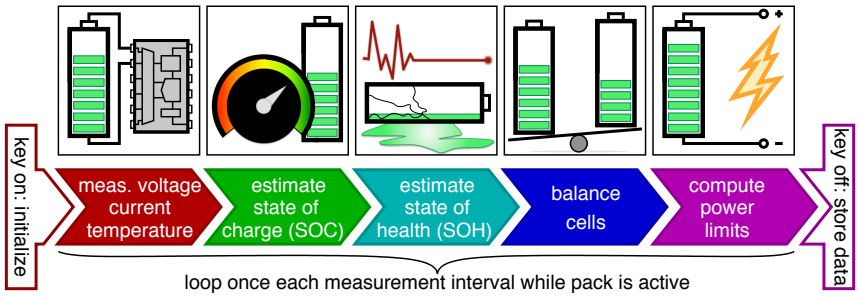
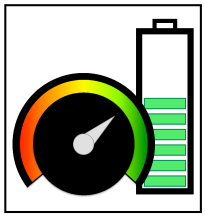
Welcome to the course!

- Welcome to ***Battery State of Charge (SOC) Estimation!***
- This course is the third in a specialization that investigates the proper management and control of battery packs, usually comprising many cells
- BMS must estimate nonmeasurable quantities that describe battery pack condition



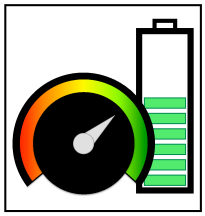
What topics will we study in this course?



In this course, you will learn:

- Preparatory definitions, math concepts
- How to derive the steps of the linear Kalman filter (KF)
- How to think about and implement the linear Kalman filter
- How to derive and implement the extended Kalman filter (EKF)
- How to derive and implement the sigma-point Kalman filter (a.k.a., unscented Kalman filter, SPKF/UKF)
- How to solve real-world issues via information provided by Kalman filter (honors)

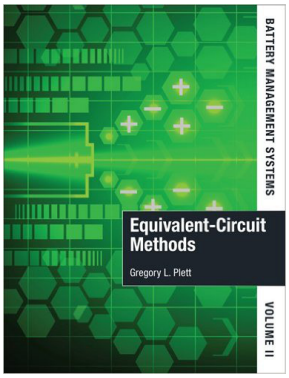
What skills will you gain in this course?



After completing the course, you'll be able to:

- Implement simple voltage- and current-based SOC estimators and understand their limitations
- Explain purpose of each sequential-probabilistic-inference step
- Execute provided Octave script for linear KF, evaluate results
- Execute provided Octave script for SOC estimation using EKF on lab-test data, evaluate results
- Execute provided Octave script for SOC estimation using SPKF on lab-test data, evaluate results
- Implement method to detect and discard faulty voltage-sensor measurements (honors)

Prerequisites; for further study



Prerequisites:

- Course 1: ***Intro. to Battery Management Systems***
  - Basic background in BMS requirements, sensing
- Course 2: ***Equivalent Circuit Cell Model Simulation***
  - Specific background in ESC cell model
- Probability theory (esp. Gaussian random variables)

Resource:

- We'll study Ch. 3 of *Battery Management Systems, Vol. 2, Equivalent-Circuit Methods*, Artech House
- For further study, you can confer this optional resource