**Assumptions:**

* Power can flow freely between nodes while neglecting heat loses and lines capacity
* Temperature of batteries are constant (Temperature control will be embedded later)
* Power can only be drawn from the main power source and it has a maximum capacity
* The power source is stable, no intermittency, can supply powers at any time as long its below the capacity
* The batteries are Li-ion batteries
* What else??????

The main objective of this project is to minimize aging of all batteries, specifically minimizing the sum of all capacity fades while the batteries are charging/discharging to accommodate energy demands. Expression to quantify the capacity loss was obtained from (source) and expressed as follows,

Therefore, the objective function here can be expressed as a minimization program of the sum of all capacity fades (Qloss) in each battery subject to the power charged or discharged (Pi) at time discrete point (k). Moreover, the capacity fade does also depend on temperature, but for the early stages of the project, temperature will be assumed constant. Later on, temperature control will be added to program by quantifying heat generated as we charge/discharge and then estimate the new temperatures by using a heat transfer model that depends on the heat generated.

The energy state of the battery at time k can be expressed as follows,

Where (Pi) is the power charged or discharged for a duration of (delta t), (pi) can be calculated by balancing the power around each node i

Where (di) is the demand at node i

Moreover, the power supplied from the power source cannot exceed its capacity and nonnegative

The energy state of battery i cannot be below or above its minimum and maximum values,

And the power charged or discharged cannot exceeds its minimum and maximum charge rates, i.e minimum and maximum C-rates.