Escape the Maze: An Arduino-Powered Car

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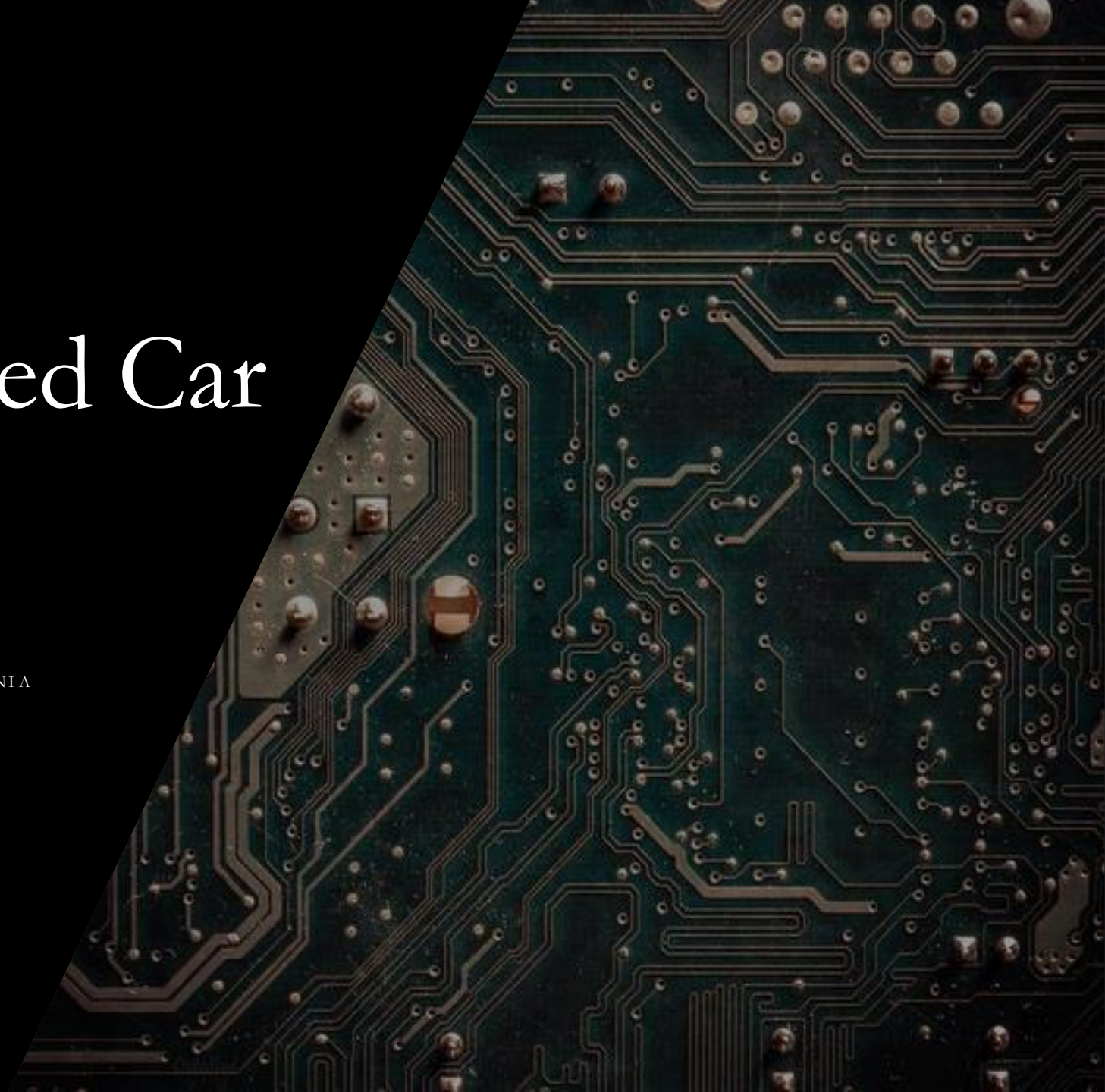


- Embedded systems are the hidden power behind countless smart devices, turning simple components into intelligent solutions. Microcontrollers like the Arduino Uno prove that even the smallest technology can create something exciting and functional. With just a few sensors and code, they transform ideas into real-world projects. This project is a perfect example of how learning can be both fun and educational!

Required Materials

- Arduino Uno

- HC – SR04 Ultrasonic Sensors x3

- 6V DC Motors x2

- L298N Motor Driver

- Batteries
- Jumper Wires
- Screws
- Nuts
- Glue
- Wood / Car Chassis

Step 1:

Prepare and build the base

Building the Base of the Car

Now that you have all the required materials, I recommend starting with the base of the car. Begin by creating the section where the sensors will be placed.

Then, construct the top and bottom layers of the car:

- The **bottom layer** will hold the battery.
- The **top layer** will secure the Arduino, motor driver, and most of the wiring.
- The **lowest layer** will support the two motors and wheels.

