DC Motor and Fan

Objective: SWBAT create a small fan using a DC motor and an Arduino board.

Materials:

- Arduino Board
- Breadboard
- DC Motor and Fan
- Transistor
- Diode
- 2.2k Ohm Resistor
- Jumper Wires
- USB Cable
- Computer with Arduino Software Installed
- Goggles

Preparation:

- Ensure that you have a computer with the Arduino software downloaded. See the 'Introduction to Arduino' section (pages 28-29) for more information on how to do this.
- Review safety procedures with students before beginning this activity.

What to do:

1) **Attach Power and Ground Cables:** Connect jumper wire from the 5V power port on the Arduino to the first peg in the positive section of the breadboard. Connect jumper wire from the ground port on the Arduino to the first peg in the negative section of the breadboard.
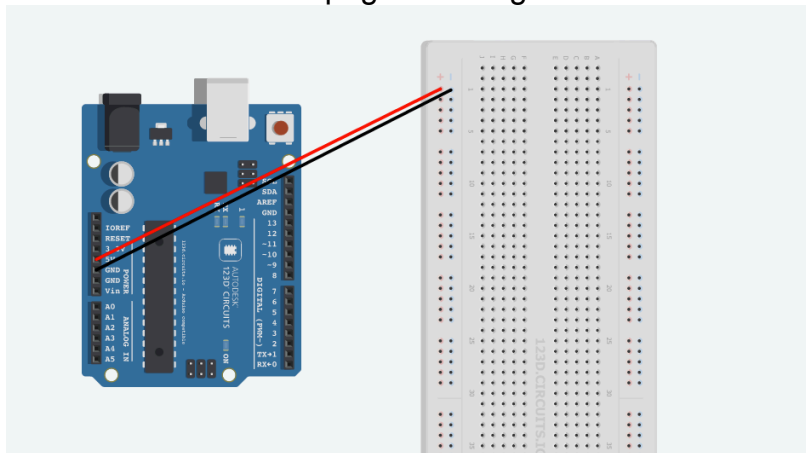

2) **Place Diode:** Connect a wire from the negative column of your breadboard to the corresponding interior row. After that, place one end of the diode in that same row and the other end 4 rows below (still in the same column), as shown below.
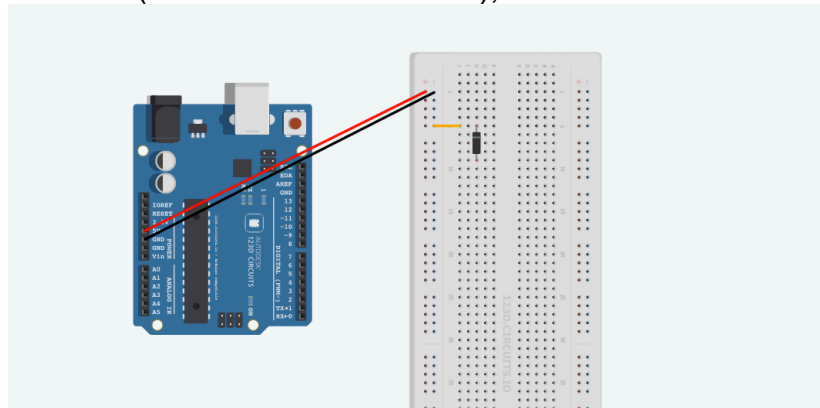

Note: Make sure you place the diode with the grey stripe facing towards the wire. If you turn the diode around, it will short the circuit.

3) **Place Transistor:** Connect the transistor as shown below. In the hole directly to the right of the lower leg of the transistor, place a wire. Connect the other end of the wire into the positive column of your breadboard.
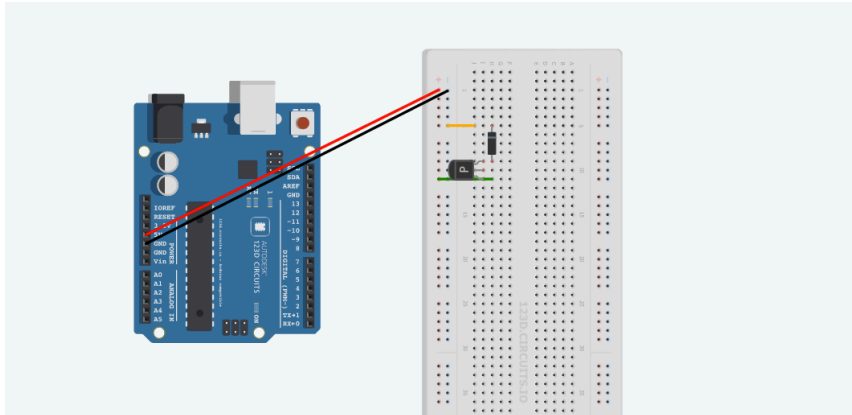

