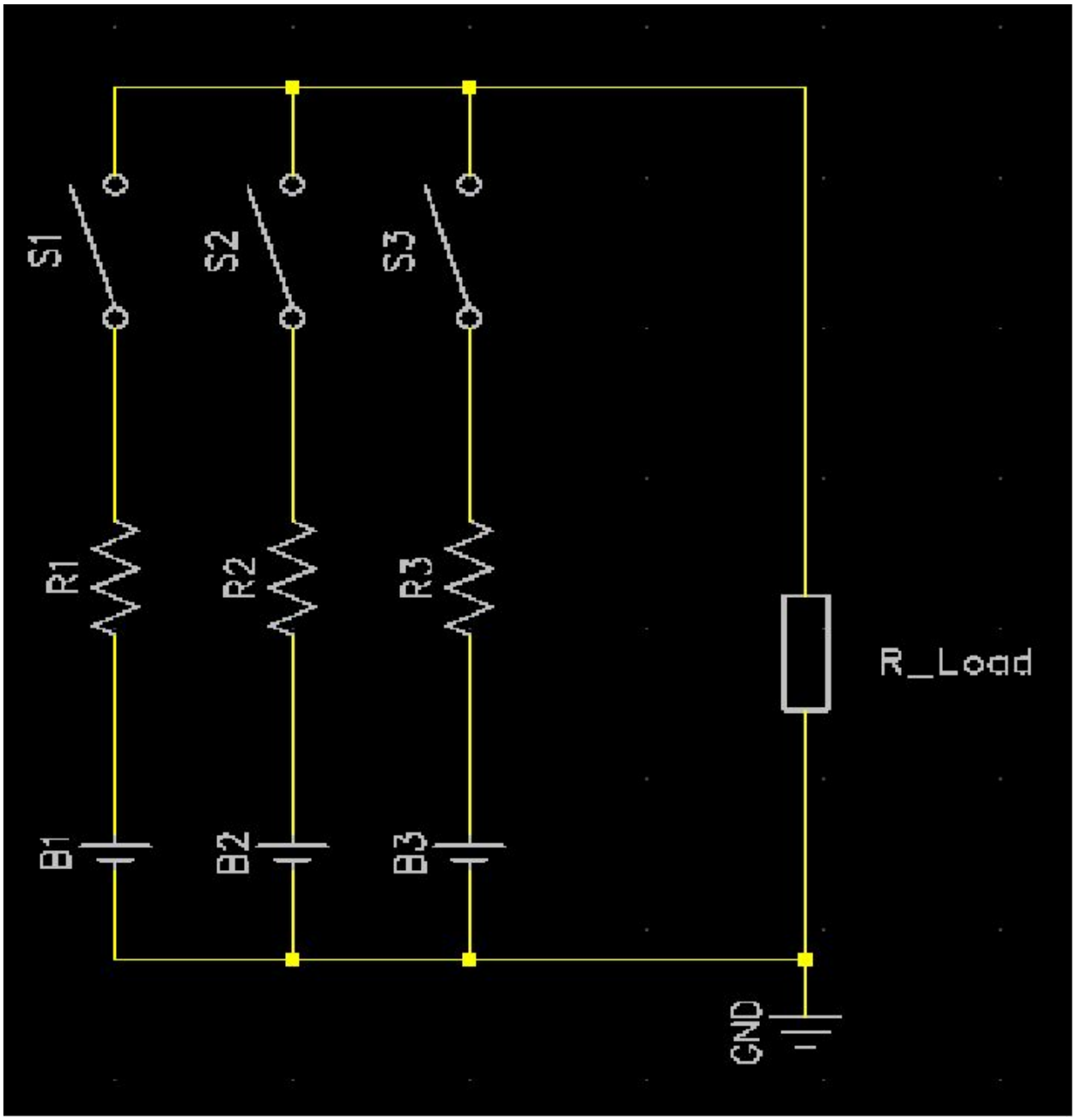
Gram Power (India) Pvt. Ltd.

Programming Assignment

Assumptions and Algorithm



Assumptions

While creating this code, following assumptions were done -

1. Battery Capacity - To calculate **total discharging time** for discharging curve, battery capacity is required in Ah or mAh or Wh. I used battery capacity in Wh because this is true capacity which does not ignores voltage change.

