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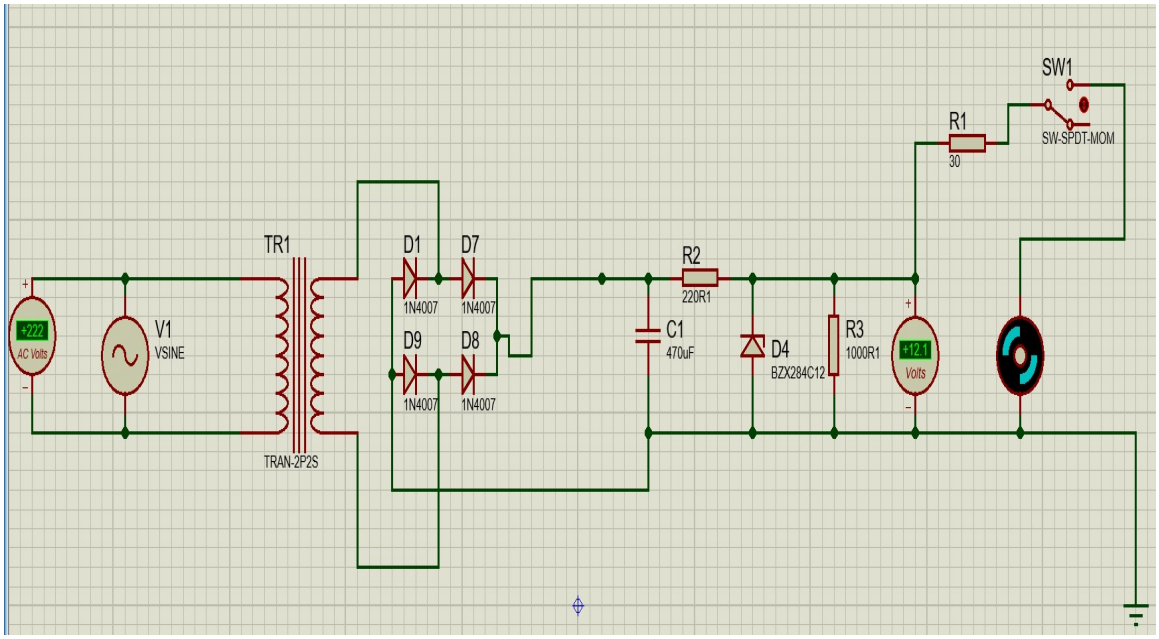
hardware report of task 3

task3.1



At first:

we used step down transformer to step down the voltage from 220v(Rms) to 24v(Rms) then we convert ac to dc by using rectifer to make the current in one direction.the capacitor charge and discharge very quickly to minimize ripples.the regulator is responsible for making the voltage fixed at 12v.