4) **Place Resistor:** Finally, place your resistor. Place the first leg in the same row as the middle leg of your transistor. Place the other leg of your resistor in the same column, but 5 rows down. Finally, place a wire in the same row as the lower leg of your resistor and connect the other end to port 9 of your Arduino.
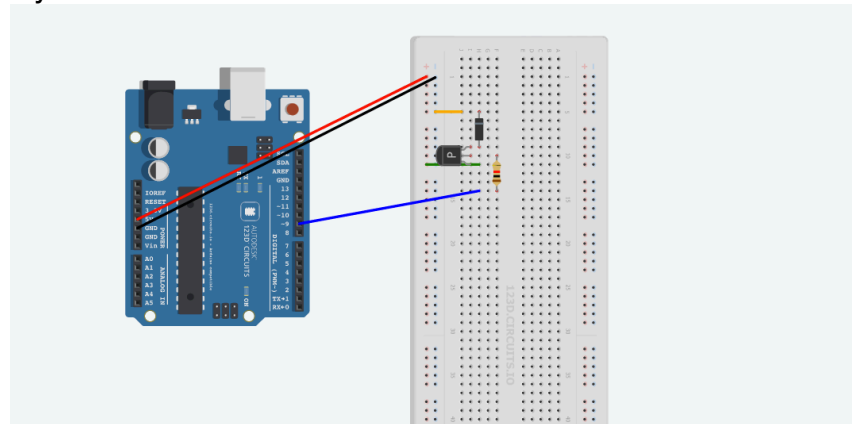
5) **Connect Wires to DC Motor:** Connect one red and one black wire to the two metal clips coming off of your DC motor (one to each clip).

6) **Place DC Motor:** Connect the wires from the DC motor as shown below, placing each wire in the holes directly to the right of your diode.
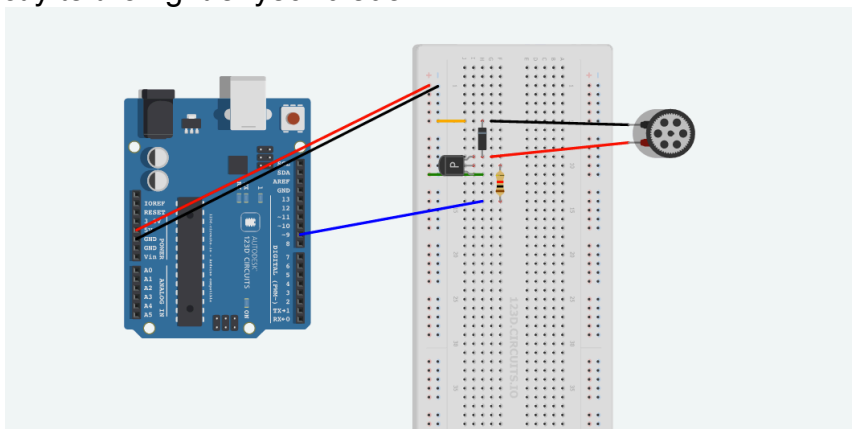
7) **Attach Fan Blade (Optional):** To make it easier to see when the motor is moving, slide the fan blade that comes in your kits over the DC motor.

8) **Upload the Code:** Connect your Arduino board to your computer and upload the following code to your device. See the 'Introduction to the Arduino' section (pages 28-29(for more

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information on how to do this. (This code is also contained on the flash drive included in your kit.)

```
int motorPin = 9;
void setup() {

pinMode(motorPin, OUTPUT);
}
void loop() {
  digitalWrite(motorPin, HIGH);
  delay(1000);
  digitalWrite(motorPin, LOW);
  delay(1000);
}
```

9) **Observe your Finished Project:** Once the code is uploaded you should see the motor run for a second and then stop for a second, repeatedly!

Is the fan not spinning?
-Make sure that you are using pin number 9.
-Check that your diode is facing the correct way, with the grey band facing the 5v connection.
-Check the connections on the breadboard. If the jump wires or components are not connected using the correct rows in the breadboard, they will not work.

Extra Challenge: Try reversing the connections to the motor. What happens?