TECHNICAL PROJECT REPORT

TITLE OF INVENTION / PROJECT:

Line following car

TEAM MEMBERS / INVENTORS:

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Section – 1 (IPR Related)

BRIEF ABSTRACT (500 WORDS):

A Line Follower Robot, as the name suggests, is an automated guided vehicle, which follow 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. Certain advanced Line Follower Robots use invisible magnetic field as their paths.Large line follower robots are usually used in industries for assisting the automated production process. They are also used in military applications, human assistance purpose, delivery services etc.

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. It is a mobile machine that can detect and follow the line drawn on the floor. Generally, the path is predefined and can be either visible like a black line on a white surface with a high contrasted color or it can be invisible like a magnetic filed. Definitely, this kind of robot should sense the line with its infrared ray (IR) sensors that installed under the robot. After that, the data is transmitted to the processor by specific transition buses. Hence, the processor is going to decide the proper commends and then it sends them to the driver and thus the path will be followed by the line follower robot. Line follower is an autonomous robot which follows either black line in white are or white line in black area. Robot must be able to detect particular line and keep following it.

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.

EXISTING STATE-OF-THE-ART AND DRAWBACKS IN EXISTING STATE-OF-THE-ART

(Brief background of the existing knowledge)

S. No.	Existing state of art	Drawbacks in existing state of art
1	US3860862A	Boring and not interesting to use
2	US8565920B2	Needs a setup before hand

NOVEL/ADDITIONAL MODIFICATIONS THAT YOU CAN PROPOSE TO IMPROVE UPON DRAWBACKS

(List down the features)

- **Industrial Applications**: These robots can be used as automated equipment carriers in industries replacing traditional conveyer belts.
- **Automobile applications**: These robots can also be used as automatic cars running on roads with embedded magnets.
- **Domestic applications**: These can also be used at homes for domestic purposes like floor cleaning etc.
- **Guidance applications**: These can be used in public places like shopping malls, museums etc to provide path guidance.
- It can't take sharp turns because of low sensitivity of the sensors.

ADVANTAGES

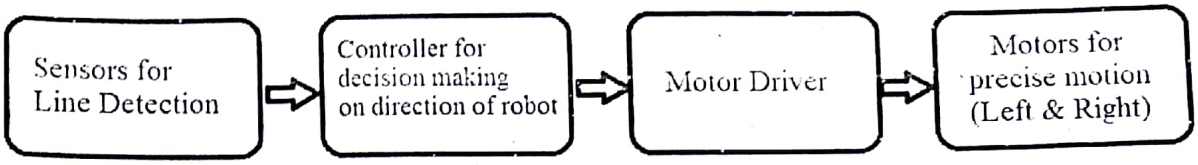
(List down the advantages, if each feature is incorporated)

- Line follower Robots are commonly used for automation process in industries, military applications and consumer applications.
- They are very useful as they can work without any supervision i.e. they work as automatic guided vehicles.
- With additional features like obstacle avoidance and other security measures, line follower robots can be used in driver less cars.
- Robot movement is automatic
- It is used for long distance applications
- Simplicity of building
- Fit and forget system
- Used in home, industrial automations etc.

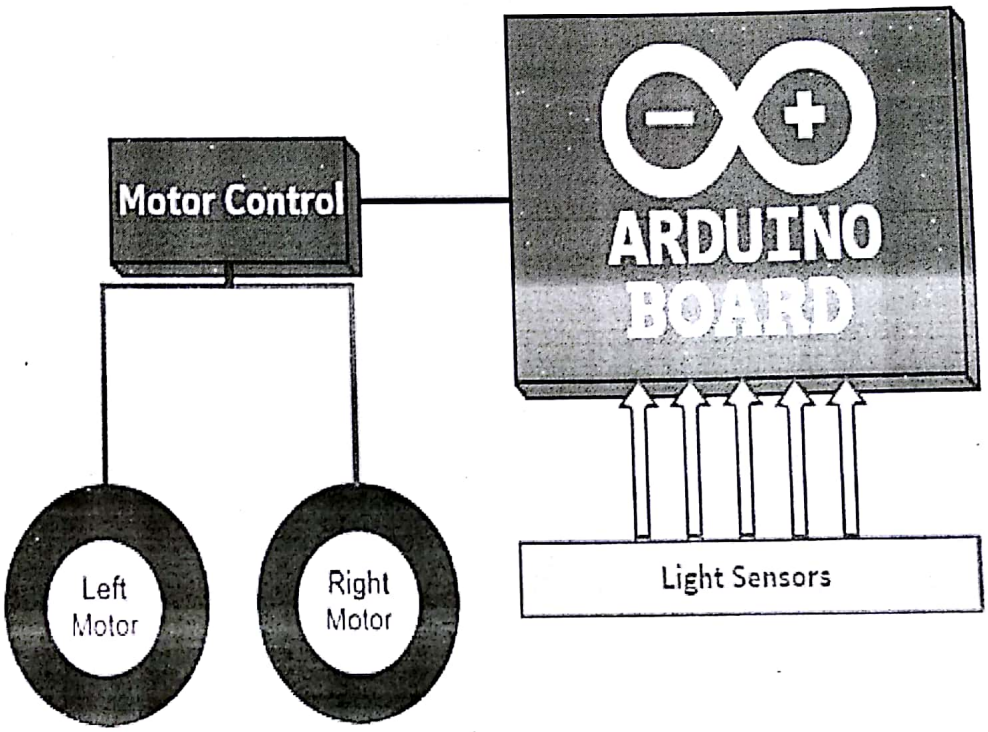
1.