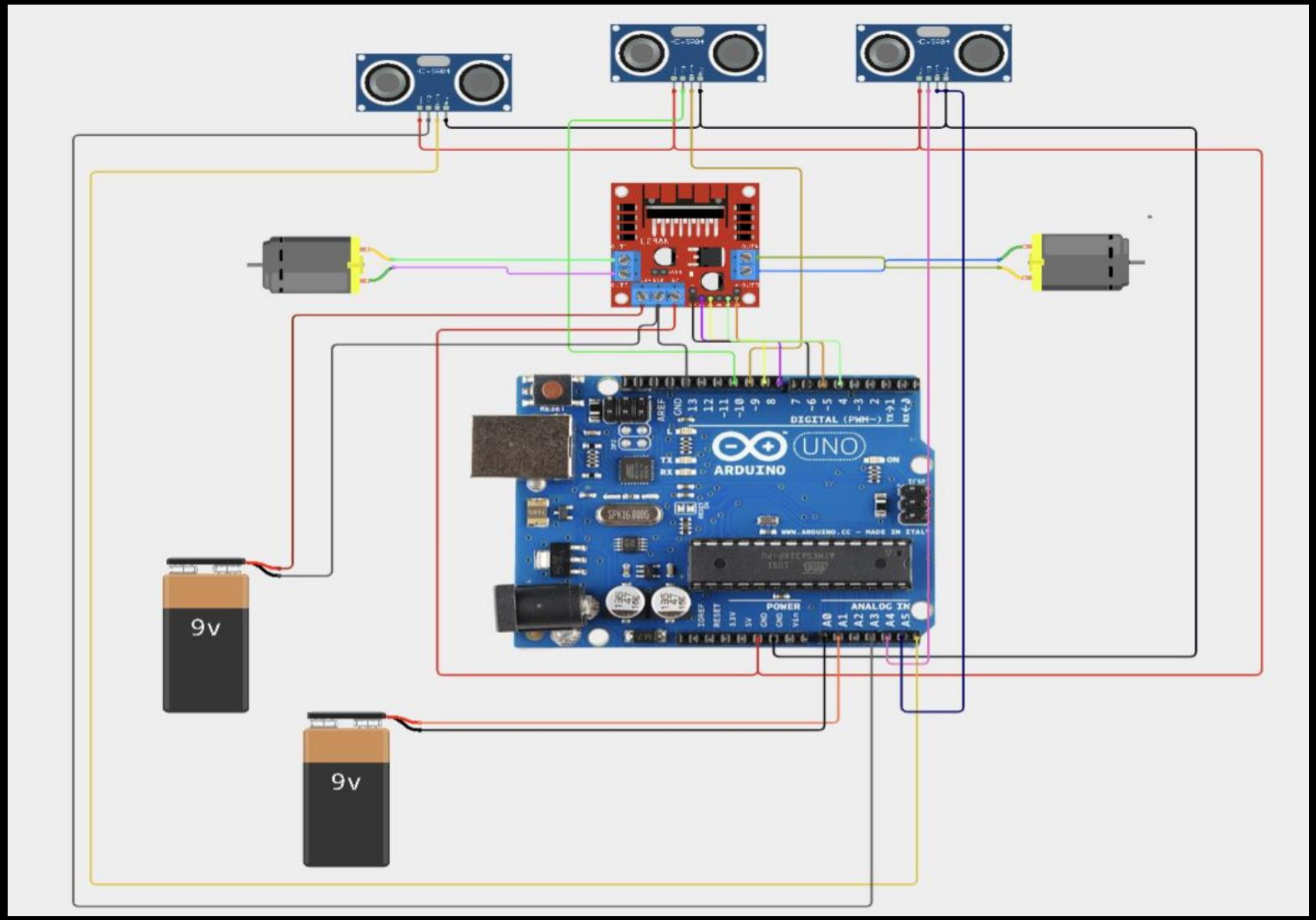
In my case, I used wood for the construction. With the help of an electric saw, I cut the wood and then assembled the base.

Step 2:

Following the scheme bring your project to life

With the base set, it's time to connect the heart of the project.

Take your Arduino Uno, motor driver, and the necessary wires. Carefully follow the schematic on the next slide, ensuring each connection matches perfectly.


9v
9v
ARDUINO
UNO
DIGITAL (PWM~)
POWER
ANALOG IN

Step 3: Uploading the Code

Next, open the Arduino IDE on your computer and download the program from my GitHub link provided at the end of the presentation. Once downloaded, upload the code to your Arduino Uno.

This step brings you one step closer to seeing your project come to life!

Code explanation

Sensor Readings:

1. The car uses three ultrasonic sensors (left, front, right) to measure distances to obstacles.
2. The getDistance() function sends a pulse from the sensor and measures the time it takes to bounce back, calculating the distance in centimeters.

Motor Control:

1. The car has two motors (left and right) controlled by a motor driver.
2. The functions moveLeftMotor() and moveRightMotor() move the car forward, while moveLeftMotorBack() and moveRightMotorBack() move it backward.

Navigation Logic:

1. The car moves forward if there's enough space in front.
2. If an obstacle is detected on the left or right, the car turns away by stopping one motor and moving the other.
3. If the car gets too close to an obstacle, it backs up and turns, trying to find a clear path to continue moving forward.

Project Recap

You've now built a car that can navigate a maze autonomously using Arduino and ultrasonic sensors. This project demonstrates the exciting possibilities of embedded systems and basic robotics.

What's Next?

- Try adding new sensors or features to improve your car's performance.
- Share your project with others and inspire creativity in embedded systems!

Feel free to explore more on my GitHub