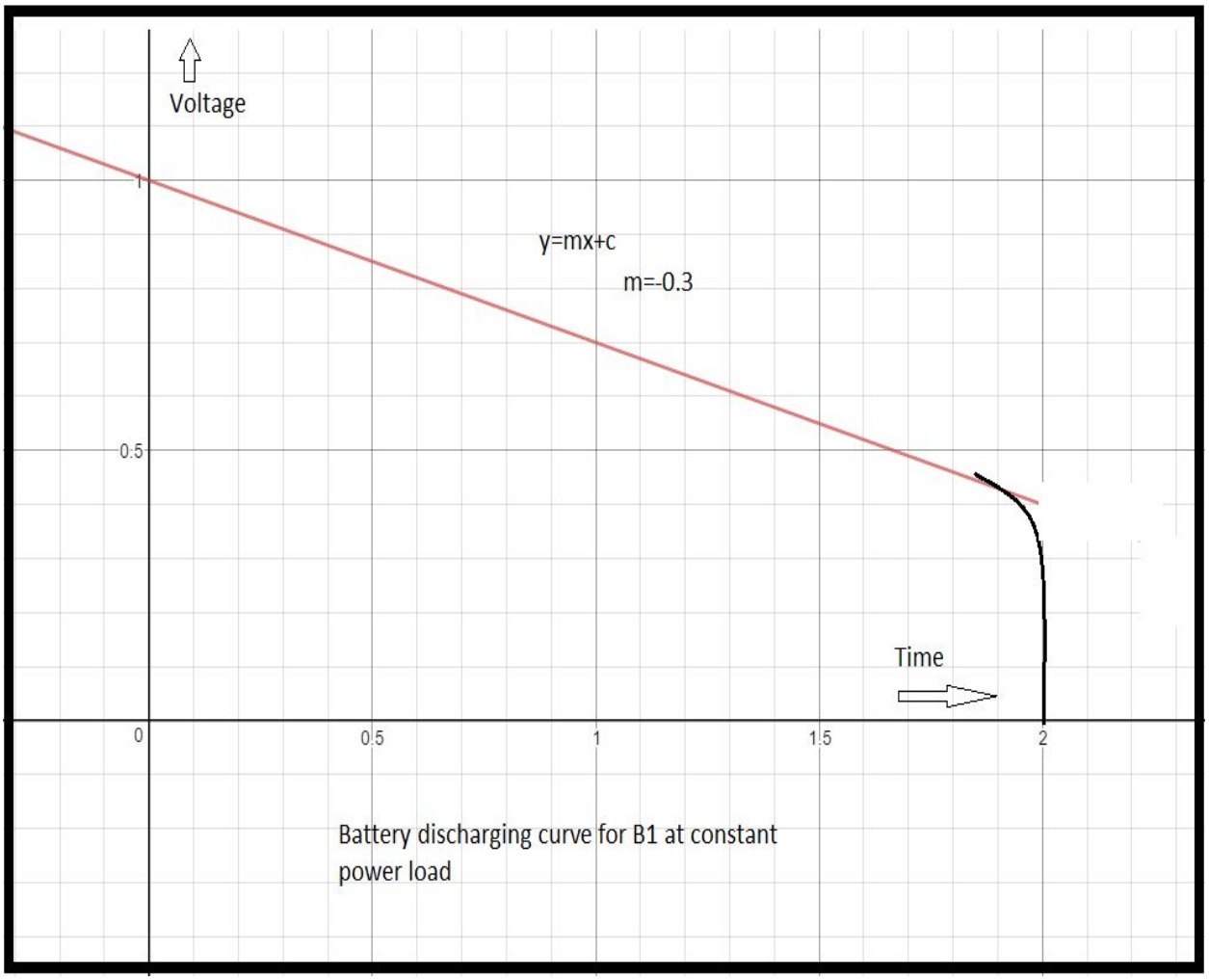
   Total Discharging time(h) = Battery capacity(Wh) / Load Value(W)

