

"Line Follower Robot: Practical Implementation of Robotics"

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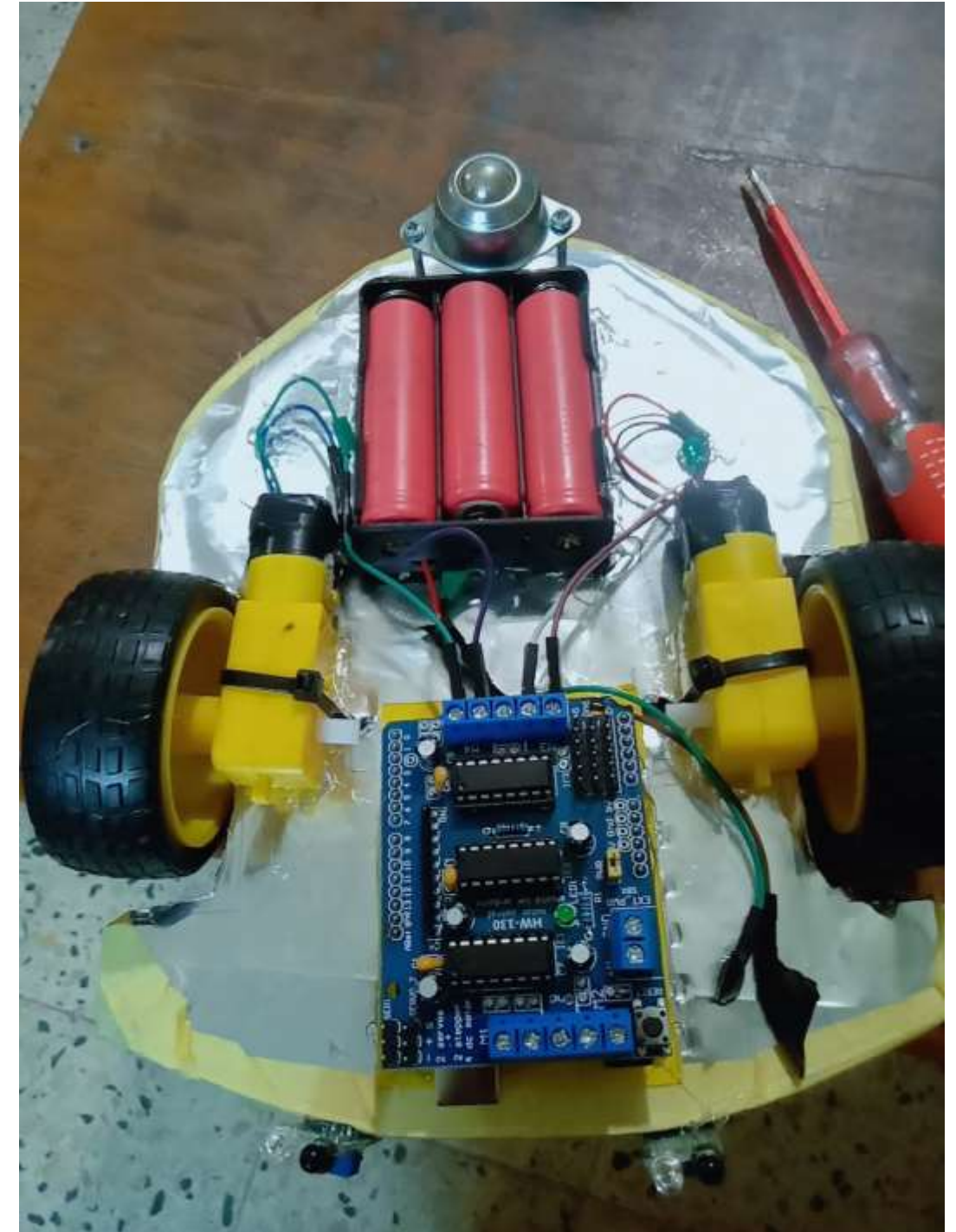
What is a Line Follower Robot?

A Line Follower Robot is:

- A simple autonomous robot designed to follow a pre-defined path (usually a black line on a white surface).
- It uses sensors to detect the line and adjusts its movement to stay on track.

Project Goals:

- **Goal:** To demonstrate basic robotics and automation principles.
- **Main Idea:** The robot detects the line using sensors and follows it by controlling its motors.



Key Components of the Line Follower Robot

- The robot consists of several essential components that work together to achieve autonomous movement:

1. Microcontroller (Arduino):

- Controls the robot based on sensor inputs.

