PORTABLE
PHOTOVOLTAIC POWER SUPPLY

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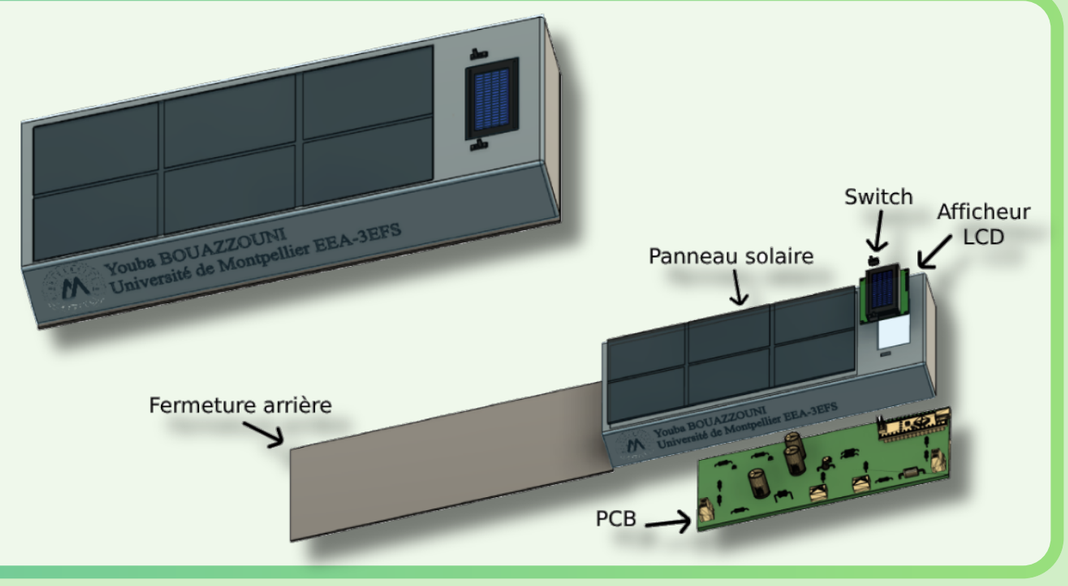
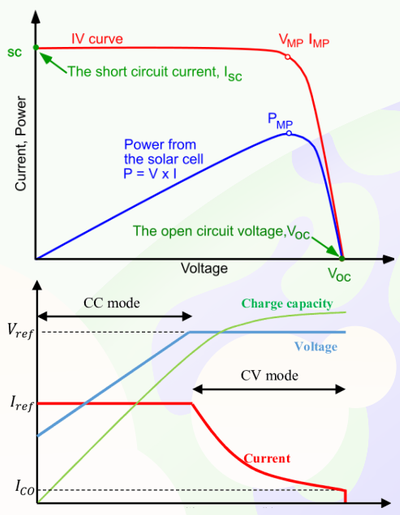
INTRODUCTION

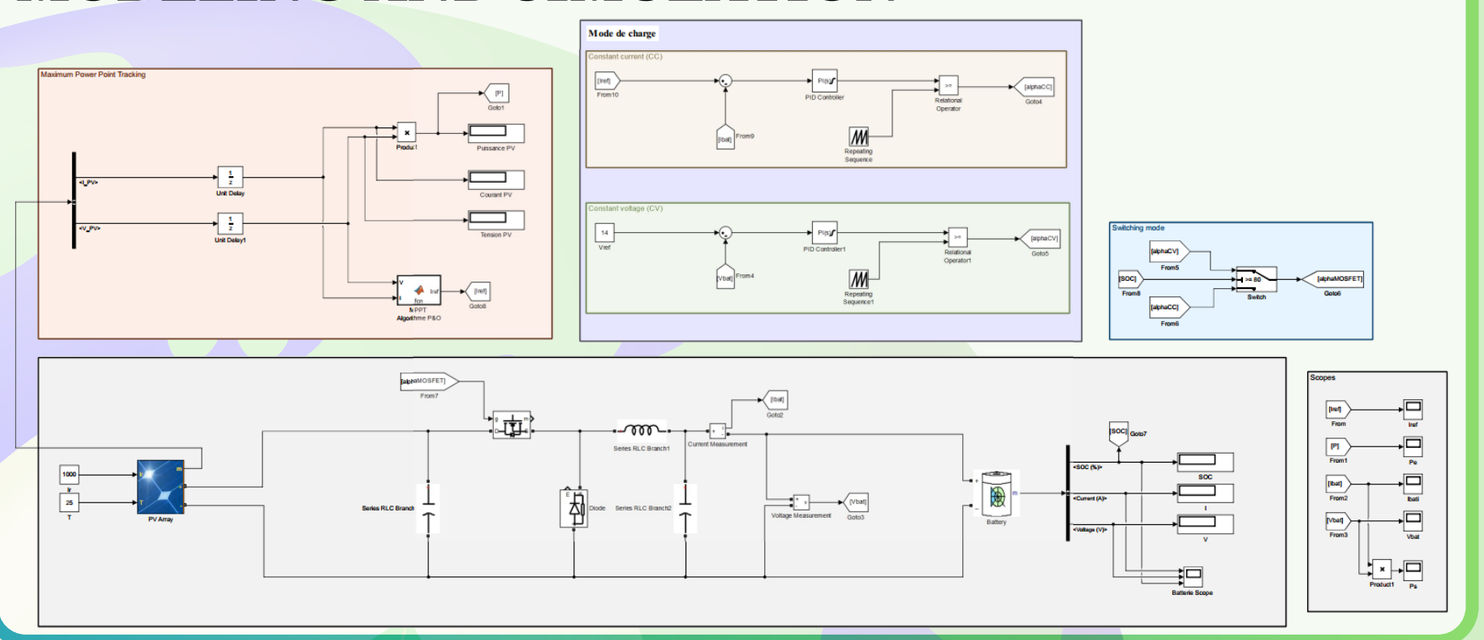
Desing and execution of a portable photovoltaic power supply, providing an effective and practical solution for battery charging utilizing solar energy. Engineered with Maximum Power Point Tracking (MPPT) integration, the power supply aims to optimize energy conversion efficiency. Its compact and portable design renders it ideal for outdoor usage, facilitating diverse applications across different environments.



