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ARDUINO CURRENT SENSOR DC 20A

To measure DC current up to 20A using an Arduino, you can use a current sensor module like the **ACS712** (though it's typically rated for up to 20A, it's better to use a sensor specifically designed for higher currents, such as the **ACS723** or **INA219**). Below is a guide on how to use the ACS712 20A current sensor with an Arduino.

Components Needed:

1. **Arduino Uno** (or any compatible board)
 2. **ACS712 20A Current Sensor Module**
 3. **Load** (e.g., a motor, LED strip, or any device drawing up to 20A)
 4. **Power Supply** (to power the load)
 5. **Jumper Wires**
 6. **Breadboard** (optional)
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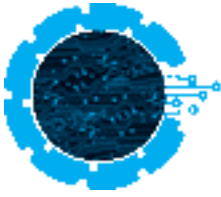
Wiring Diagram:

1. **VCC** of ACS712 → **5V** on Arduino
 2. **GND** of ACS712 → **GND** on Arduino
 3. **OUT** of ACS712 → **Analog Pin A0** on Arduino
 4. Connect the **load** in series with the ACS712 sensor (the current flows through the sensor).
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Code Example:

```
cpp
Copy
const int currentPin = A0; // Connect the ACS712 OUT pin to A0
float sensitivity = 0.100; // Sensitivity for ACS712 20A is 100mV/A
float offsetVoltage = 2.5; // ACS712 output is 2.5V at 0A
float current = 0;

void setup() {
  Serial.begin(9600); // Initialize serial communication
```



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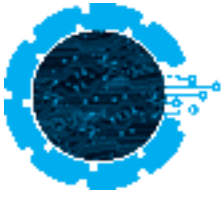
```
}  
  
void loop() {  
  int rawValue = analogRead(currentPin); // Read the analog value  
  float voltage = (rawValue / 1023.0) * 5.0; // Convert to voltage (0-5V)  
  current = (voltage - offsetVoltage) / sensitivity; // Calculate current  
  
  Serial.print("Current: ");  
  Serial.print(current, 3); // Print current with 3 decimal places  
  Serial.println(" A");  
  
  delay(500); // Delay for stability  
}
```

Explanation:

1. **Sensitivity:** The ACS712 20A sensor outputs 100mV per ampere of current. For example, 2.5V corresponds to 0A, 2.6V corresponds to 1A, and so on.
2. **Offset Voltage:** At 0A, the sensor outputs 2.5V (half of the 5V supply).
3. **Analog Read:** The Arduino reads the voltage from the sensor and converts it to a digital value (0-1023).
4. **Current Calculation:** The current is calculated using the formula:
$$\text{Current (A)} = \frac{\text{Voltage (V)} - \text{Offset Voltage (2.5V)}}{\text{Sensitivity (0.1V/A)}}$$
$$\text{Current (A)} = \frac{\text{Voltage (V)} - \text{Offset Voltage (2.5V)}}{0.1}$$

Notes:

- Ensure the power supply and load are compatible with the sensor's current rating (up to 20A).
- For higher accuracy, calibrate the sensor by measuring a known current and adjusting the offset voltage.
- If you need to measure currents higher than 20A, consider using a shunt resistor with an amplifier or a dedicated high-current sensor like the **INA219**.



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Safety Tips:

- Double-check your wiring to avoid short circuits.
- Use appropriate wire gauges for high currents (e.g., 12 AWG for 20A).
- Avoid exceeding the sensor's maximum current rating to prevent damage.

