**🧠 AI Steam Robot Repository**

This repository documents the components, functions, and configuration of the **AI Steam Robot**, a smart robotic platform designed to detect and respond to colored signals, navigate around obstacles, and execute directional movements using various integrated sensors and actuators.

**🔧 Hardware Components**

**1. Camera Module**

* **Function**: Detects color signals.
* **Detection Method**: Monochrome processing using **LAB Thresholding**.
  + **Red**: Turn **Right**
  + **Green**: Turn **Left**
* **Connection Port**: P1 slot

**2. Integrated Grayscale Sensor**

* **Function**: Detects **orange** and **blue** colors using intensity levels (1–5).
* **Use Case**: Assists in surface detection and color-based triggers.
* **Connection Port**: A5 slot

**3. Full-Color Actuator Lights**

* **Function**: Enhances camera's ability to distinguish **red** and **green** under different lighting conditions.
* **Connection Port**: A3 slot

**4. Obstacle Avoidance Sensors**

* **Function**: Detects and avoids barriers to the **left** and **right** of the robot.
* **Number of Sensors**: 2 (left and right)
* **Connection Ports**: A1 and A4 slots

**5. Motors**

* **Type**: Standard mobility motor
* **Function**: Provides forward and backward movement.
* **Connection Port**: M2 slot

**6. Rudder**

* **Function**: Controls turning angle and direction of the robot.
* **Connection Port**: D1 slot

**7. Battery**

* **Brand**: **NASHENBOT Lithium-Ion Rechargeable Battery**
* **Specifications**:
  + Voltage: **7.4V – 8.14Wh**
  + Capacity: **1100mAh**
  + Charge Limited Voltage: **8.4V**
  + Current: **1A**

**8. Microcontroller**

* **Role**: Central controller that integrates all sensors, actuators, and decision-making logic.
* **Slot Assignments**:
  + A1: Obstacle Avoidance (Left)
  + A4: Obstacle Avoidance (Right)
  + A3: Full-Color Actuator Lights
  + A5: Integrated Grayscale Sensor
  + P1: Camera Module
  + M2: Ordinary Motor
  + D1: Rudder

**🧠 Robot Logic Summary**

1. **Color Detection**:
   * Uses the camera with LAB thresholding to decide movement direction:
     + **Red = Turn Right**
     + **Green = Turn Left**
2. **Environment Awareness**:
   * Integrated grayscale sensor identifies colored paths (orange/blue).
   * Obstacle sensors prevent collisions on both sides.
3. **Enhanced Vision**:
   * Full-color lights help the camera distinguish red/green in varying light.
4. **Movement Control**:
   * Motors allow linear movement.
   * Rudder adjusts turning angle based on camera and sensor data.