2. Line Sensors (IR Sensors):

- Detects the black line on the surface.

3. Motors:

- Powers the wheels to move the robot.

4. Motor Driver (L298N or L293D):

- Controls the direction and speed of the motors.

5. Battery:

- Provides power to the robot.

6. Chassis & Wheels:

- The physical structure and wheels that allow movement.



How the Line Follower Robot Works

The robot follows a simple process to stay on the path by detecting and reacting to the line:

1 1. Sensor Reading:

- The IR sensors continuously monitor the surface for the line.
- They send signals based on the line's position (black or white).

2 2.Signal Processing:

- The microcontroller (Arduino) processes the sensor signals to determine the robot's next move.

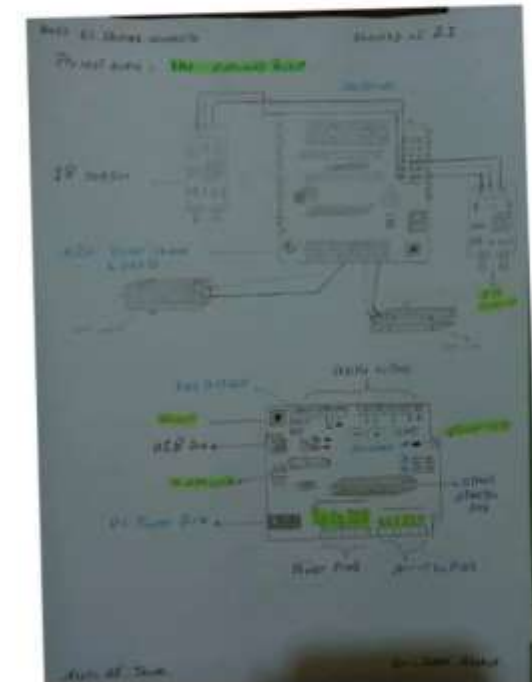
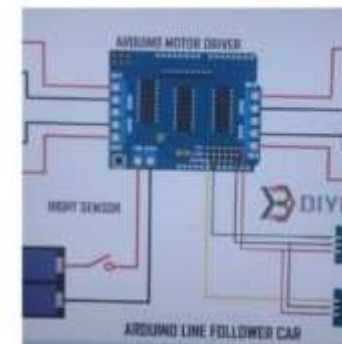
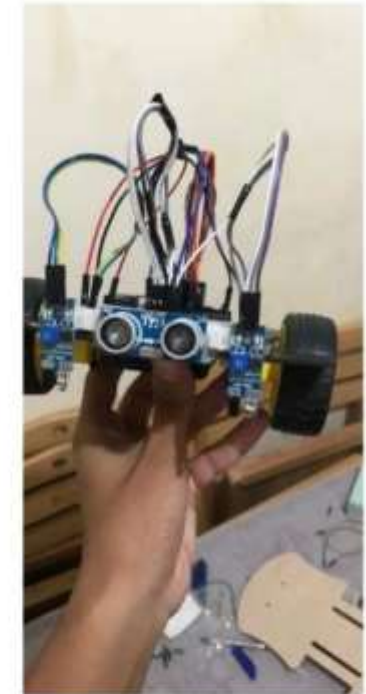
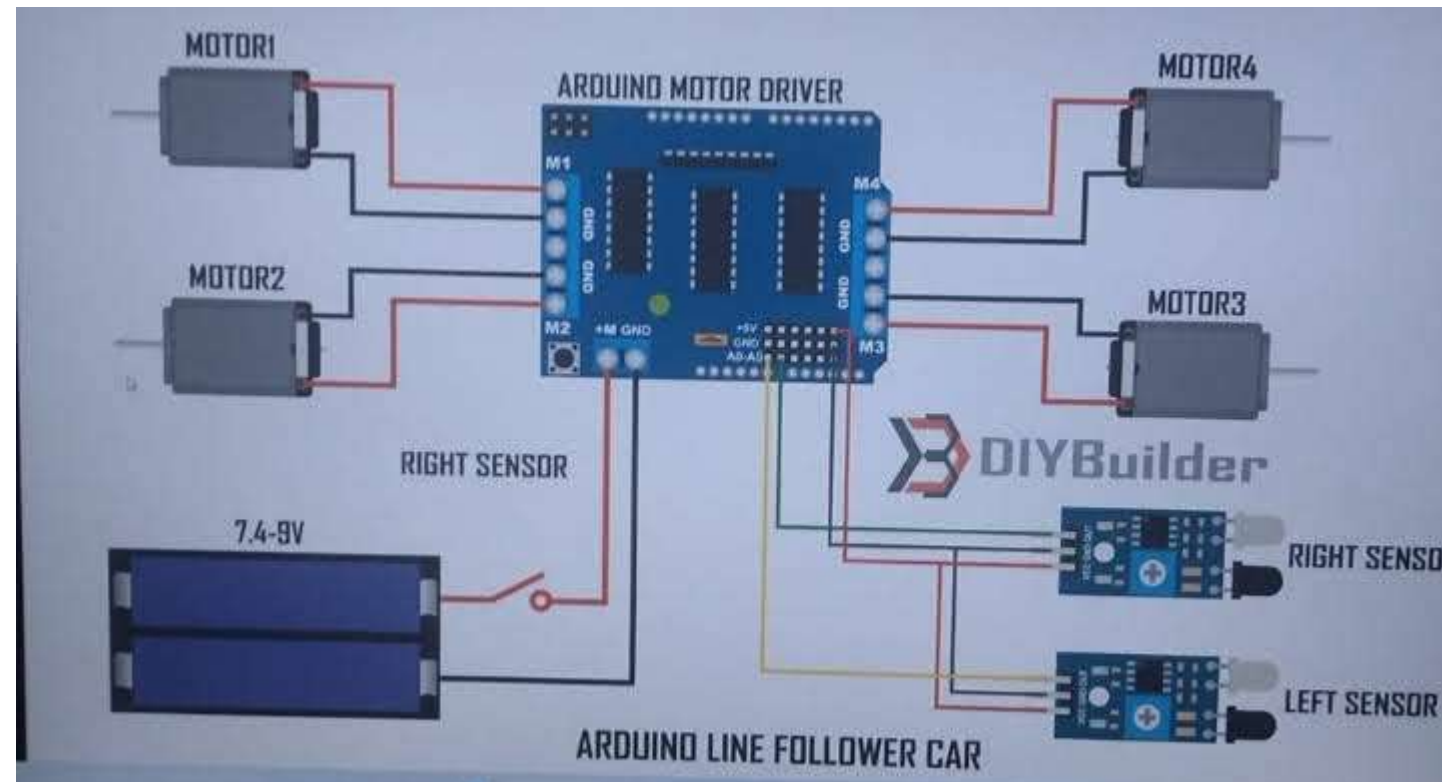
3 Motor Control:

- The motor driver adjusts the motors' speed and direction based on the signals from the sensors.
- **If the robot is off track:** It turns towards the line.
- **If the robot is on track:** It moves straight forward.




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Part of the Code Behind the Line Follower Robo

Here's a simple code snippet that controls the robot's movement based on sensor inputs.

```
Copy code   
  
if (leftSensor == 1 && rightSensor == 0) {  
    // Turn right  
    motorLeftForward();  
    motorRightBackward();  
} else if (leftSensor == 0 && rightSensor == 1) {  
    // Turn Left  
    motorLeftBackward();  
    motorRightForward();  
} else {  
    // Move forward  
    motorLeftForward();  
    motorRightForward();  
}
```

شرح الكود (Code Explanation)

- `: if (leftSensor == 1 && rightSensor == 0)`
• .If the left sensor detects the line and the right sensor doesn't, the robot turns right
- `: else if (leftSensor == 0 && rightSensor == 1)`
• .If the right sensor detects the line and the left doesn't, the robot turns left
- `: else`
• .If both sensors detect the line, the robot moves forward

Practical Applications of Line Follower Robots

Line Follower Robots have various real-world applications, demonstrating their versatility in automation and robotics:

1 Automated Delivery Systems:

- Used in factories and warehouses to move objects along a set path.