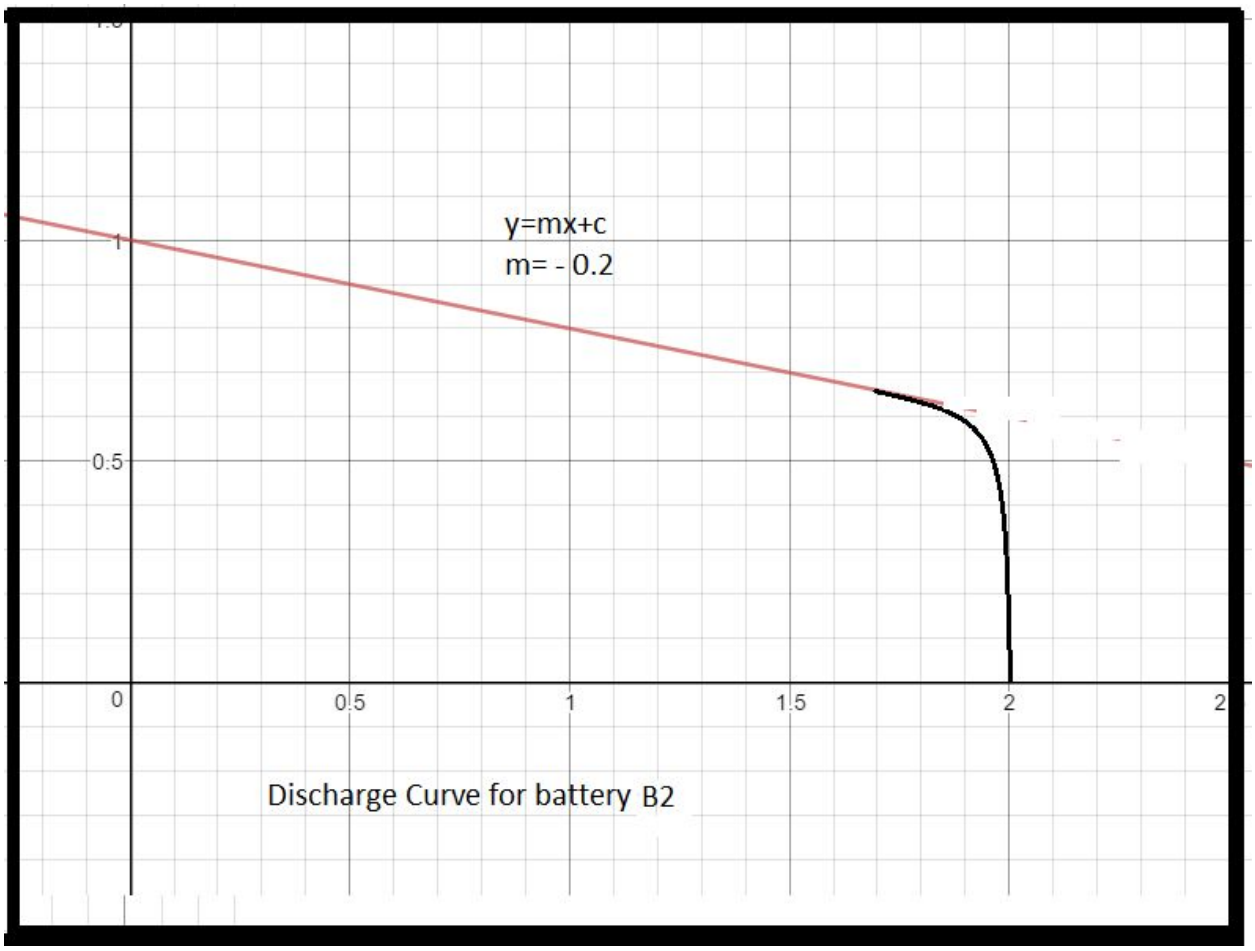
   Here I assumed battery capacity as 50 Watt*Hour for all batteries. Now, as we can see that assumed battery capacity and connected load is same for all three batteries so Total Discharging time(h) will also be same irrespective of voltage and current deviation.