BLOCK DIAGRAM

(Functional diagram depicting the flow of information in your system. Do not define exact components, only use generic terms. Must include modifications as well.)



Block Diagram for Line Follower Robot



Section – 2 (Real Project)

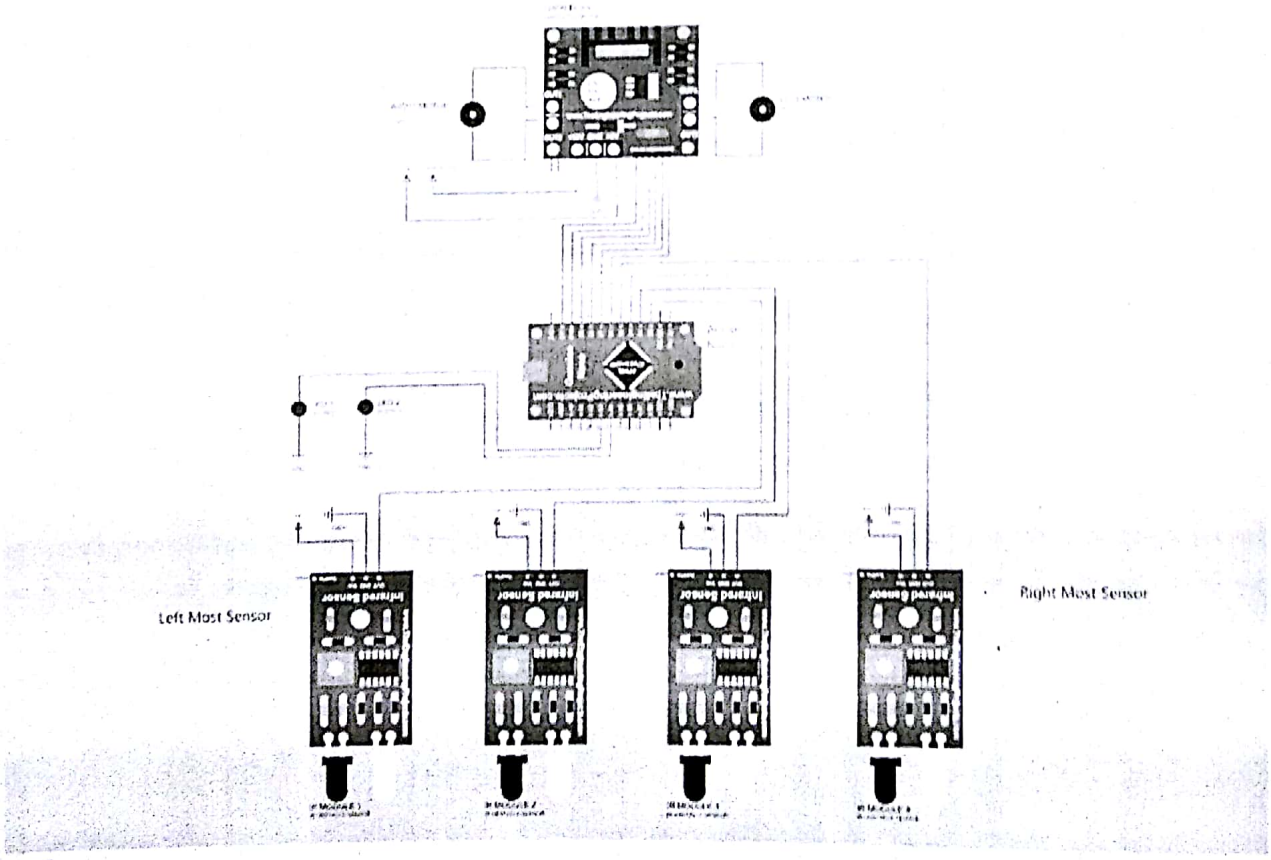
MATERIALS

(*List down the Components, Equipment, etc. actually used in the project*)

S no.	material	quantity	cost
1	Arduino Nano	1	350
2	Breadboard	1	50
3	IR Modules	4	300
4	Car Chassis	1	200

