Line follower bot

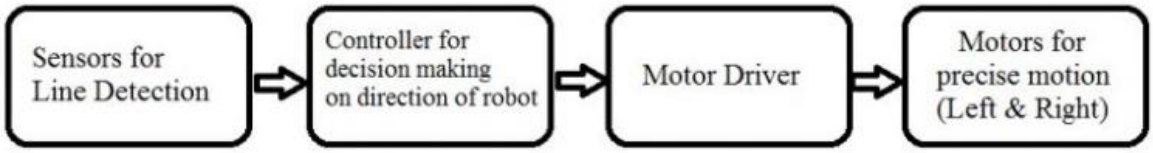
Introduction

In this project we have created a line follower bot.It is an automated guided vehicle, which follows a visual line embedded on the floor or ceiling. Usually, the visual line is the path in which the line follower robot goes and it will be a black line on a white surface but the other way (white line on a black surface) is also possible.

Items Required:

- Arduino UNO (or Arduino Nano)
- L293D Motor Driver IC
- Geared Motors x 2
- Robot Chassis
- IR Sensor Module x 2
- Black Tape (Electrical Insulation Tape)
- Connecting Wires
- Power supply

Detailed Description of project building



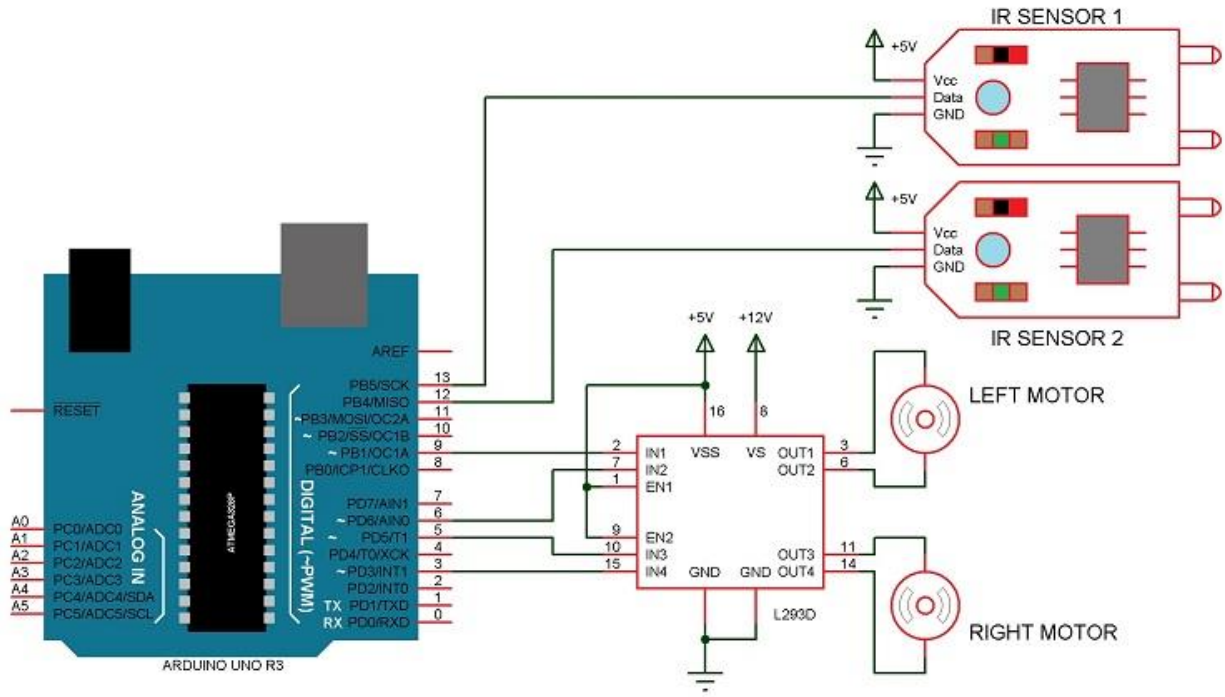
Block Diagram for Line Follower Robot

Sensors (IR Sensor): We have used IR Sensor Module as the line detecting sensor for the project. It consists of an IR LED and a Photo diode and some other components like comparator, LED etc.

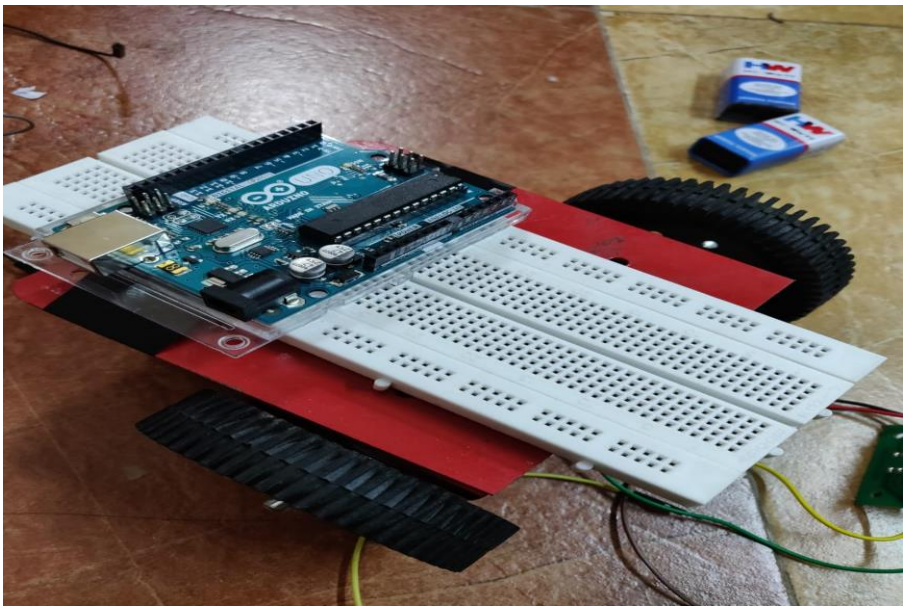
Controller (Arduino UNO): Arduino UNO is the main controller in the project. The data from the sensors (IR Sensors) will be given to Arduino and it gives corresponding signals to the Motor Driver IC.
Motor Driver (L293D): L293D Motor Driver IC is used in this project to drive the motors of the robot. It receives signals from Arduino based on the information from the IR Sensors.