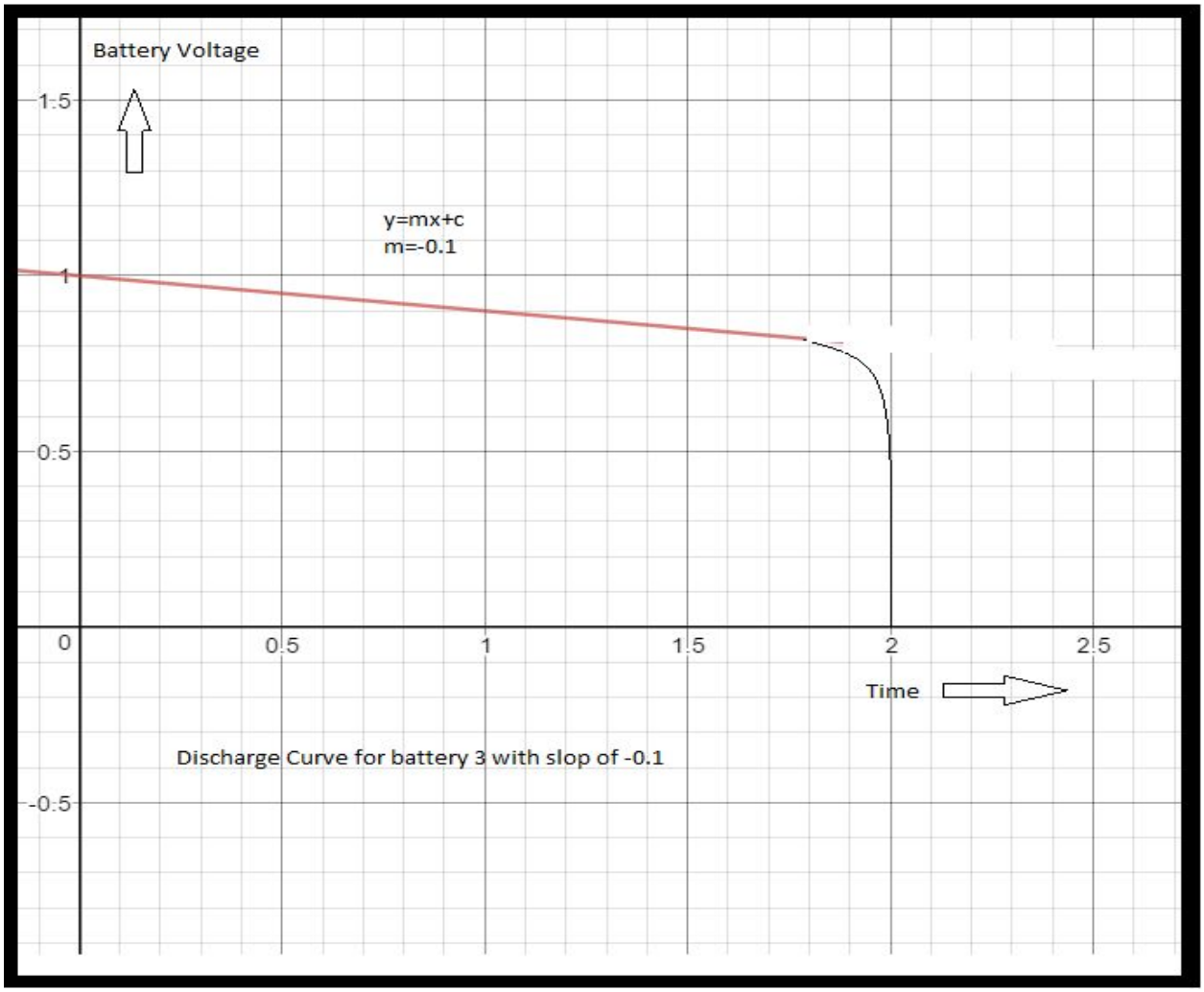
2. R_load in problem statement is considered as load with SI unit in Watt (Not resistance) because when we increase resistance according to Ohm's Law current decreases. Load does not follow ohm's law. So when user will increase load in program, current drawn by battery will also increase.
3. R_load is assumed to consume constant power.
4. As batteries never discharges ideally, so different discharging curves were assumed in program as shown below -

   Here total discharging time is same for all

   Discharging slope m is -0.3 for B1, -0.2 for B2 , -0.1 for B3 .


Voltage
1
y=mx+c
m=-0.3
0.5
Time
0
0.5
1
1.5
2
Battery discharging curve for B1 at constant power load


y=mx+c
m= - 0.2
1
0.5
0
0.5
1
1.5
2
2
Discharge Curve for battery B2



Algorithm

{ We will firstly disconnect all batteries from circuit means S1,S2 and S3 are OFF. Then we will check highest voltage battery and connect that in circuit. This battery will start discharging and after some time voltage of that battery voltage will become equal to second highest volt battery. When these two batteries come to equal voltage than we will connect both battery in circuit. Now both battery will start discharging simultaneously till their voltage becomes different. **As we have different discharging curves so batteries will not discharge with equal voltage drop**. Similarly third battery come in circuit and

this switching will continue till batteries reaches 8V or current discharging time becomes equal to total discharging time.

Three threads will run parallel to process of main function and when Battery B1 gets connected in circuit this thread start changing battery parameters automatically based on slope of discharging curve.

Present Battery voltage = (slope)*(Discharging time)+ Initial battery voltage

Present Current sourced by battery = (Load in watt) / (Present Battery voltage)

}

Step 1: Start

Step 2: Create a 'structure' of **battery parameters** and create its three objects for three different batteries.

Battery Parameters are -

1. Initial Battery Voltage
2. Current Battery Voltage
3. Battery Current
4. Battery Resistance
5. Switch State - Switch to disconnect battery from circuit
6. Discharge Second - discharging time in seconds when battery is connected in circuit.

Step 3: Take input from user - Battery voltages, R1, R2, R3, R_load value and assign them to their respective variables.

Step 4: Check battery voltages received from user and find out greatest among them.

Step 5: Connect highest battery voltage in circuit. If any two voltages are same and highest then connect both corresponding batteries in circuit. These battery will start

discharging and after some time voltage of that battery voltage will become equal to second highest volt battery.

Step 6: Continuously check battery voltages and monitor highest voltage battery and operate S1, S2 and S3 accordingly. Repeat Step 5. This is how equal voltage could be achieved in all three batteries.

Step 7: Stop