

# Measurement of SOC, SOH, Impulse Measurements of Super Capacitors

## Bachelor thesis project



Figure 1 Maxwell super capacitor bank ( [www.amazon.com](http://www.amazon.com) )

### Summary:

The aim of this thesis is to model and characterize supercapacitors (SC) for determining SOC, SOH and perform impulse measurements for characterization of supercaps. It is important to also look at rapid and accurate measurements and hence an overview of several measurements techniques and its comparison is important.

### Problem definition:

Super capacitors are important as an additional option for high power density and energy storage including peak shaving in different applications including hybrid energy storage (coexistence of battery- super capacitor) solutions. There is a lack of standards for multiparameter equivalent circuits of SC. This thesis will look into performing SOC, SOH and characterization of supercapacitors/ultracapacitors/ EDLC with a view to perform fast and accurate characterization.

### Method:

1. Perform a literature survey on different electrochemical parameters of super capacitors
2. Model, develop ECMs using EIS (Electrochemical Impedance Spectroscopy) and characterize the capacitance, resistance, energy and power storage parameters including derived states (SOC, SOH) in SC
3. Perform a survey of measurement techniques (dc measurements, impulse measurements, EIS etc) and compare the various techniques in terms of different criteria speed, accuracy etc
4. Validate the performance measurements with measurements of the supercaps

### Courses and supervision:

This is a challenging, hands-on power electronics project. Background of EE and power electronics and understanding of electrochemical storage devices are considered mandatory.

---

### Contact:

Dr. Prasanth Venugopal (PE) [prasanth.venugopal@utwente.nl](mailto:prasanth.venugopal@utwente.nl), Prof. Gert Reitveld: [g.rietveld@utwente.nl](mailto:g.rietveld@utwente.nl), Prof. Thiago Batista Soeiro [t.batistasoeiro@utwente.nl](mailto:t.batistasoeiro@utwente.nl)

University of Twente.