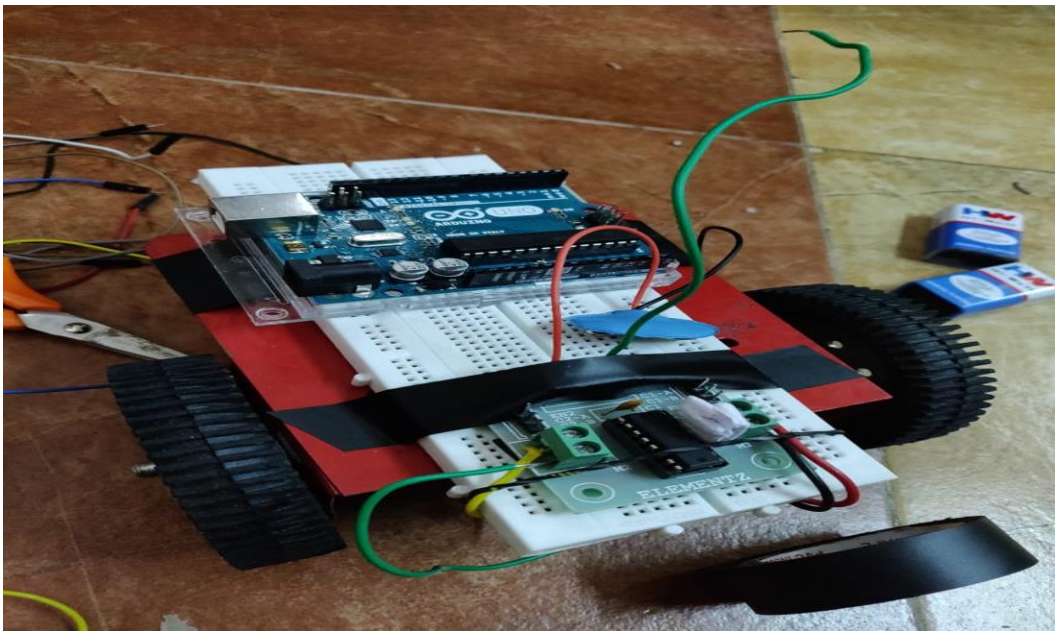
Note: The power supply to the motors must be given from the motor driver IC. Hence, choose the appropriate power supply which is sufficient for all the components including the motors.
Motors (Geared Motors): We have used two geared motors at the rear of the line follower robot. These motors provide more torque than normal motors and can be used for carrying some load as well.

- In this project, we have designed an Arduino based Line Follower Robot. The working of the project is pretty simple: detect the black line on the surface and move along that line. The detailed working is explained here.
- As mentioned in the block diagram, we need sensors to detect the line. For line detection logic, we used two IR Sensors, which consists of IR LED and Photodiode. They are placed in a reflective way i.e. side – by – side so that whenever they come in to proximity of a reflective surface, the light emitted by IR LED will be detected by Photo diode.
- When the robot moves forward, both the sensors wait for the line to be detected. For example, if the IR Sensor 1 in the above image detects the black line, it means that there is a right curve (or turn) ahead.
- Arduino UNO detects this change and sends signal to motor driver accordingly. In order to turn right, the motor on the right side of the robot is slowed down using PWM, while the motor on the left side is run at normal speed.
- Similarly, when the IR Sensor 2 detects the black line first, it means that there is a left curve ahead and the robot has to turn left. For the robot to turn left, the motor on the left side of the robot is slowed down (or can be stopped completely or can be rotated in opposite direction) and the motor on the right side is run at normal speed.
- Arduino UNO continuously monitors the data from both the sensors and turns the robot as per the line detected by them.


IR SENSOR 1
+5V
Vcc
Data
GND
+5V
Vcc
Data
GND
IR SENSOR 2
+5V
+12V
LEFT MOTOR
RIGHT MOTOR
L293D
IN1
IN2
EN1
EN2
IN3
IN4
VSS
VS
OUT1
OUT2
OUT3
OUT4
GND
GND
AREF
RESET
PB5/SCK
PB4/MISO
PB3/MOSI/OC2A
PB2/SS/OC1B
PB1/OC1A
PB0/ICP1/CLKO
PD7/AIN1
PD6/AIN0
PD5/T1
PD4/T0/XCK
PD3/INT1
PD2/INT0
TX PD1/TXD
RX PD0/RXD
DIGITAL (~PWM)
ANALOG IN
A0 PC0/ADC0
A1 PC1/ADC1
A2 PC2/ADC2
A3 PC3/ADC3
A4 PC4/ADC4/SDA
A5 PC5/ADC5/SCL
ATMEGA328P
ARDUINO UNO R3

Pictures

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