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LINE FOLLOWER

(Arduino Line Follower Robot)

Team Name : Night Crawlers

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Introduction :

Welcome to the exciting world of robotics with Arduino! Here, we'll delve into the fascinating realm of autonomous navigation using an Arduino-based line follower robot. Line following robots are a classic example of simple yet effective autonomous systems. They are designed to follow a predetermined path marked by a contrasting line on the surface. This technology finds applications in various fields including industrial automation, warehouse logistics, and even hobby robotics. The primary objective of this project is to build a robot capable of following a black line on a white surface using sensors and control algorithms implemented on an Arduino microcontroller board. The robot will rely on infrared (IR) sensors to detect the contrast between the line and its surroundings and make decisions based on the sensor readings to stay on track.

Specifications:

(i) Hardware Components:

(a) Arduino microcontroller board {Arduino Uno}.

(b) Motor driver module (here, L298N) to control the motors.

(c) Two Infrared (IR) sensors or line sensor array to detect the line.

(d) Two BO Motors of 150 rpm.

(e) Two Wheels and one Caster Wheel for locomotion.

(f) Chassis to hold the components together.

(g) Power source (here, two 18650 Li –ion batteries) for Arduino & Motors

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Components:

Sr. No	Name of the components	Quantity
01	Arduino Uno	01
02	BO Motors	02
03	IR Sensors	02
04	L298N Motor Driver	01
05	Chassis	01
06	Li –ion batteries (3.7 Volts)	02
07	Wheels	02
08	Caster Wheel	01
09	Jumper Wires and Single Stranded Wires	NA
10	3mm Nut Bolts	07
11	Double Sided Tape	01
12	Insulation Tape	01
13	Black Tape	01
14	Screwdriver	01

Circuit Diagram :

The following Circuit Diagram represents the the manner and order of interconnections we used for the proper functioning of the Arduino Line Follower Robot.
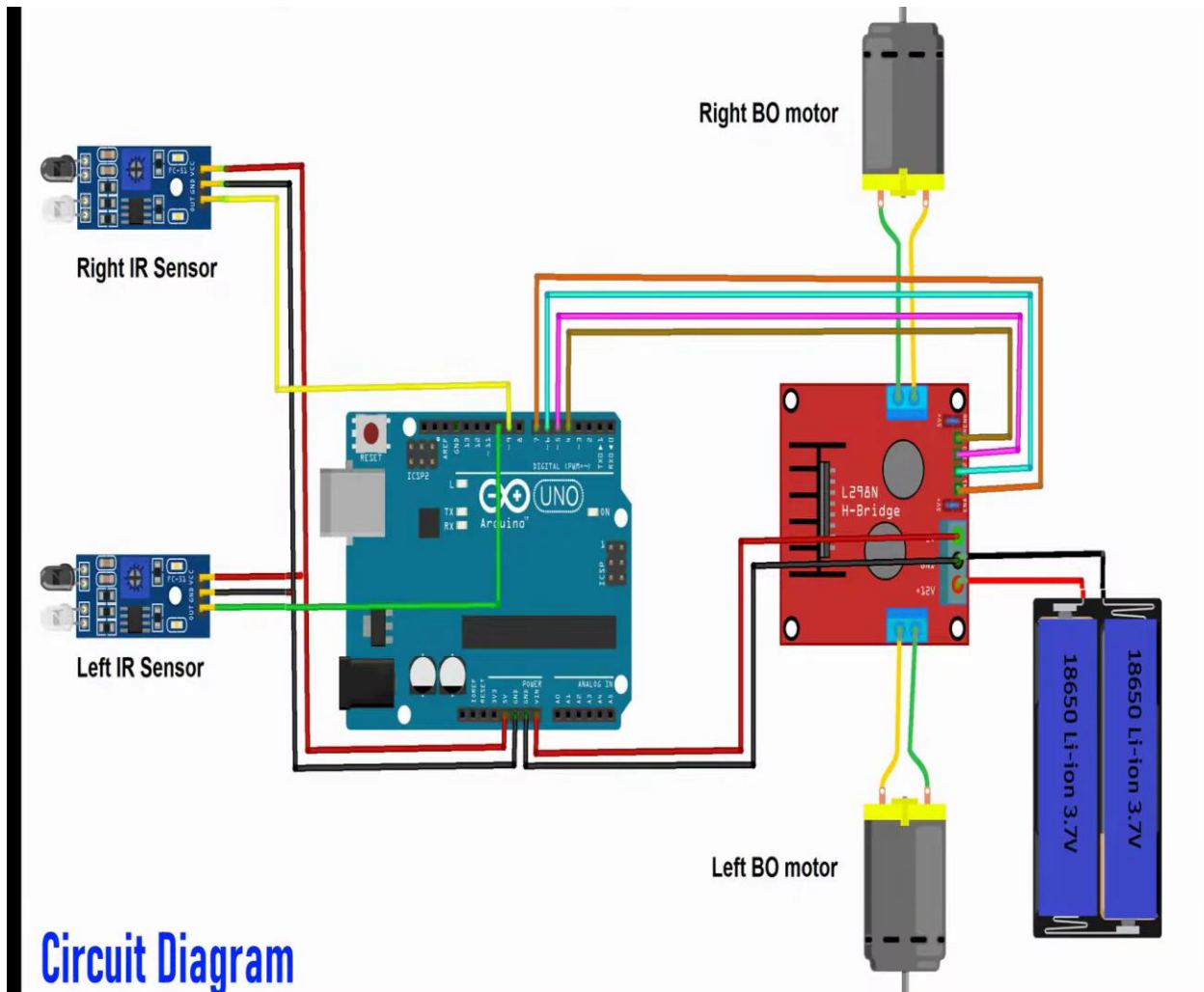
Algorithms :

This algorithm is designed to enable an Arduino-based line follower robot to autonomously track and follow a black line on a contrasting surface. The robot is equipped with infrared sensors to detect lines on the ground and motor drivers to control its movement. The primary objective is to develop a system that enables the robot to autonomously follow a predefined path marked by a contrasting line.

The algorithm implemented in the code defines four main behaviors:

1. Initialization: Configure the pin modes for the left sensor (LS), right sensor (RS), and motor control pins (LM1, LM2, RM1, RM2) as input and output, respectively.

2. Loop Execution:

Read sensor inputs: Continuously monitor the states of the left and right sensors (LS and RS) to detect the presence of a line.

Forward Movement:

If both the left and right sensors detect no line (LS = 0 and RS = 0), the robot moves forward.

Activate both left (LM1) and right (RM1) motors in the forward direction by setting their corresponding control pins HIGH (LM2 and RM2 pins are set LOW to ensure forward rotation).

Left Turn:

If only the left sensor detects a line (LS = 1 and RS = 0), the robot executes a left turn.

Stop the left motor (LM1 and LM2 pins are set LOW) to halt the left wheel, while activating the right motor (RM1) for forward rotation.

Right Turn:

If only the right sensor detects a line (LS = 0 and RS = 1), the robot executes a right turn.

Stop the right motor (RM1 and RM2 pins are set LOW) to halt the right wheel, while activating the left motor (LM1) for forward rotation.

Stop:

If both the left and right sensors detect a line (LS = 1 and RS = 1), the robot comes to a complete stop.

Set all motor control pins (LM1, LM2, RM1, RM2) LOW to stop both motors.

3. **Repeat:** Continuously repeat the loop to enable real-time line following behavior based on sensor inputs.

This algorithm describes the basic functionality of the line follower robot, where it follows a predefined path marked by a contrasting line using infrared sensors and adjusts its movement to stay on track.