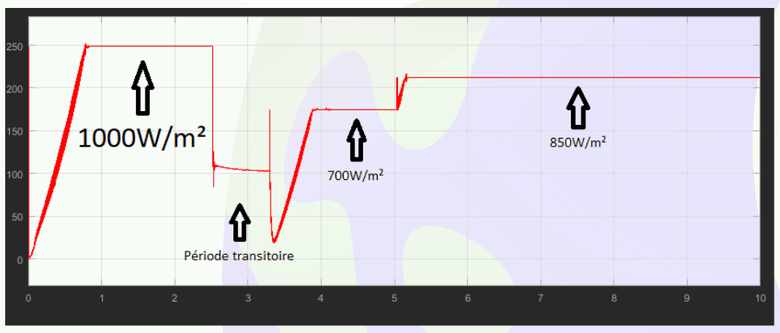
The main challenge in this project is to implement a Perturb and Observe (P&O) algorithm for Maximum Power Point Tracking (MPPT), while also managing battery charging with both Constant Current (CC) and Constant Voltage (CV) phases.



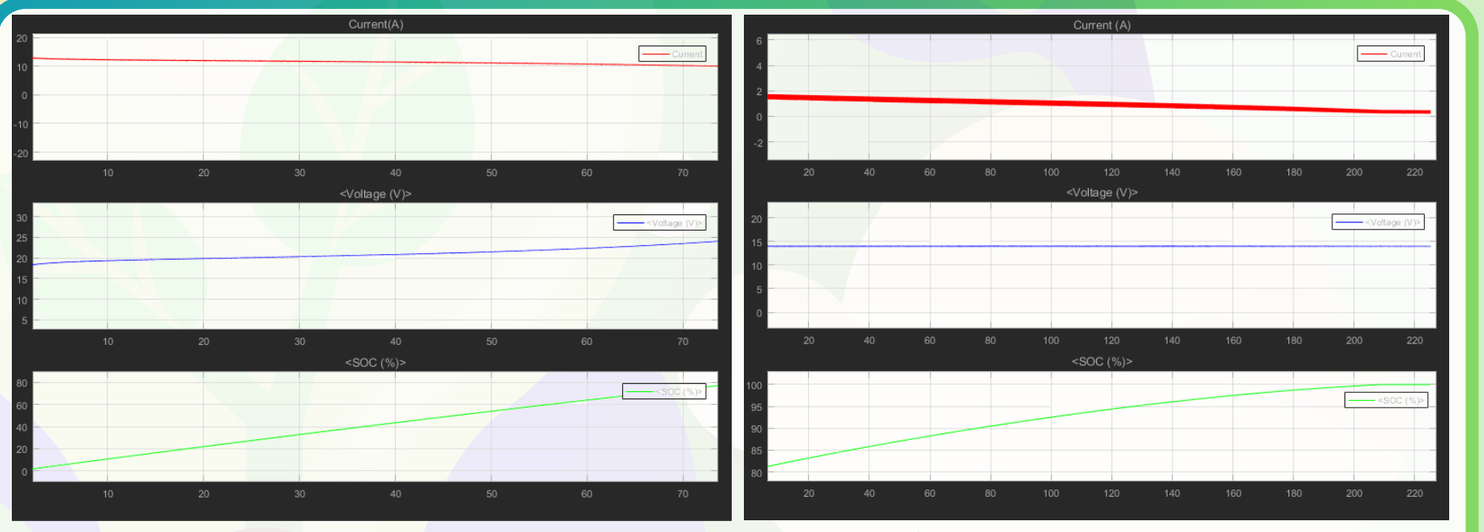
MODELING AND SIMULATION



RESULTS



In our experiments with a 250W panel, the algorithm consistently responds to irradiance changes, striving to optimize panel performance. This dynamic adjustment is evident in the algorithm's ability to maximize power output in varying sunlight conditions. Through iterative processes, it adeptly adapts to environmental shifts, ensuring efficient panel operation.



During the CC phase, a constant current (Red) is supplied to the battery while the voltage steadily increases.

CV phase, a constant voltage (blue) is applied to the battery while the charging current gradually diminishes to zero.

PROTOTYPE IMPLEMENTATION

The IR2104 integrated circuit is utilized for controlling the two MOSFETs, providing efficient gate driving capabilities. Meanwhile, the INA138 is employed for precise current measurement via a shunt resistor. Together, these components enable accurate monitoring and regulation of current flow, enhancing the effectiveness of both the MPPT algorithm and the battery charging phases.