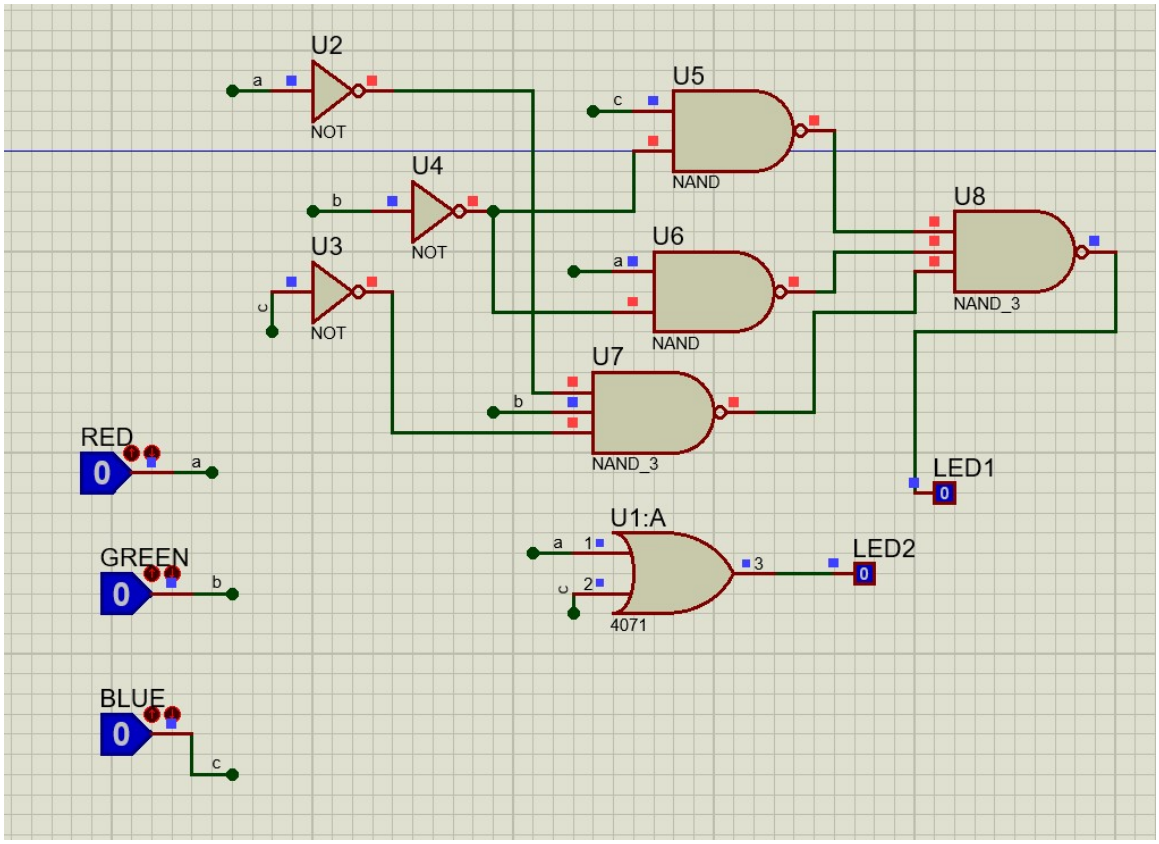
then:

we used the fixed dc voltage to open and close a door by using a switch(single pole double throw).the door is represented by the dc motor.

note : I used the same switch to open and close the door.

task3.2

communication system by logic gates



We have 3 inputs represnted by logic states.

we have two outputs represnted by logic probes

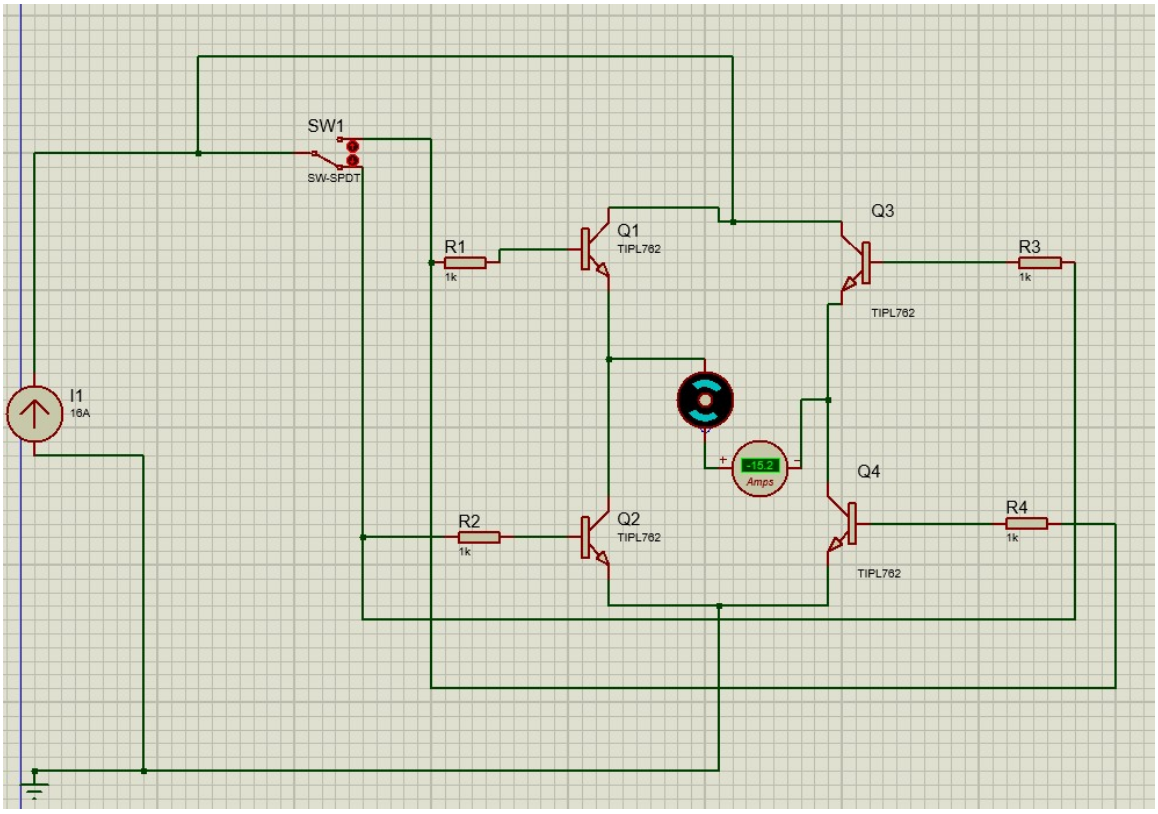
I have used truth table and minimize the expression by karnaugh maps.

