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Project Proposal

Introduction and Problem Statement:

With the society becoming more modern, more electrical equipment should be controlled automatically. Our project is to design and create a system which can let a little car to move along the wall. The wall should not be straight at all. The actual meaning of this project is that we can design a car which won't crash on the wall even if there is no one controls it. The main problem is how to let the car do go along the wall instead of going straight.

Proposed Solution Concept:

We prepare to use the modeling methods to solve the problem. The car will receive the data, which is given by the wall: that is, we use flex-sensor to get the input value from the wall, and use some circuits to achieve the target, which is controlling the car to change directions by slowing down one of the wheel's speed.

What's more, there are only two persons in our group. Thus, we will do the project just on our own.

Solution Outline:

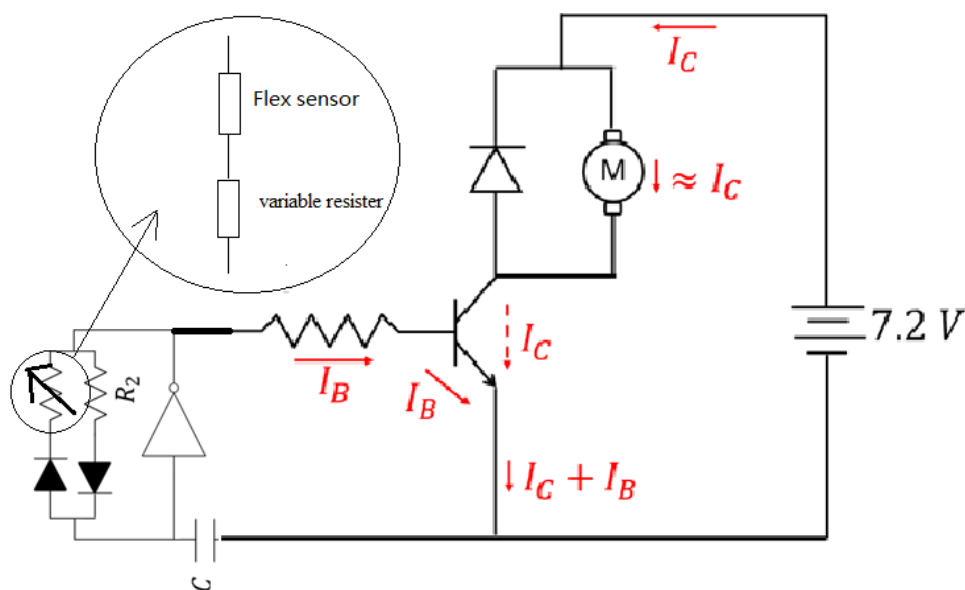
First, in order to achieve that the car can take turns, the two wheels should have different speeds when it changes the direction. To let the car have this function, we plan to use two motors, and each motor controls one wheel's speed. So that the car can take turns by change the voltage on one of the motors.

Second, to reduce the waste of energy, we choose the way which control the voltage's duty cycle to control the motor's speed. Using the inductor and variable resistor to set the duty cycle to a proper value. What's more, to control the two motors' speeds are same, we add only one variable resistor in the one wheel's circuits. (we use Arduino to charge the transistor's BE ports, and use battery to charge the motor, the current across the motor will judge by the I_B)

Third, before we set the circuits on the car, we decide to build the circuits on another breadboard firstly. After build the circuits down (have already add the flex-sensors to the circuits), we should check the output anyway. Using oscilloscope to measure the voltage wave of two motors, and adjust the two waves until they become same. In consideration of the two motors are not exactly same, thus, we should test the car to look whether it can go straight without a wall or not. If it cannot, we should adjust it again. (we adjust the duty cycle by vary the variable resistor)

Finally, we will test it will the experimental wall, and see it if it can go along the wall at all. Do some necessary changes if they are needed.

And the diagram is following:



Necessary Components:

1. Vehicle and Chassis
2. Motors (2)
3. Wheels (2)
4. Roller (1)
5. Battery and Battery Panel
6. Flex sensors (2)
7. Breadboard (1)
8. Arduino (1)
9. 2N5192 Transistors (2)
10. CD40106BE Inverter (1)
11. Resistors (about 10)
12. Wires (about 20)
13. 105 Capacitors (2)
14. 1N4148 Diodes (6)

Schedule and Milestones:

Week 1:

1. Design the circuits.
2. Prototype it on the breadboard
3. Test the output signal (on the motor)

Week 2:

1. Set the circuits onto the car
2. Find out the duty cycle when the car can go straight without a wall

3. Adjust the circuit to promise the car can go straight without a wall.

Week 3:

1. Test the car with an experimental wall
2. Observe it and see if there are something can be update
3. Ensure the car can go along most walls properly