# Lead Acid Battery Charger

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## 1 Introduction

Each battery has their own charging profile. In order to maintain a healthy battery, this charging profile should be followed correctly. Normally, this charging profile is comprised of constant current charging followed by a constant voltage stage. In this project you must design a power source which can operate in both conditions.

## 2 Requirements/Outcomes

- Design a constant current source to charge a 12v Lead acid battery, with a maximum charging current of 1A
- Input voltage for the system should be 230v AC.
- System must be based on Pulse Width Modulation (PWM) technique.
- Design a suitable enclosure to enclose all the circuits in a safe and ergonomic manner.
- Follow provided "General guidelines".
- Lead acid battery charging:-
  - https://batteryuniversity.com/learn/article/charging_the_lead_acid_battery

## 3 Additional Notes

- Any change of project specification is negotiable only before the mid review
- All circuits must be simulated using software (e.g., Multisim, LTspice,PLECs)
- All circuits should be tested on the breadboard and reviewed by the assigned supervisor before moving further
- Circuits must be designed using professional EDA software (e.g., Altium Designer, OrCAD)

- Schematics should be verified and evaluated by the assigned supervisor
- Design for manufacturability should be considered when designing the PCB
- Complete set of design and manufacturing documents
  - Schematics, Layout, 3D file
  - Gerber files, Assembly files
  - BoM

  must be generated and properly documented.
- Students are encouraged to procure components from international component distributors (e.g., Mouser, DigiKey, Arrow Electronics, LCSC)
- Students are encouraged to get the PCBs manufactured from international PCB manufacturers (e.g., JLCPCB, PCBway)
- Main functionality of the project must be achieved with basic electronic components such as resistors, capacitors, inductors, diodes, transistors and other analog integrated circuits.
- Using any other pre-built programmable ICs are prohibited.
- Microcontrollers can be only used for user interface operation.
- Enclosure design must be done using a professional software (e.g., Solidworks)
- Enclosure and 3D model of the circuit must be assembled and inspected before manufacturing.
- 3D printing, Laser cutting and Sheet metal bending can be used to manufacture the enclosure.
- Students are encouraged to consider the 3D model and PCB co-design (design in parallel by taking their integration into consideration) when designing.
- Final implementation of the project need to done in a PCB.
- Follow provided "General guidelines".