task3.3

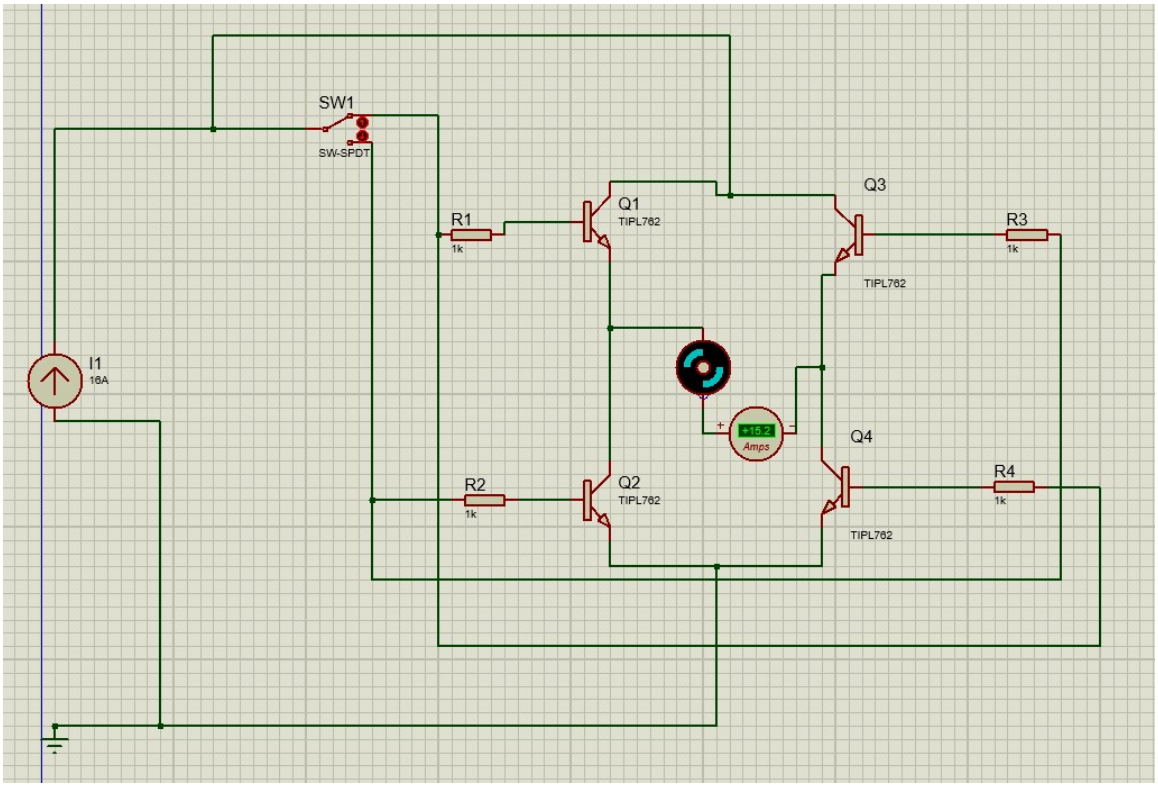
control the direction of motor

first case:

negative direction:



positive direction:

