Micro car Rally

Road Rebels

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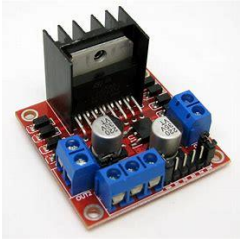
Mechanical systems

Includes (ilustrated with pictures):

1. Advantages of mechanical systems (disterebution of different component on chasses)

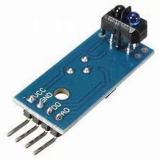
    - Mini DC Gearbox: Mini DC gearboxes are compact and lightweight, making them suitable for smaller-scale applications like a line follower car. They provide torque multiplication and speed reduction, allowing you to achieve the desired speed and control for your car.

    - Dual H-bridge L298 Module (Driver): The dual H-bridge L298 module is commonly used as a motor driver in robotics projects. It allows you to control the direction and speed of the motors, making it ideal for controlling the movement of your line follower car.



    - Rechargeable Li-ion Batteries: Li-ion batteries offer high energy density, which means they can store a significant amount of energy in a compact size. They provide a reliable and long-lasting power source for your car, enabling it to operate for extended periods without frequent battery replacements.

    - IR Sensors: IR sensors are commonly used for line detection in line follower robots. They emit infrared light and measure the reflection to detect the presence or absence of a line. Using two IR sensors allows you to implement line-following algorithms, enabling your car to track and follow the desired path accurately.



2. Disadvantages that happened.

    - We used 8 TCRT 5000 sensors at first, but most of them stopped working and the rest were not reading correctly.

    - Using non-rechargeable batteries that did not live for a long time and were not enough to try the car and make it run properly.

3. Modifications that you are luky to do

    - we used the ir sensors instead of the 8 TCRT 5000 sensors.

- We have divided the voltage coming from the batteries on the driver and on the Arduino so as not to cause the Arduino to burn again.
- We use the rechargable batteries instead of non-rechargeable batteries.

4. May you have to talk a bout materials that are used and if there any alternatives. We think that they are the best materials for the line follower competition

    - Chassis Material: The choice of chassis material depends on factors such as weight, durability, and cost. Common materials include acrylic, aluminum, or even 3D-printed materials. Acrylic is lightweight, inexpensive, and easy to work with, while aluminum offers greater strength and durability. 3D-printed materials provide flexibility in design but may have limitations in terms of strength. Choose a material that suits your specific requirements and constraints.

    - Motors: The Mini DC Gearbox motors you mentioned are suitable for line follower cars. However, if you require higher speed or torque, you can explore alternatives like stepper motors or servo motors. Stepper motors provide precise position control, while servo motors offer built-in feedback for accurate angle control. Consider the speed, torque, and control requirements of your line follower car to determine the most appropriate motor type.

    - Motor Driver: While the Dual H-bridge L298 module is commonly used for motor control, there are alternative motor driver modules available. For example, you can consider using a motor driver based on the TB6612FNG or L293D chip. These drivers provide similar functionality and are widely used in robotics projects.

    - Line Detection Sensors: In addition to IR sensors, you can explore alternative sensors for line detection. For example, you can use reflective optical sensors or digital color sensors that can detect color variations on the track. These sensors can provide more precise and reliable line detection, especially in challenging lighting conditions or when dealing with complex track patterns.

    - Microcontroller: If you are using an Arduino Uno or Nano, they are generally suitable for line follower competitions. However, if you require more processing power or advanced features, you can consider using more powerful microcontrollers like the Arduino Mega or even explore other platforms like Raspberry Pi, which offer greater computational capabilities and connectivity options.

5. Mention workshops (if any) that assisset you to compelet any part of mechnical design

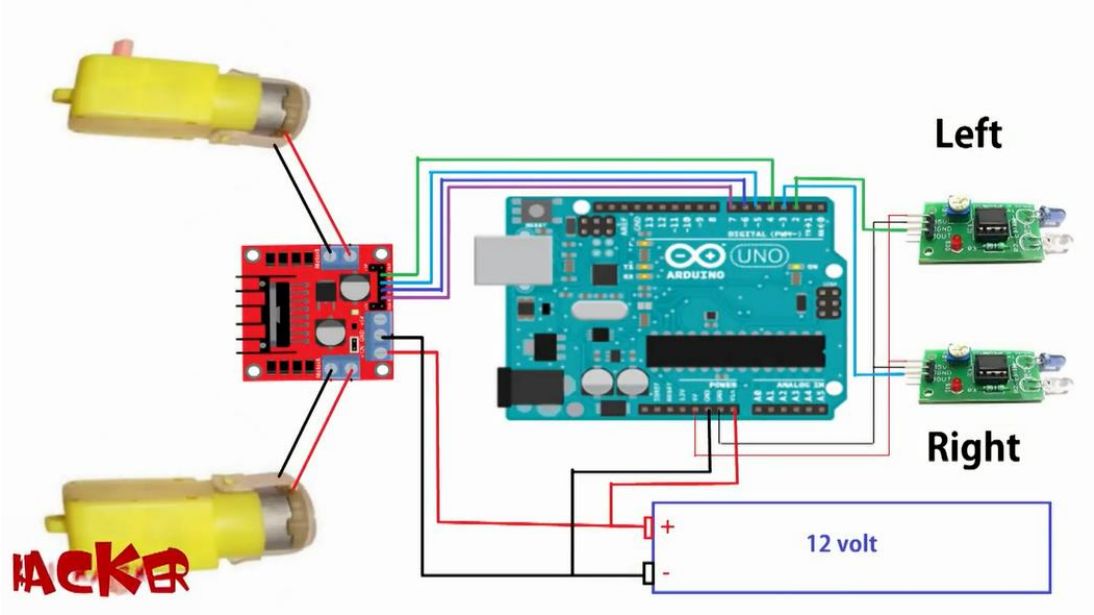
Electrical design

Includes

1. Electrical specifications of any electrical components (motors, sensors, IR, .etc.)
    - One piece car chasses
    - 2 Mini DC Gearbox
    - 2 car wheels

- 1 caster wheel
- 2 IR sensors
- Arduino uno
- Dual H-bridge L298 Module (Driver)
- Bread board
- 3 Rechargeable li-ion batteries

2. Wiring diagram of the circuit



3. Faults that you are faced when wiring (change circuit, break down some other components, battery problems)

    - We burned the Arduino Nano because we connected the voltage coming from the batteries directly to the Arduino without dividing that voltage by the driver and Arduino. And we have to make that because the Arduino can't withstand an effort higher than 5 volt.

    - It happened to us that the battery wires were touching each other and that is dangerous because when the positive wire meets the negative the circuit closes and the electric current moves in it and this caused us to burn the battery wires many times.

4. You may promote some vendor names, market places ….
   (Ram and free)

Software design

Flowcharts, state machine

code

link: https://github.com/nawaranasser/line_follower_car/blob/main/line_follwer_code.ino