5	12v 300 RPM DC Geared Motors(2 Pcs)	2	400
6	7x2cmWheels (2 Pcs)	2	30
7	L298N Motor Driver Modules(4Pcs)	1	190

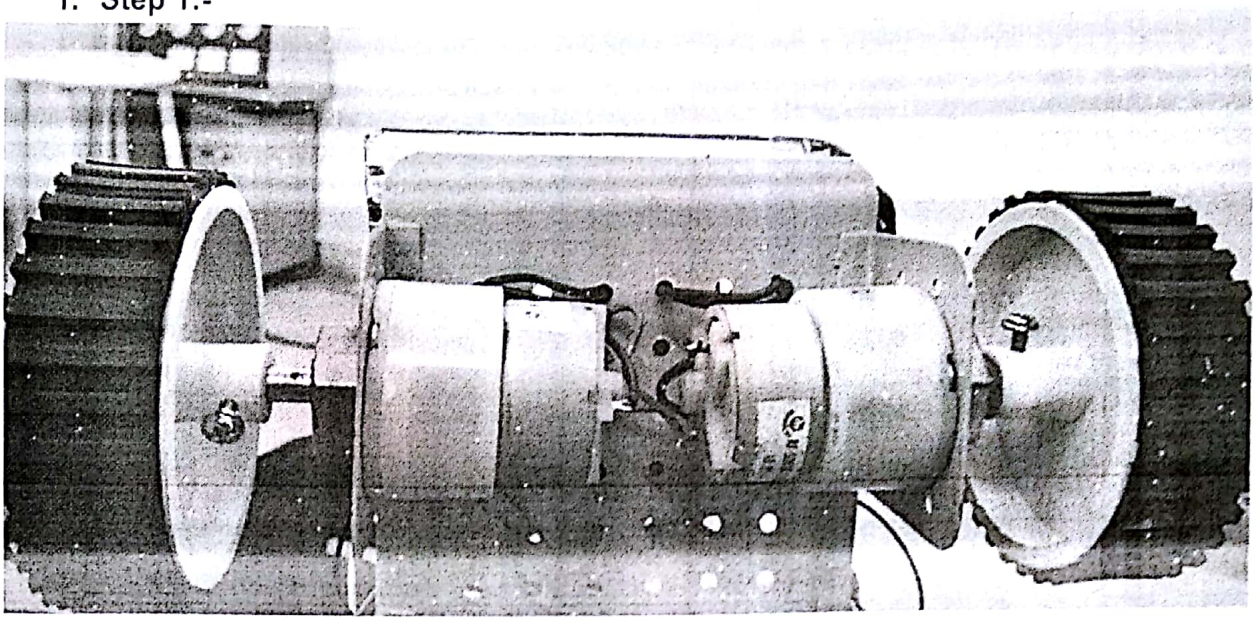
CIRCUIT DIAGRAM→



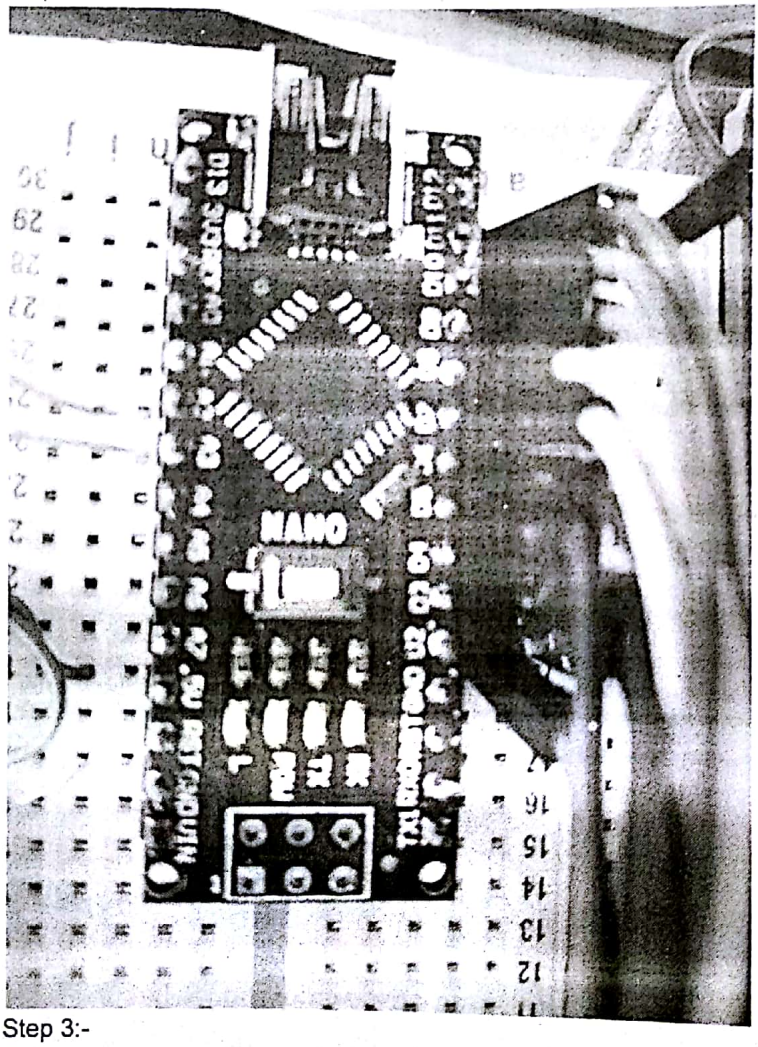
STEPS OF CIRCUIT COMPLETION

(Bifurcate the circuit completion in steps, specify with photographs, leading to final project)

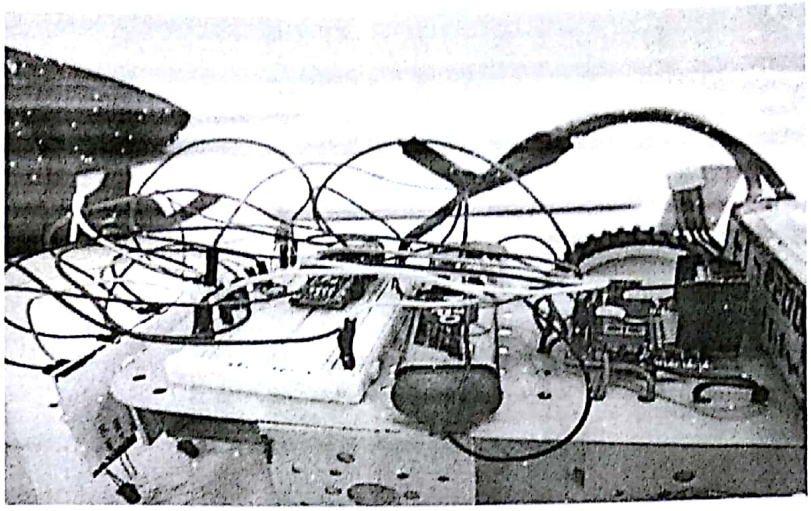
1. Step 1:-



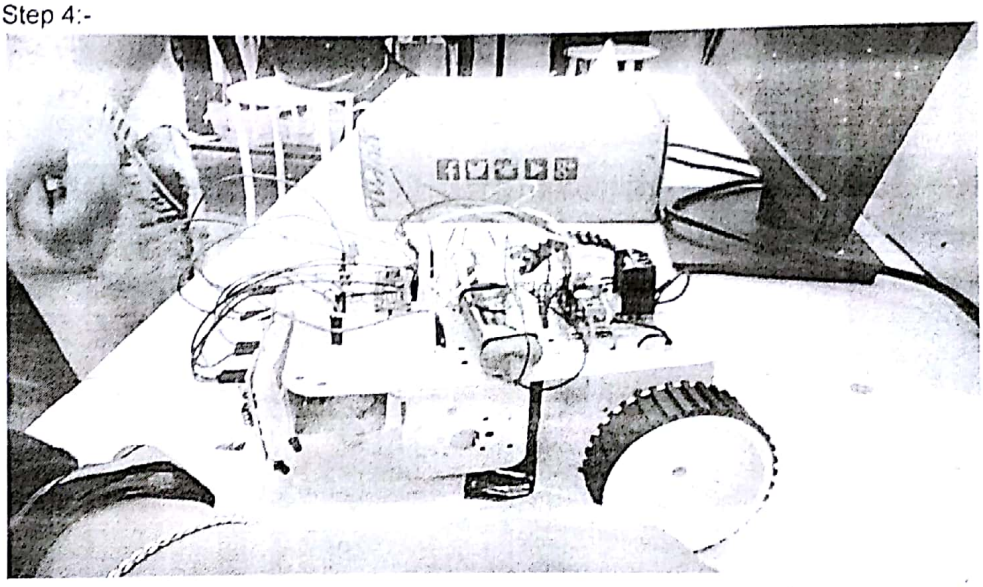
2. Step 2



3. Step 3:-



4. Step 4:-



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.

The working of the IR Sensor and its scope in this project will be explained in the actual working of the Line Follower Robot.

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.

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 case of black surface, which has a low reflectance, the light gets completely absorbed by the black surface and doesn't reach the photodiode.

Using the same principle, we will setup the IR Sensors on the Line Follower Robot such that the four IR Sensors are on the either side of the black line on the floor.

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.

PROGRAM CODE

(Link of your Github project)

https://github.com/Aniranjalm/Line-following-robot/blob/master/beee_project.ino