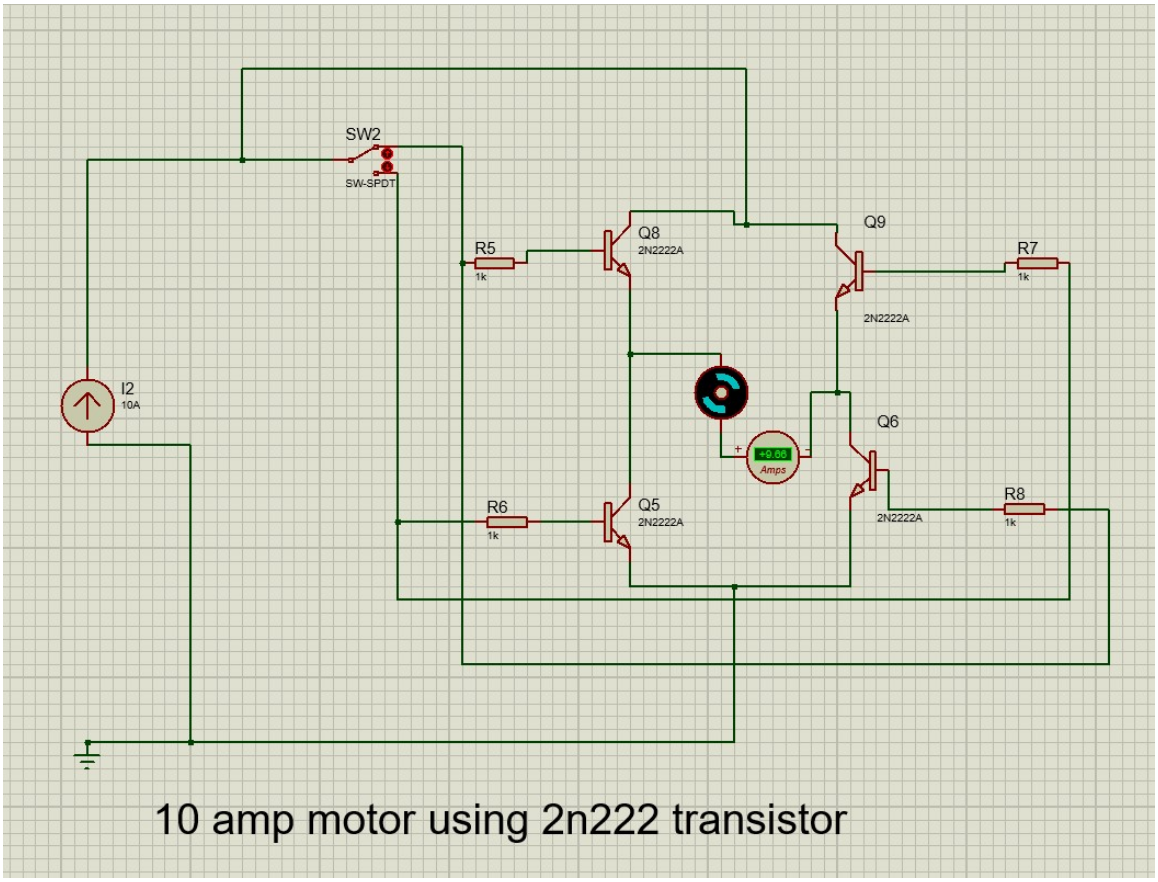


Q1: there are many types of transistors that can handle high currents(15A) like: IRL mosfet power transistor that can carry till 86A.

