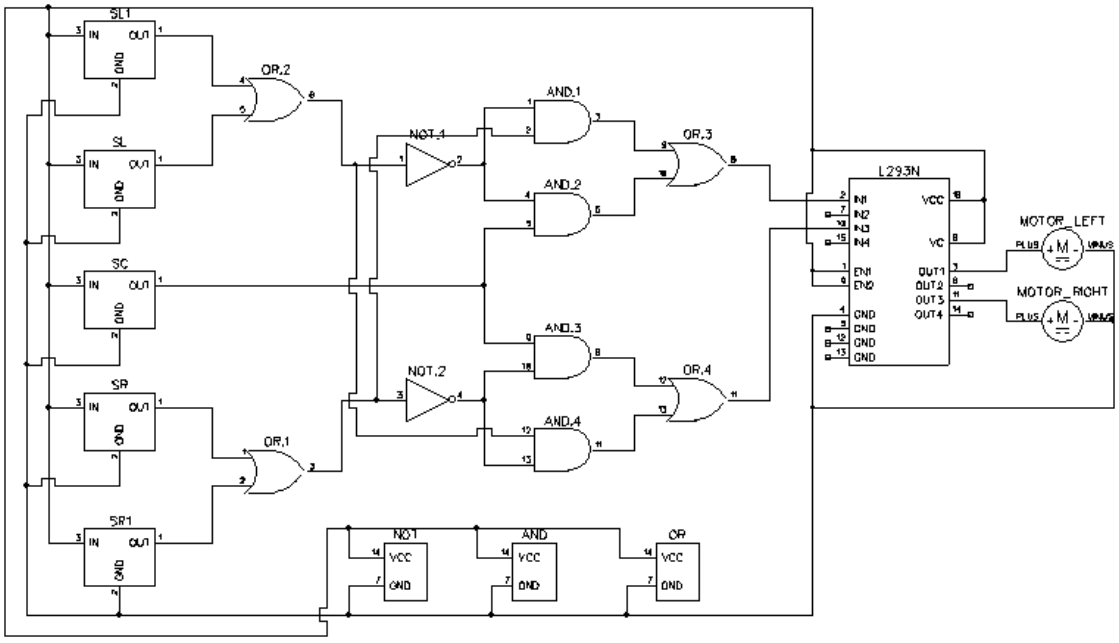
5 SENSORS
NON-PROGRAMMABLE LINE FOLLOWING ROBOT USING LOGIC GATES

SCHEMATIC DIAGRAM:

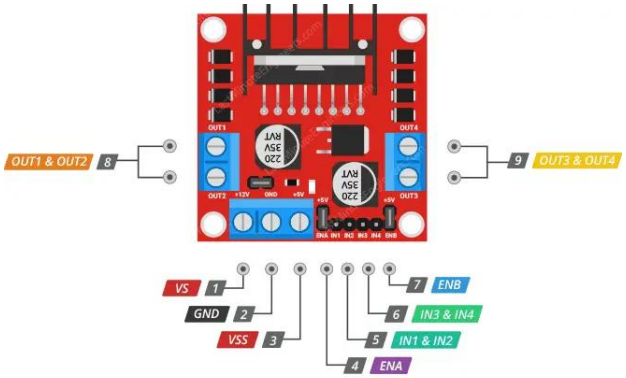


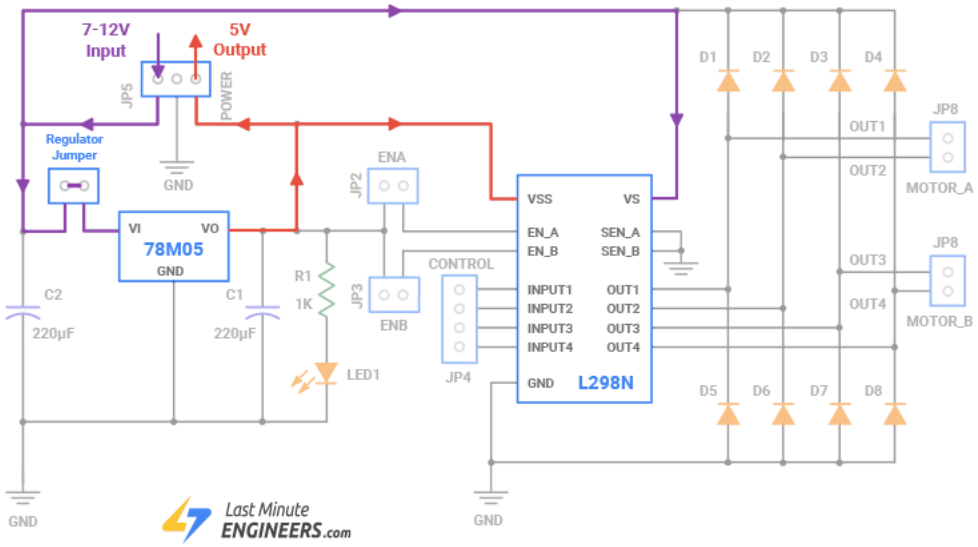
MATERIALS:

- IR Sensor (5)
- 74LS04 – NOT Gate (2)
- 74LS08 – AND Gate (4)
- 74LS32 – OR Gate (4)
- L293N Motor Driver (1)
- Batter Container (1)
- 3.7V Lithium Rechargeable Battery (2 or 3)
- DC Motor (2)
- Jumper Wires
- MOBOT Chassis (1)
- Wheels (2)
- Caster Wheel (1)
- Breadboard (For Prototyping)
- PCB
- Glue Gun/Stick
- Screws

Brief Description:

The schematic diagram illustrates a motor control system that uses sensors and logic gates to guide the movement of two DC motors. Sensor inputs (SL1, SL2, SC, SR1, SR2) are processed through AND, OR, and NOT gates to generate control signals. These signals are fed into an H-Bridge motor driver IC (L298N) that supplies the proper current and voltage to the motors. As a result, the left and right motors can be driven forward, or stopped based on the sensor conditions.





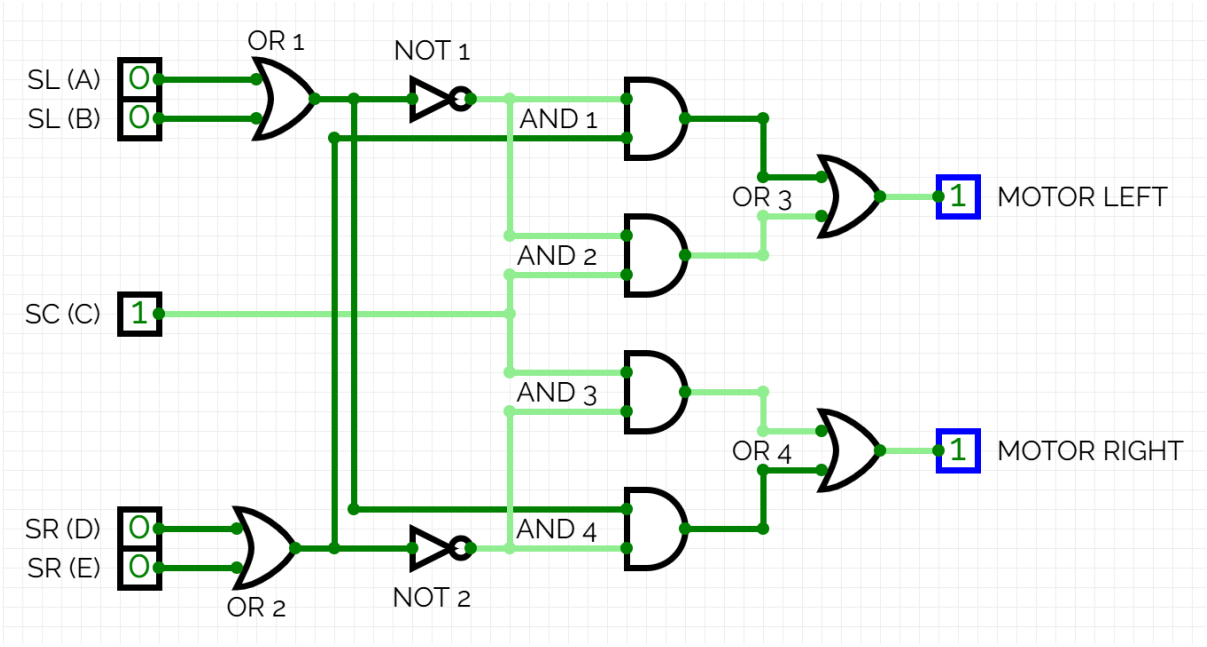
As shown in these figures, pin **VS** is the main power input for the motors. If the jumper connector is in place the 78M05 5V Regulator is enabled and automatically powers the **VSS**, and at the same time it can also release 5V as an output that can be used to supply the voltage to other circuits used. **VSS** is the power input for the internal logic circuitry of the chip. This logic circuitry needs a steady 5V to operate.

