Artificial Intelligence Lab

Lab 3

## Spring 2025

# Reflex and Model based Agents

**Note: You are only allowed to use searching algos like BFS, DFS, etc. in the second question.**

## **Task 1: Firefighting Drone (Simple Reflex Agent)** (3 Marks)

Design a **Simple Reflex Agent** that controls a firefighting drone to efficiently extinguish fires in a forest.

**Task Description:**

* **Environment:**
  + A **4x4 grid** representing a forest, where some cells may contain fire (F) or be safe (S).
* **Percepts:**
  + The agent can only sense the current cell.
  + If the cell contains fire (F), the agent perceives it.
* **Actions:**
  + **Move** in four directions: Up, Down, Left, Right.
  + **Extinguish Fire:** If the current cell is on fire, put it out.
* **Goal:**
  + Extinguish all fires in the forest efficiently.

## **Task 2: Hospital Service Robot** (7 Marks)

Design a **Model-Based Agent** that operates as a **Hospital Service Robot** to efficiently deliver medicine to patient rooms while avoiding obstacles.

#### **Task Description:**

* **Environment:**
  + A **5×5 grid** representing a hospital floor, containing:
    - **Patient Rooms (P): Locations where medicines need to be delivered.**
    - **Medicine Storage (M): Locations where the robot collects medicine.**
    - **Obstacles (#)** that can appear randomly.
    - **Empty Spaces (.)** where the robot can move freely.
* **Percepts:**
  + The robot is aware of the **hospital layout**, including the locations of patient rooms and medicine storage.
  + It detects **changes in obstacles** due to moving staff.
* **Actions:**
  + **Move** (Up, Down, Left, Right) Navigate through empty spaces.
  + **Pick Up (P)** Collect a medicine from a storage location.
  + **Drop Off (D)** Deliver a medicine to a patient room.
  + **Recalculate Path** when obstacles appear.
* **Goal:**
  + **Maintain an Internal Model:**
    - Track the hospital layout, including medicine storage and patient rooms.
    - Update the model when obstacles appear or disappear.
  + **Adapt to Changes:**
    - If a new obstacle appears, find an alternative route.
    - If a patient room becomes inaccessible, attempt delivery later.
  + **Efficiently Deliver Medicine:**
    - Pick up medicines from storage.
    - Deliver them to the correct patient rooms while minimizing unnecessary movements.