

TI-RSLK **MAX**

Texas Instruments Robotics System Learning Kit



Module 12

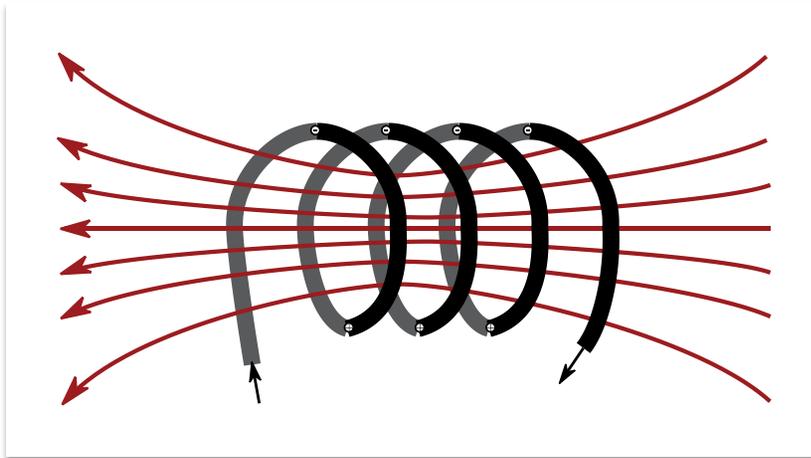
Quiz: DC motors



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Q1 Electromagnets

You wish to increase the strength of the magnetic field created by a coil. You increase the number of turns and for a while, the strength increases. However, after increasing it more and more, you notice the strength starts to decrease. Why?



Q2 Energy conversion

Motors convert between electrical energy and mechanical energy. However, in what two ways are some energy also converted to thermal energy (heat)? Can a DC motor convert thermal energy into electrical or mechanical energy?

Q3 DC motor physics

Fill in boxes with *voltage*, *current*, *resistance*, *inductance*, *capacitance*, *energy*, *force*, *magnetic field*, or *electric field*. The basic principle behind the simple DC motor is that wires that carry experience when placed in regions of space that have .

Q4 Components of a DC motor

Explain the purpose of the brushes and commutators in a DC motor.

Q5 DC motor behavior

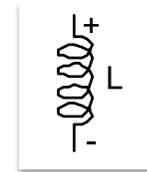
A DC motor has a static resistance of 1 ohm. 5 V is applied to the motor and 10 A of current flows. What is the emf developed in the motor? From where does this emf arise?

Q6 DC motor behavior

A DC motor has a static resistance of 1 ohm. 5 V is applied to the motor and 5 A of current actually flows in the opposite direction of the voltage. How does this opposite direction current occur?

Q7 Inductance

Consider a DC motor with 0.1 mH of inductance. 1 A DC current is flowing in the motor, what is the voltage drop across this inductance (neglecting resistance for this question)? Subsequently, this 1 A current is switched off and drops linearly from 1 A to 0 within 1µs. How much voltage is created by shutting off this current? Explain how the electronics is protected from this voltage spike.



Q8 H-bridge

On the DRV8838 what is the difference between EN being low and nSLEEP being low? In both cases the motor does not spin.

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