For this project, 7.4V rechargeable batteries are used to supply the circuit. Knowing the voltage used is necessary as it controls the power of your motors. **VS** voltage controls the motor speed, higher voltage means faster motor speed.

TRUTH TABLE

	SL(A)	SL(B)	SC(C)	SR(D)	SR(E)	ML	MR
0	0	0	0	0	0	0	0
1	0	0	0	0	1	0	1
2	0	0	0	1	0	0	1
3	0	0	0	1	1	0	1
4	0	0	1	0	0	1	1
5	0	0	1	0	1	0	1
6	0	0	1	1	0	0	1
7	0	0	1	1	1	0	1
8	0	1	0	0	0	1	0
9	0	1	0	0	1	0	0
10	0	1	0	1	0	0	0
11	0	1	0	1	1	0	0
12	0	1	1	0	0	1	0
13	0	1	1	0	1	0	0
14	0	1	1	1	0	0	0
15	0	1	1	1	1	0	0
16	1	0	0	0	0	1	0
17	1	0	0	0	1	0	0
18	1	0	0	1	0	0	0
19	1	0	0	1	1	0	0
20	1	0	1	0	0	1	0
21	1	0	1	0	1	0	0
22	1	0	1	1	0	0	0
23	1	0	1	1	1	0	0
24	1	1	0	0	0	1	0
25	1	1	0	0	1	0	0
26	1	1	0	1	0	0	0
27	1	1	0	1	1	0	0
28	1	1	1	0	0	1	0
29	1	1	1	0	1	0	0
30	1	1	1	1	0	0	0
31	1	1	1	1	1	0	0

LOGIC DIAGRAM:



BOOLEAN EXPRESSION:

MOTOR LEFT: $\overline{\mathrm{A}}\mathrm{BC} + \overline{\mathrm{A}}\mathrm{B}\overline{\mathrm{D}} + \overline{\mathrm{A}}\mathrm{B}\overline{\mathrm{E}}$

MOTOR RIGHT: $\mathrm{A}\overline{\mathrm{DE}} + \mathrm{B}\overline{\mathrm{DE}} + \mathrm{C}\overline{\mathrm{DE}}$

REFERENCES:

ElectroDuino. (2020, June 8). *IR Sensor Module | How IR Sensor Module Works » ElectroDuino*. Retrieved from IR Sensor Module | How IR Sensor Module Works: https://www.electroduino.com/what-is-ir-sensor-module-how-ir-sensor-module-works/

Last Minute Engineers. (n.d.). *Interface L298N DC Motor Driver Module with Arduino*. Retrieved from In-Depth: Interface L298N DC Motor Driver Module with Arduino: https://lastminuteengineers.com/l298n-dc-stepper-driver-arduino-tutorial/

Mandral, T. (2017, February 24). *Line Following Robot*. Retrieved from Line Following Robot: https://oshwlab.com/TapendraMandal/Line_Following_Robot-a1bb40b34cd14a9186ca10b7a76df764

Qadeer, U., Riaz, Q., Rafique, W., & Junaid, R. (2024). *mr-kasim-mehar/Line-Following-Robot-with-gates*. Retrieved from Line-Following-Robot-with-gates: https://github.com/mr-kasim-mehar/Line-Following-Robot-with-gates/tree/Line-Following-Robot

UDVABONY. (n.d.). *2WD Smart Robot Car Chassis Kit*. Retrieved from 2WD Smart Robot Car Chassis Kit: https://udvabony.com/product/2wd-smart-robot-car-chassis-kit/