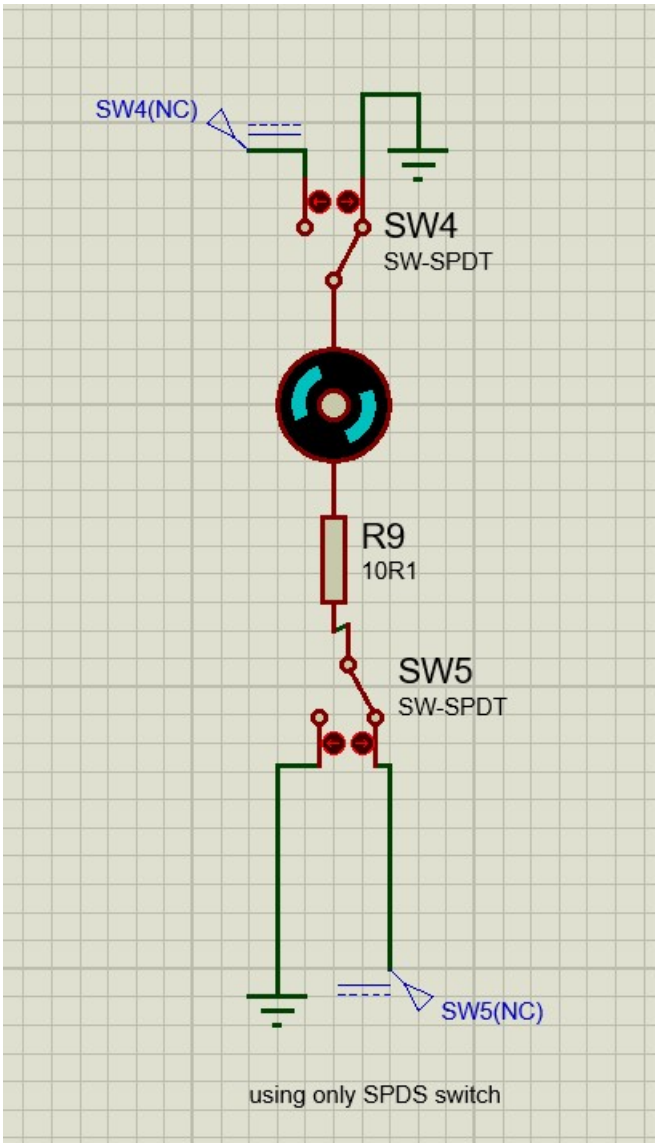
I have used TIPL762 Bipolar transistor as it is used for high power applications (it is able to carry till 120watt)

Q2: when the motor current is reduced to 10A,we can use different types of transistors or switches that can stand with this current.

for example, we can use 2N2222 Bipolar junction transistor



we can also use only two switches (single pole double throw) as following and the circuit will work.



task3.4

Kinds of batteries:

suitable specifications for battery:

Energy density: high

cost: cheap

total voltage: medium (3-12v)

weight: light

non-rechargeable

portable

types we can use:

1-alkaline and carbon zinc batteries:

the most common type of single use battery-cheap-commonly used in cameras and portable electronics

2-lithium batteries(nom lithium ion battery):

