

## ABSTRACT

The working principle of an on-grid photovoltaic system is where the electricity network in a home connected to the PLN electricity network is combined with a power plant that uses photovoltaics. The power obtained from photovoltaic itself can still be maximized by using the maximum power point tracking method to help with the problem of limited time to obtain photovoltaic energy. Also storage of electrical energy in batteries can be done to overcome the limited time to obtain photovoltaic energy. However, overcharging and using the battery can reduce the battery usage time (SoH). Therefore it is necessary to monitor battery capacity (SoC) to avoid overuse which can speed up damage to the battery.

In this final project the author implements a tool that can maximize the efficiency of battery charging using a solar charge controller. Use the maximum power point tracking algorithm to measure the optimal photovoltaic work point and apply it to a buck converter output voltage to maximize photovoltaic output power efficiency, and also protect the battery from overcharging and emptying by estimating the battery's state of charge (SoC) capacity using the open circuit voltage (OCV) method.

The results of this final project are buck converter using 100 Wp photovoltaic MPPT algorithm, and can estimate the state of charge of a 12V / 9Ah battery using the open circuit voltage (OCV) method.

**Keyword :** Photovoltaic on-grid system, solar charge controller, buck converter, battery state of charge, battery open circuit voltage