2 Manufacturing Lines:

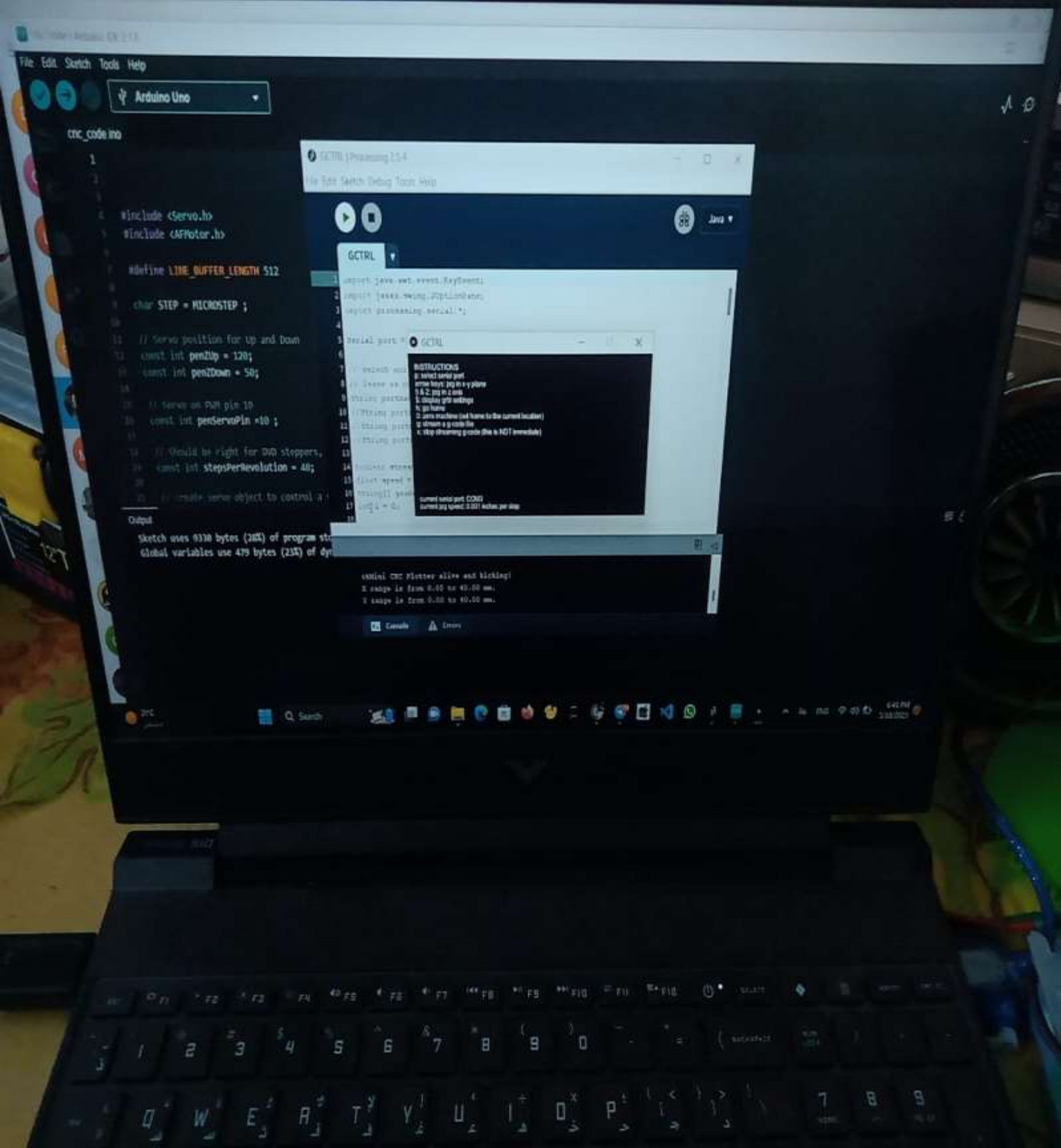
- Can be used in assembly lines to transport materials or perform repetitive tasks.

3 Educational Tools:

- Used to manage the cart state across screens.
- Ensures that changes in the cart (e.g., adding/removing items) are reflected in real time throughout the app.

4 Automated Guided Vehicles (AGVs):

- Used in logistics and material handling, where robots follow predetermined paths to transport goods.



Demo: Line Follower Robot in Action

- In this demo, you can see how the Line Follower Robot works in real-time, following the line with precision.



Watch the robot follow the path autonomously, adjusting its direction as needed.

Conclusion

- The Line Follower Robot is a great example of how basic robotics principles can be applied to create an autonomous system.
- It demonstrates the power of sensors, microcontrollers, and motor drivers in real-world applications.
- By understanding this project, we can advance towards more complex robotic systems in various fields.

Summary:

- The robot follows a black line using sensors, making real-time decisions to move in the correct direction.

Future Work:

- Possible improvements include adding obstacle avoidance, enhancing the robot's speed, or making it more efficient with advanced algorithms.

The background of the slide is a solid light gray. On the left side, there is a decorative arrangement of stylized leaves. These leaves are rendered in various shades of light gray and white, with some featuring thin white outlines to define their veins. The leaves are scattered across the left half of the slide, creating a naturalistic yet minimalist aesthetic.

Thank you

**I would like to thank Dr. Tamer Medhat
for her support and guidance
throughout this project.**