Circuit Diagram Description
Components:
Arduino Uno/nano

L298N Motor Driver

IR Sensors (5x) for line tracking

IR Obstacle Sensors (2x) for left/right detection

DC Motors (2x)

Potentiometer (speed control)

Push Button (start/stop)

LEDs (Red/Green) for obstacle indication

Resistors (220Ω for LEDs, 10kΩ for pull-up/down as needed)

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## Connections Table

| Component | Arduino Pin | Details |
|---|---|---|
| **L298N Motor Driver** | | |
| ENA (Enable Left) | D9 (PWM) | Left motor speed control |
| IN1 (Left M1) | D4 | Left motor direction control |
| IN2 (Left M2) | D5 | |
| ENB (Enable Right) | D10 (PWM) | Right motor speed control |
| IN3 (Right M1) | D6 | Right motor direction control |
| IN4 (Right M2) | D7 | |
| **Line IR Sensors** | | |
| Sensor 1 (Leftmost) | A0 | Detects left edge/line |
| Sensor 2 | A1 | |
| Sensor 3 (Center) | A2 | Primary line detection |
| Sensor 4 | A3 | |
| Sensor 5 (Rightmost) | A4 | Detects right edge/line |
| **Obstacle IR Sensors** | | |
| Left Obstacle | D12 | Triggers Red LED (D10) |
| Right Obstacle | D13 | Triggers Green LED (D11) |
| **Potentiometer** | A5 | Middle pin connected; outer pins to 5V and GND |
| **Push Button** | D3 | Pull-up resistor to 5V, other side to GND |
| **LEDs** | | |
| Red LED | D10 | Anode → 220Ω resistor → D10; Cathode → GND |

| Component | Arduino Pin | Details |
|---|---|---|
| Green LED | D11 | Anode → 220Ω resistor → D11; Cathode → GND |
| **Power** | | |
| L298N VCC | External 9V | Separate power for motors |
| Arduino VIN | 9V Battery | Power for Arduino (or USB) |