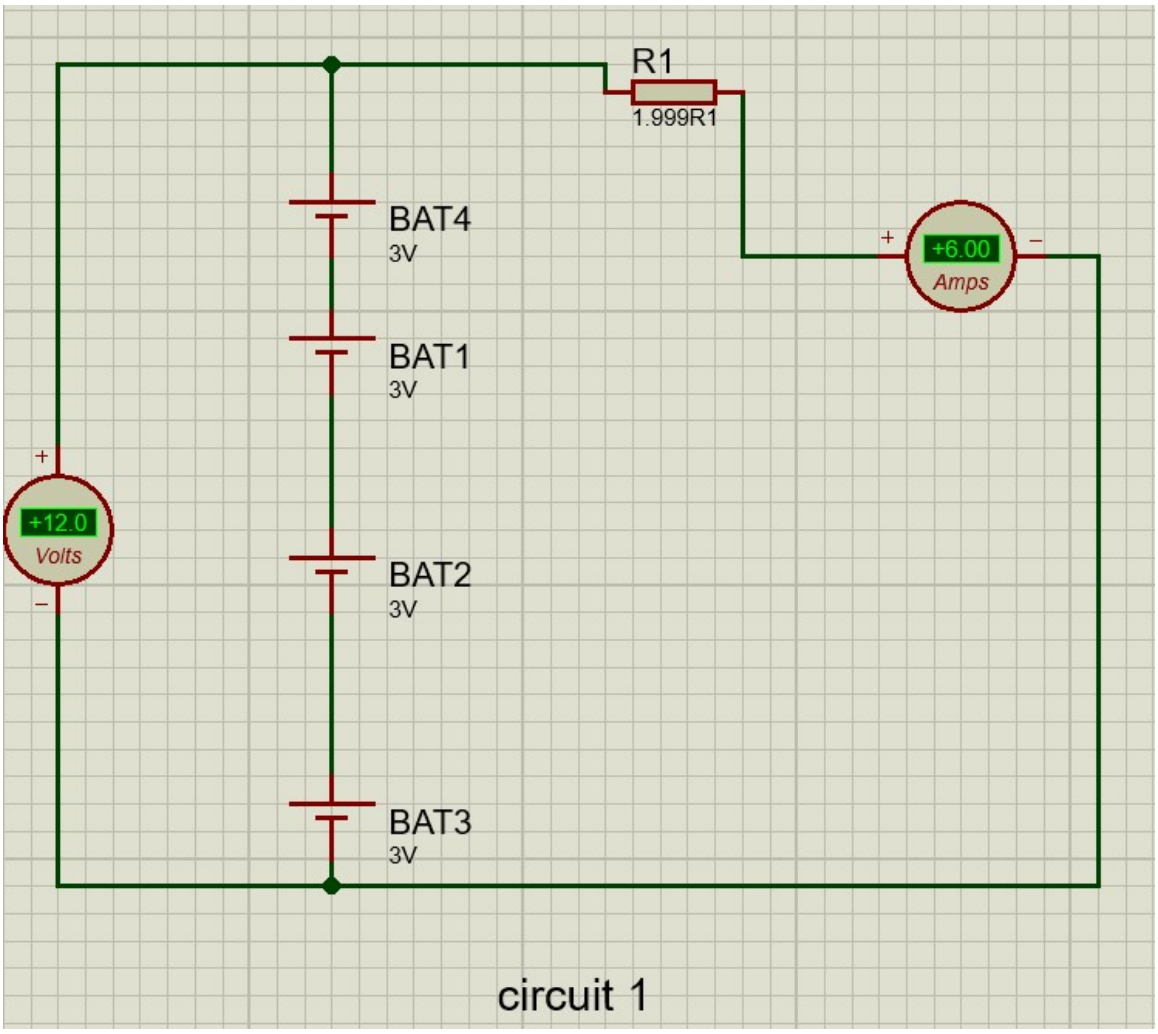
standard sizes and custom sizes too-used in small and large portable electronic

3-silver oxide batteries:

small button cells-high voltage

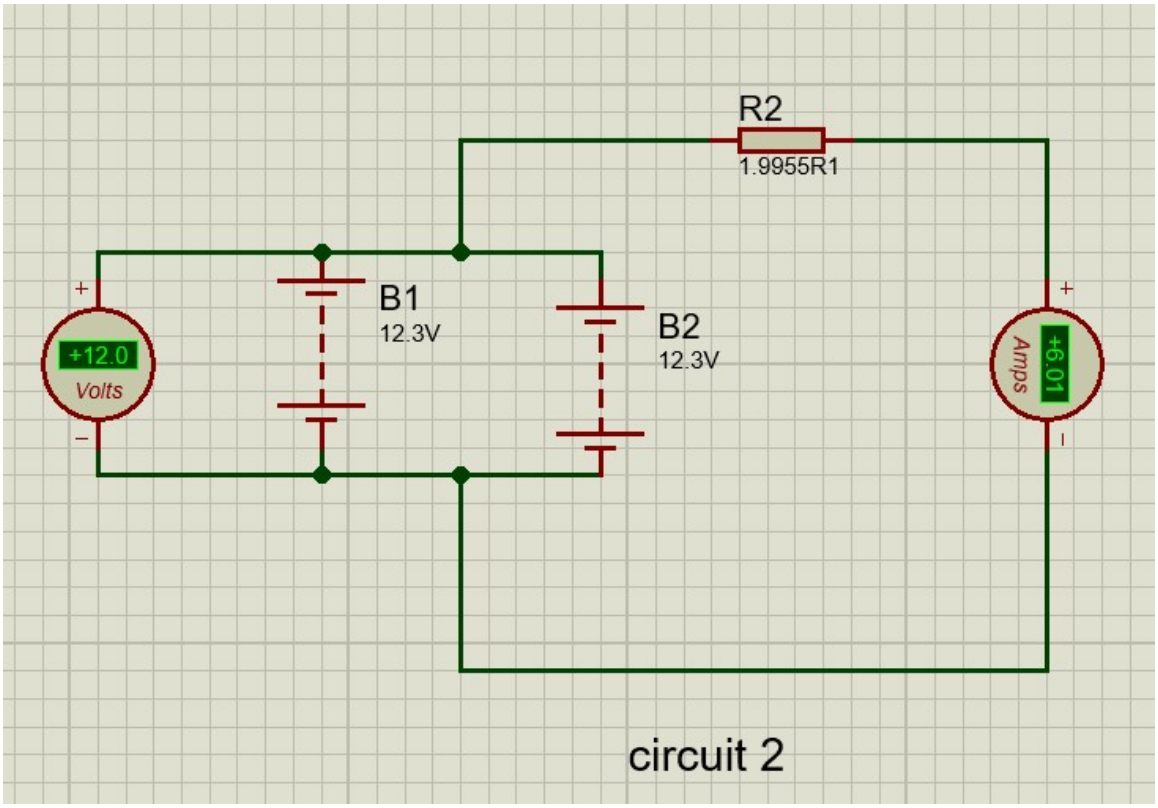
The connection of batteries:

