.

Task Description:
Create a class **VacuumAgent** that acts based only on the **current percept** (location + status).
The agent has no memory and does not store past states.

Requirements:

1. Create a class **VacuumAgent** with a method **decide(percept)**
2. **percept** will be a tuple like: **("A", "Dirty")**
3. Agent follows rules:
   - If current cell is **"Dirty"** → return **"Suck"**
   - If **"Clean"** → return **"Move"** (to the other cell)
4. No history or internal state allowed

Expected Example:

```
Input: ("A", "Dirty") → Output: "Suck"
Input: ("B", "Clean") → Output: "Move"
```

Task 2: Traffic Light Reflex Agent

Objective: Create a class-based agent that decides movement based only on the traffic light color.

Requirements:

1. Create a class TrafficAgent
2. Implement a method decide(light_color)
3. Action rules:

Percept (Light)	Action
"Red"	"Stop"
"Yellow"	"Slow"
"Green"	"Go"

4. No stored memory, only reacts to current input.

Example:

```
Input:  "Red"   → Output: "Stop"
Input:  "Green" → Output: "Go"
```

Task 3: Model-Based Vacuum Cleaner Agent

Objective: Extend the vacuum agent to **store the internal state** of cleaned rooms.

Requirements:

1. Create a class **ModelVacuum**Agent
2. Maintain a dictionary to store room states (A/B: Clean/Dirty)
3. **decide(percept)** should update internal state before deciding
4. If both rooms are clean, agent should return **"NoAction"**

Example internal state:

```
self.state = {"A": "Clean", "B": "Dirty"}
```

Expected Output Flow:

```
Percept: ("A", "Dirty") → Action: "Suck"
Percept: ("A", "Clean") → Action: "Move"
Percept: ("A", "Clean") again → Action: "Move" (does not suck again)
```

Task 4: Model-Based Warehouse Robot Agent

Objective: Agent should pick packages only once using memory of picked locations.

Requirements:

1. Create a class **WarehouseAgent**
2. Maintain an internal dictionary **picked_items** to remember collected packages
3. Percept will be a tuple like: **(location, has_package)**
4. Decision rules:
    - If package exists and not picked before → **"Pick"**
    - If already picked before → **"Skip"**
    - Else → **"Move"**

Example internal state:

```
self.picked = {"P1": True, "P2": False}
```

Example Output:

```
At P1, package found → Pick
At P1 again → Skip (package already picked)
```