Graph theory approach for Modeling Electrical Circuits

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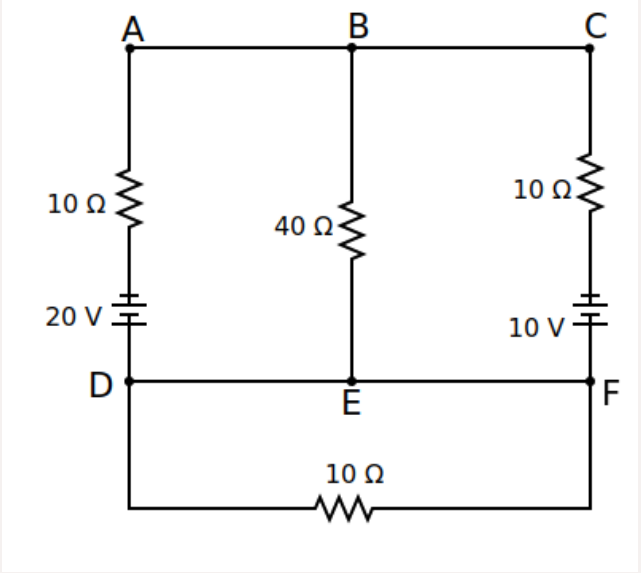
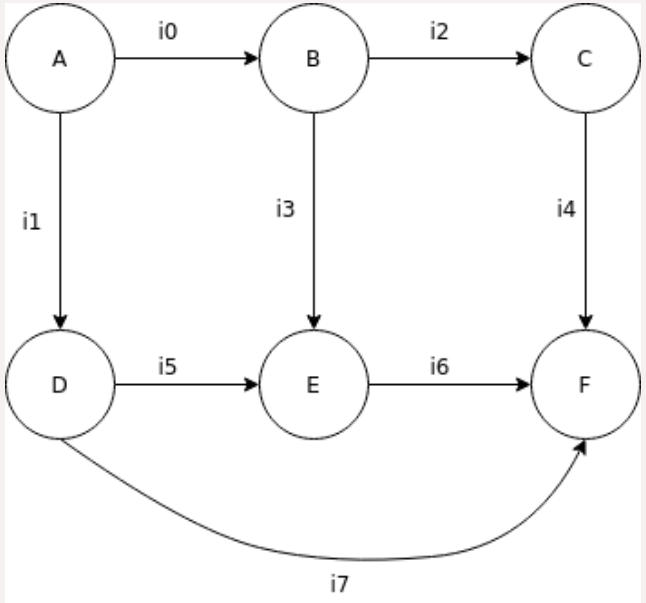
What this project is about?

- The project goal is developing python library helping developers solving. circuits, its not about developing an app.
- Assuming a circuit as a graph we try to find the circuit answer.



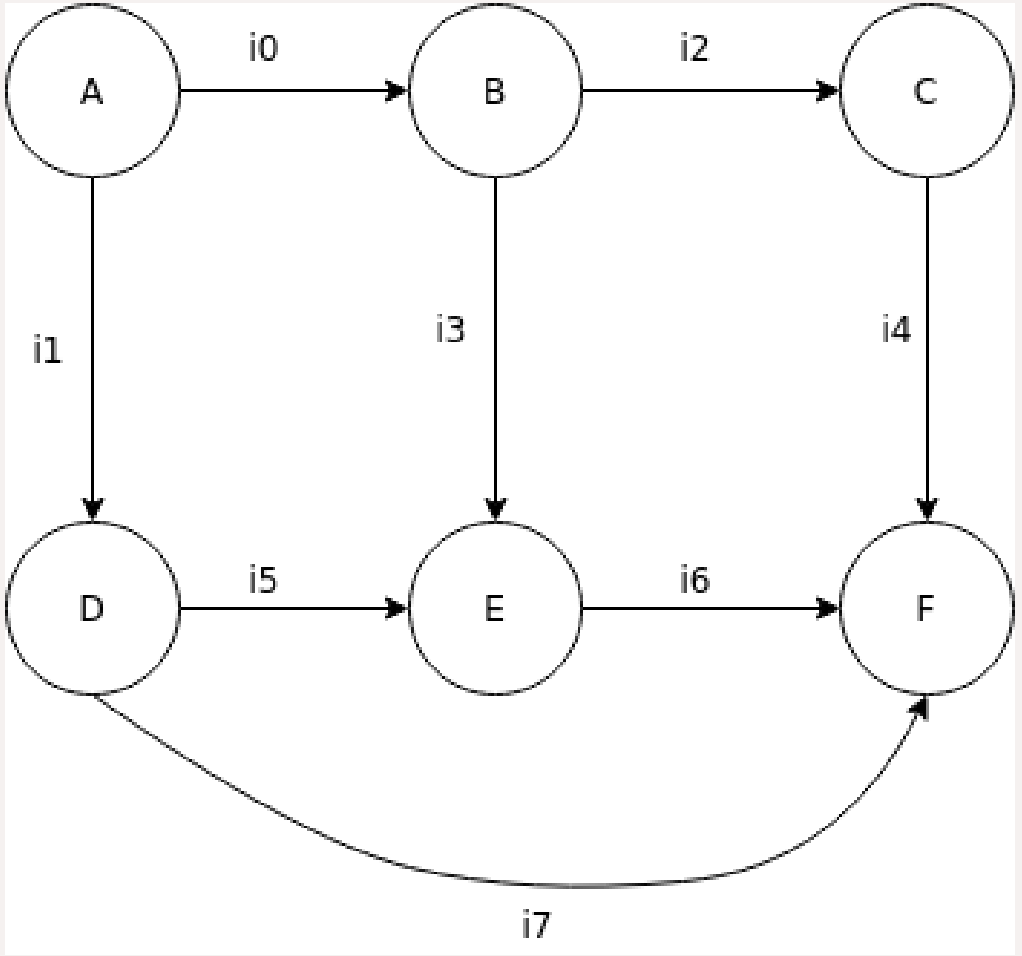


How??

- We got to apply kirchoff rules to our model.
- Each cycle in kirchoff graph give us a kvl.
- Each node in kirchoff graph give us a kcl.
- Many of these rules are not algebraically independent weve got to find algebraically independent rules.

Finding kvl independent rules

- Only simple cycles give us an kvl independent rule.
- For example ABEDA is a simple cycle but ABCFEDA is not.



Finding kcl independent rules

- By having n nodes in kirchoff graph n-1 of them give us independent rules but the node number n is dependent to them.

Then...

Then by finding all kirchoff rules we convert them to matrix form and simply solve it.

How about circuits with capacitor and inductor?

- In these circuit the system of algebric equation became a system of differential equation(a matrix differential equation).
- It means that the current in each edges change with time
- We solve matrix differential equations using numerical analysis