1-In series



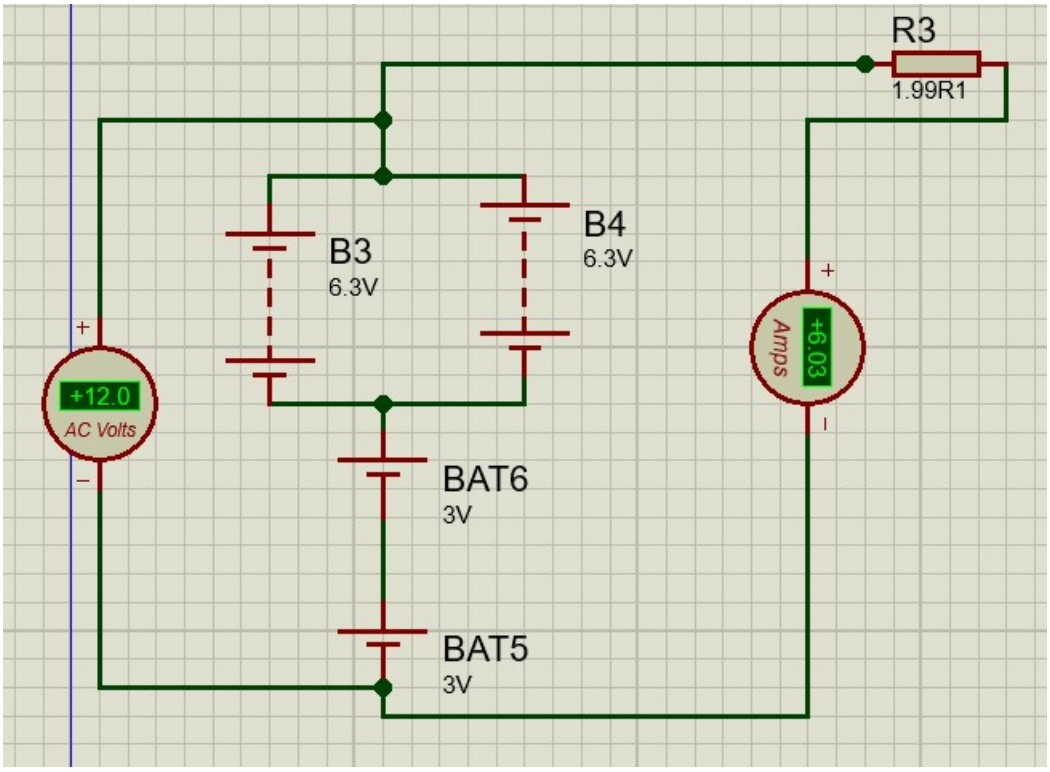
I have used 4 cells(each is 3 volt) in series with a resistance (2ohm).

2-In parallel



I have used two batteries(each is 12v) with a resistant(2ohm) to limit the current to 6A.

3-series and parallel


R3
1.99R1
B3
6.3V
B4
6.3V
+12.0
AC Volts
+6.03
Amps
BAT6
3V
BAT5
3V